

# ENRICHMENT PROGRAM REPORT

IMPLEMENTATION OF SSOP (SANITATION  
STANDARD OPERATING PROCEDURES) ON  
HYGIENIC TEMPE PRODUCTION AT RUMAH TEMPE  
PUSBATARA

STUDY PROGRAM  
**Food Science  
& Nutrition**

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**INTERNSHIP REPORT**  
**IMPLEMENTATION OF SSOP (SANITATION STANDARD**  
**OPERATING PROCEDURES) ON HYGIENIC tempe PRODUCTION AT**  
**RUMAH TEMPE PUSBATARA**

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Submitted to

i3L – Indonesia International Institute for Life Sciences  
School of Life Sciences

in partial fulfillment of the enrichment program for the Bachelor of Science in  
Food Science and Nutrition

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Jakarta, Indonesia  
2022

# CERTIFICATE OF APPROVAL



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## Certificate of Approval

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*IMPLEMENTATION OF SSOP (SANITATION STANDARD OPERATING PROCEDURE) ON HYGIENIC TEMPEH PRODUCTION AT RUMAH TEMPE PUSBATARA*

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## **ABSTRACT**

Tempe is one of the most popular foods in Indonesia, unfortunately, the production of tempe is mostly not sanitized. Sanitation Standard Operating Procedure (SSOP) is one of the crucial methods in implementing a sanitized way of production, and tempe production could use the method in order to achieve better shelf life and better quality of the product, and trust for the consumer. Rumah Tempe Pusbatara, a tempe factory located in Banten, already produced tempe in a sanitized way and already applied the SSOP. The data collection of SSOP parameters from the FDA guidelines was conducted from August 2022 - December 2022. The observation result for SSOP in Rumah Tempe Pusbatara is satisfactory. At the fulfillment percentage of 78.5%, there could be some improvements that could be made by the company to be more hygienic.

**Keywords:** *tempe, tempe production, Sanitized Standards Operating Procedures*

## ACKNOWLEDGEMENT

The author was very thankful to almighty God, for His grace, the author was able to finish the EP internship program from August 2022 to December 2022, and able to complete the report with the title of 'IMPLEMENTATION OF SSOP (SANITATION STANDARD OPERATING PROCEDURES) ON HYGIENIC TEMPE PRODUCTION AT RUMAH TEMPE PUSBATARA'. This internship report is on partial fulfillment of the enrichment program for the Bachelor of Science in Food Science and Nutrition program in the Indonesia International Institute for Life Sciences.

The author was grateful for the people that support, motivated, and contribute to the author during the internship report. The people author includes are:

1. Ms. Siti Muslimatun as HoD of the Food Science and Nutrition Department
2. Mr. Edwin Hadrian as internship project supervisor
3. Mr. Handy as the field supervisor
4. Author's parents, sibling, partner, and friends as mental support during the internship period

Here conclude the internship report, and the author realizes that the report is far from perfect, and the author is open to any critique and suggestions

Jakarta, December 20th, 2022



**Peter Furianto**

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## **LIST OF ABBREVIATIONS**

FDA	: United States' Food and Drug Administration
GMO	: Genetically Modified Organism
GMP	: Good Manufacturing Practice
HACCP	: Hazard Analysis and Critical Control Points
SNI	: Standar Nasional Indonesia (Indonesia's national standard)
SSOP	: Sanitation Standard Operating Procedures

## I. INTRODUCTION

### 1.1. Host Institution/Company



**Figure 1.** The logo of Pusbatara

Rumah Tempe Pusbatara is one of the businesses from Pusbatara (Pusat Budaya Alam Nusantara). Rumah Tempe Pusbatara began carrying out its operational activities in August 2021, thus it is still classified as a new industry. Meanwhile, the Pusbatara nature tourism development project is still ongoing at the same location. Currently, the nature tourism project is located on Jl. Parung Panjang KM 1, Cirarab Village, Legok District, Tangerang Regency, Banten 15820.

Dr. Drs. Susianto, MKM is an activist and practitioner vegan, another reason for the pioneering development of the Rumah Tempe Pusbatara is that he took the initiative to increase the production and distribution of tempe made hygienically for the people of Indonesia. This prompted Dr. Drs. Susianto, MKM to set up a tempe factory with the name Rumah Tempe Pusbatara, to raise awareness of the society about the importance of consuming tempe which is healthy, rich in nutrients, as well as high in protein and vitamin B12 which is especially needed by the vegan community in Indonesia. Not only that, Dr. Drs. Susianto, MKM also wants to develop a modern tempe industry that no longer produces tempe with traditional methods or techniques (manual) which until now are still considered lacking sanitation. Rumah Tempe Pusbatara is using modern, hygienic, and tempe-making methods with guaranteed sanitation and quality of the final product.

### 1.2. Vision and Mission

Pusbatara covers various business fields relating to the preservation of the natural environment. In running the company's business/operational activities, the vision of Pusbatara is to realize healthy, harmonious, and happy individuals, families, communities, and nations. For realizing the vision of the company that has been set, the mission of Pusbatara is as follows:

1. Invite people to appreciate the priceless value of their lives through moral and ethical education, as a basis for positive character development
2. Educate people to love nature and be in harmony with the environment
3. Conducting education and environmental preservation activities
4. Building a generation that is healthy, intelligent, and happy, who respects the glory of the life of all humans and living things, and is devoted to parents, society, nation, and country
5. Invite people to love the culture of the Nusantara, to embody harmony amid ethnic and cultural diversity, in line with the spirit of Bhinneka Tunggal Ika

### 1.3. Main Activity



**Figure 2.** Product of Rumah Tempe Pusbatara, Organic tempe

The main and only product so far marketed by Rumah Tempe Pusbatara is organic tempe which is packed in a modern and hygienic way. Tempe production at Rumah Tempe Pusbatara is carried out using instruments and quality equipment (made from stainless steel with the category of food grade), hygienic, and environmentally friendly, therefore that the cleanliness and quality of tempe products can be guaranteed. In addition, tempe products are also not produced by the technique or traditional methods, but using modern methods with guaranteed sanitation. The raw materials for tempe at Rumah Tempe Pusbatara include soybeans and tempe yeast, where soybeans used as raw material are selected local soybeans, organic, and not the result of genetic engineering (non-GMO/Genetically Modified Organisms).

During the tempe production process at Rumah Tempe Pusbatara, the cleanliness, and hygiene of tempe products are supported by the use of clean water that has been treated using a filtration process (with a water filter tool that is replaced and drained regularly), both in the processing of peanuts soybeans and in the process of cleaning the place and equipment used in the tempe production process, to ensure the quality of the tempe produced. Each package of tempe at Rumah Tempe Pusbatara has a net weight of 330 grams.

The tempe product was mainly sold through the online market. The bigger portion of the production was being distributed by the shipping division throughout Jakarta, Bogor, Depok, Tangerang, and Bekasi areas. However, a small portion of tempe in Rumah Tempe Pusbatara could be bought at Tzu Chi school, in Pantai Indah Kapuk, Jakarta.

#### **1.4. Organizational Structure**

For legal reasons, The company decided that the organizational structure data is confidential and are not allowed to be consumed by the public.

#### **1.5. Description of Internship Departments**

The author is responsible for the production department and social media department. The production department is responsible for the tempe production. During production, the production staff is in charge of meeting quality standards and deadlines for products. It is important for the production division to follow all the standard operating procedures, and monitor all the production equipment including machines, tools, or materials used for the production alongside the production process. After producing the tempe, the staff is in charge of checking for any defects on the products and making sure that the tempe is ready to be delivered.

The social media department is responsible to plan, create, publish, and share content about promos, orders, events, and education for the customer using any sort of media (video, texts, images, etc.), increase brand awareness, contacting the potential buyer, make the customer connections, and encourage the community members to engage with the contents.

## II. INTERNSHIP ACTIVITIES

### 2.1. Working Conditions

#### 2.1.1 On-site activities

Rumah Tempe Pusbatara Operates every day (including weekends and national holidays), starting from 7 A.M. to 4 P.M. The company does production three times a week, starting every Monday, Wednesday, and Friday. Typical day-to-day activities for the production team are producing tempe and cleaning the equipment after being used. All the weekly production division activities are repetitive. At the end of the month, there is going to be an evaluation meeting. The author always participated in the meetings, and the author had the task to make a recap of the meeting, provide suggestions for the problems mentioned in the meetings, and report it to the head of the production department.

The internship experience that has been carried out by the author at Rumah Tempe Pusbatara from August 2022 to December 2022. The tasks given in Rumah Tempe Pusbatara are repetitive. On the first day of production (Monday, Wednesday, Friday), The soybeans are soaked for two hours, then boiled, and then soaked again for twenty hours. Proceeding to the second day (Tuesday, Thursday, Saturday), the soaked soybeans were milled, separated from the testa, then soaked in hot water for 30 minutes. After the soaking process, the soybeans are cooled to room temperature, then the yeasts are put into the mix of the soybeans, and the packaging process shall begin. On the third day (Wednesday, Friday, and Sunday), the soybeans mix was already matured and ready to be delivered the next day. As the maturation process, the day of the production also can be started.

#### 2.1.2 Off-site activities

The task in the Social media department started after the work in the production department was done. The social media department posts online ads and interactive posts for the audience every day around 6 p.m. The working days for social media are also the same as the production division, which is every day. The author also acts as an admin for social media accounts that replies to all feedback from customers.

The task in the social media department started with the idea creation. The idea was generated by the author and the creative team and then passed to the design team. Once the design were generated, the design will be posted on Rumah Tempe Pusbatara's social media, such as Facebook and Instagram.

## 2.2. Internship Experience

During the internship, the author only applied for the production division, however, the company assigned the author to join the production division and social media division at the same time. The author learned about the process of tempe production and how to promote the social media account at the same time. The field where the author learned the most is the production department, where the author learned about the production process of tempe, the fermentation process, the sanitation process, and most important things, the SSOP that became the project for this enrichment program.

During courses at Indonesia International Institute for Life Sciences (i3L), the author was taught about GMP, SSOP, and HACCP. However, the learning plan in i3L mainly focuses on the HACCP program, hence the SSOP part was only covered a little. The author needed to look for resources to learn more about the program and tried to implement it in a manner that is considered good by the company.

**Figure 3.** Activity during the internship



There were side projects that were being given during the internship period. The list of projects was:

1. *Writing standard operating procedures for the company - August*

The company did not have a written SOP the moment the author arrived, so the author was asked to make a written SOP in tempe production.

2. *Preservation of soybean stock - October*

During October 2022, the soybeans were almost out of stock, hence the company bought soybeans from the local farmers. However, soybeans are prone to pests. Thus, whole soybeans that were procured need to undergo a fumigation process.



### **2.3. Challenges**

The challenge faced by the author is a problem with time management. The author has difficulty following the working hour from the factory due to the relatively far distance from the internship site. This challenge allowed the author to be able to rearrange the author's daily schedules and follow the designated working hours.

Another challenge is the challenge of communicating with other co-workers, where not everyone can accept new ideas, especially people who have less education. The author must learn to be able to communicate so that colleagues who are less able to accept new changes in work can accept new flows in the production process.

### III. PROJECT DESCRIPTION

#### 3.1. Internship Project

Rumah Tempe Pusbatara is implementing quality control (Quality Control) on raw materials, production processes, and final products for tempe products at the Rumah Tempe Pusbatara hygiene (Pusat Budaya Alam Nusantara). Internship projects carried out by the author are to carry out an analysis of the application of SSOP or Sanitation Standard Operating Procedures on processed food production processes in factories or places of production, with the title 'Implementation of SSOP (Sanitation Standard Operating Procedures) on Hygienic Tempe Production at Rumah Tempe Pusbatara.

##### 3.1.1. Project Background

Tempe is one of the traditional processed foods typical of Indonesia which is still commonly consumed by almost all levels of Indonesian societies. This traditional processed food has a basic ingredient, soybeans. The production process of tempe generally utilizes a fermentation process by the yeast *Rhizopus sp.*, which is also known as '*ragi tempe* (tempe yeast)'. The fermentation process by this yeast can form hyphae and mycelium, a white-colored tissue that grows to cover soybeans, thus the soybeans will form a solid and compact structure, like the shape of tempe recognized by today's society (Astawan et al., 2013). In Indonesia, tempe is a food source of vegetable protein important to the general public. It is known that most of the soybean production usage in Indonesia is mostly used to meet the needs of the tempe industry and tofu is one of the highest sources of vegetable protein in Indonesia, while some small amount is used in the industry of soy milk, soy sauce and other products made from soybeans (Haliza, Purwani, and Thahir, 2007). Because the demand for and production of tempe is high, generally a lot of tempe products are found in traditional markets at prices affordable to the general public. Not only domestically, but tempe also has great export opportunities or potential high due to large foreign enthusiasts of tempe, such as India, America, and various countries in the European region (Astawan, 2017).

Traditionally, the tempe production process is carried out manually, where stripping or separation of the testa (seed coat) of soybean nuts/seeds is done by stepping on it, therefore the testa attached to soybeans can be separated using water. However, it is known that the separation/stripping process with the traditional method cannot ensure the hygiene and sanitation of tempe products, due to the usage of human feet in the production process. Not only is it unhygienic, but the separation stage also requires quite a long time. Thus it is inefficient, especially

for large-scale tempe production (Wisnujati, 2016). In addition to the production of tempe which is carried out traditionally, various modern tempe production methods have been developed, which prioritize cleanliness and hygiene aspects of tempe products by using machines that are high-quality equipment, durable, anti-rust, and safe to use for food products (food grade materials). At present days, the modern tempe industry is growing rapidly, with the increasing trend of various hygienic tempe factories that can produce tempe with quality that meets the requirements set by the authorities. By implementing a strict quality management system, consumers can obtain tempe of the highest quality (Astawan, 2017).

With the development of the national tempe industry which aims to produce tempe with good quality and in accordance with quality standards and the acceptable final product (such as SNI/Indonesian National Standard), modern tempe production worker who produces tempe on a large scale/manufactured factory needs to pay attention and implement a food safety system properly. The basis of a food safety system that should be applied in industry food in general is composed of a combination of the concept of Good Manufacturing Practice (GMP), Sanitation Standard Operating Procedure (SSOP), and systems Hazard Analysis and Critical Control Point (HACCP), where GMP and SSOP known as a prerequisite program to implement HACCP within the industry (Oliveira, Cruz, Tavolaro, and Corassin, 2016).

SSOP is the most basic aspect of a food safety system. As a newfound industry, Rumah Tempe Pusbatara still needs to have an SSOP that needs to be implemented through the production and distribution of processed food. SSOP is a procedure that needs to be used and fulfilled to be able to achieve the goals of the GMP in producing food ingredients whose safety and quality are guaranteed. SSOP covers all documented procedures regarding sanitation and cleaning machinery, equipment, and specific areas of the facility food industry. (De Oliveira, Da Cruz, Tavolaro, and Corassin, 2016)

By implementing a good food safety system within the company or industry, the modern and hygienic production of tempe by the tempe industry can help the distribution of clean tempe products, have good quality, and are capable of ensuring the potential buyer with guaranteed hygiene and sanitation.

### **3.1.2. Scope of the Project**

Due to the scope of the tempe production system at Pusbatara Tempe House broad, then this study will have some limitations as follows:

1. Observation of the production process and the conditions or environment of the factory/production site will be carried out in general, assuming normal production conditions

2. There was currently no written SOP, therefore recommendations provided for improvements to the observation of the implementation of SSOP at Rumah Tempe Pusbatara will consider the scale of production from companies that are still classified as local (do not produce on a national or international scale).
3. Recommendations given would follow the following considerations, budget, manpower, and the condition of the factory. After the list of recommendations was given, the company decides on the most effective way to apply changes.

### **3.1.3. Aim**

To help the company on identifying deficiencies in compliance with each key sanitation area in SSOP, as well as provide recommendations for improvements to areas that are still not well fulfilled by the current production system.

### **3.1.4. Problem Formulation and Proposed Solutions**

The method used in this study was to identify the implementation of SSOP (Sanitation Standard Operating Procedures) at Rumah Tempe Pusbatara based on observations of compliance with the SSOP sanitation area according to the previous research method by Saninta (2020), which was based on SSOP guidelines according to the FDA (Food and Drug Administration) (1995). The criteria going to be as follows:

#### *1. Safety of water that comes in contact with food or food contact surfaces.*

In the food industry, water safety is one aspect that is very important and can affect the quality of the food product. Water in the production process also has the function as to make ice, the water used generally must be free of bacteria, ingredients, suspended matter, chemical pollutants, viruses, or other objects that can contaminate water (Syamsinar, 2017). Water used during the production process and experiencing direct contact with food production generally must meet the criteria of the Ministry of Health Regulations in the Republic of Indonesia No. 416/MENKES/PER/IX/1990 concerning Requirements and Supervision of Water Quality, where the quality requirements are stated physically and chemically for drinking water and clean water.

#### *2. Condition and cleanliness of food contact surfaces, including utensils, gloves, and outer garments.*

All surfaces in contact with food must be inert, cannot migrate or be absorbed by food, smooth, non-porous, must be visible or easily disassembled for inspection/inspection, and easily

accessible and disassembled for manual cleaning, or if surfaces must be cleaned in place (without dismantling), it must be shown that the results of such cleaning will be as good as manual cleaning with machine disassembly (Ahmed, 2006).

Furthermore, all interior surfaces in contact with food must be designed to self-empty or drain. Then, all machines and equipment used must be designed in such a way as to be able to protect the inside from various external contaminants. The outside of machines and equipment that will not have direct contact with food must also be arranged to prevent the accumulation of soil, pests, bacteria, and other unwanted microorganisms (Ahmed, 2006).

### *3. Prevention of cross-contamination.*

In the food production process, cross-contamination is very easy and occurs mainly with raw materials that have not been processed. Of course, cross-contamination can be a huge problem for industries that produce products with food ingredients that are prone to be microbiologically contaminated by bacteria or microorganisms, such examples are aquatic materials (fish, shrimp, etc.) or milk and their derivatives (Samsinar, 2017). However, tempe production has a low risk of cross-contamination, hence, it is generally not a big concern for the company.

To prevent cross-contamination, various aspects of the production process need to be paid attention to, namely the surface from production machines or equipment, personnel or employees, and the prevention of cross-contamination between raw products and mature or final products. The surface of the production equipment can be one of the common sources of cross-contamination, especially when the same machines and equipment are used repeatedly in a short time. To prevent cross-contamination from occurring must be carried out proper disinfection, cleaning, and maintenance and routinely on all surfaces in contact with the product food (Hui, 2015)

### *4. Maintenance of hand washing, sanitizing, and toilet facilities.*

Cleanliness of the personnel involved in the production process Food is a very important aspect in the manufacturing process of food products. All employees should use personal protective attributes to prevent contact between the product and the skin and wash their hands thoroughly. This is because Human-facilitated cross-contamination generally occurs because of the transfer of bacteria or microorganisms through the skin. Not only therefore, however, the production employee should also have previously obtained basic training on the basics of internal hygiene and sanitation food industry, to provide insight to personnel or employees on the importance of preventing cross-contamination in products. In this sanitation area, it is necessary to carry out maintenance on various facilities that can be used by production workers, such as toilets and facilities to wash hands

(Hui, 2015)

*5. Protection of food, food packaging material, and food contact surface from adulteration with lubricant, fuel, pesticides, cleaning, components, sanitizing agent, condensate and other chemicals, and physical and biological contaminants.*

Prevention or protection of food products from adulteration can be carried out by monitoring materials known to be toxic and protection from water that has not been sanitized during the production process. If there are biases in the monitoring process, several corrective actions can be carried out by clearing contaminants from surfaces, improving airflow to prevent condensation, preventing the formation of puddles on the floor, washing feet and wheels well before entering the production room, and avoiding the use of chemicals. which does not include a label or complete information. In addition, disinfectant compounds used in cleaning must be stored separately from storage rooms for food products and packaging materials, and other chemicals used in the food production process (additives) (Syamsinar, 2017)

*6. Proper labeling, storage, and use of toxic components.*

Labeling and proper storage of all materials involved in the production process as well as cleaning from the food product production environment are carried out to prevent the occurrence of cross-contamination. Some things that needed to be considered in labeling and storage of these materials include writing the clear name of the material, instructions for using the material, storage instructions, separating food grade and non-food grade ingredients, and separating materials that are toxic from equipment that will come in contact with food (Syamsinar, 2017)

*7. Control of employee health conditions that could result in the microbiological contamination of food, packaging material, and food contact surface.*

Most of the hygiene problems come from employees or production personnel. Therefore, it is very important for all employees to be in top condition or healthy while carrying out the production process and have good knowledge of the principles of personal hygiene or personal hygiene while in a food production environment. In general, production employees are required to wear protective clothing to prevent contamination, such as headgear, masks, aprons, gloves, and closed shoes (covering the toes). In the process of food production, hair is generally a source of physical and biological contaminants that are often found. Thus, it is necessary to prevent these events by wearing appropriate protective clothing (Haileselassie et al., 2013). In addition to maintaining good personal hygiene, all production employees must also be in good health when in a

food production environment. Employees with certain disease symptoms are required to report and not work to prevent cross-contamination. Some of the symptoms that are considered important include severe flu, stomach cramps, vomiting, diarrhea, skin irritation, dermatitis, open wounds, and contracting infectious diseases (Syamsinar, 2017).

#### 8. *Exclusion of pests from the food plant.*

Pest eradication is the final SSOP sanitation area which is also very important in maintaining the sanitation and quality of food products. At the building construction stage, it is necessary to prevent the possible entry of pests such as rats, mice, insects, and birds into the building, especially in the drainage canals. In addition, there should be no plants or gardens around the production area, because they can attract insects and pests

Other than that, an asphalt road must be made and a concrete area must be constructed that surrounds the production building. Furthermore, there are no animals that roam freely in the production area, such as dogs, cats, chickens, and so on. Warm-blooded animals are generally known to be able to carry pathogenic microorganisms in their bodies, which have the potential to contaminate food (De Oliveira et al., 2016)

#### **3.1.5. Data Collection**

The data will be collected from August 2022 - December 2022 using tables showing parameters in each SSOP aspect according to the FDA (1995). Each aspect will have its parameter, and each aspect or criterion included in the guideline is determined for its fulfillment based on 3 categories of fulfillment, namely 'Good', 'Adequate', and 'Poor'. The data collection was conducted during the evaluation process each day at three P.M. Once the observation was made, and the parameters have been graded for 'good', 'adequate', and 'poor' measures, for criteria that achieve the fulfillment of 'adequate' and 'poor', recommendations for improvements are given that are useful for maintaining or improving these criteria. Good categories define as the company already practicing the SSOP parameter, and it has been done regularly. Adequate categories indicate that the company might be practicing the parameter not regularly, or that the company only did a portion of the parameter. Lastly, poor categories indicate that the company does not do the parameters at all. The compiled data was then calculated in numbers, showing the fulfillment percentage of each aspect in SSOP. The calculation was based on the following equation:

$$\frac{\text{Good fulfillment} + \text{Adequate fulfillment}}{\text{Total criteria}} \times 100\%$$

Example: The company started doing observation on the safety of the water. There are 10 parameters of the safety of water aspect. The result indicated that the company got 6 good, 3 adequate, and 1 poor results for the implementation of SSOP. Then the calculation will be:

$$\frac{6+3}{6+3+1} \times 100\% = \frac{9}{10} \times 100\% = 90\%$$

Lastly list of the data, observations, and recommendations would be given to the company for further improvements.

### **3.2. Results**

The results from the SSOP analysis are based on the author's analysis based on the criteria, and each figure represents different aspects of the SSOP. The records are the following



**Table 1.** Observation of the Safety of water that comes in contact with food or food contact surfaces.

Parameter	Fulfillment	Observation	Recommendation
Separation of waterways for production and non-production activities	Good	Waterways for production and non-production activities have been separated sufficiently	
Separation of waste waterways	Good	Clean waterways and waste waterways have been separated	
Inspection and maintenance of the condition of the installation and leakage of water distribution pipes	Adequate	Inspection and maintenance of the condition of the installation and leakage of the water distribution pipes has been sufficiently carried out, inspections are not carried out routinely and only on certain days, but so far there has never been a problem found in the water distribution pipes	Inspection and maintenance needs to be carried out more routinely to prevent leaks in the water distribution pipes, and picket paper is provided to schedule inspections of the installation and water distribution pipes by the production party
Water treatment application	Good	Water treatment had been done without flaws before and after production. The water is clear and clean	
Compliance with the quality of water used for the production process and in direct contact with processed food ingredients according to the requirements for drinking water or clean water	Good	The water used in the tempe production process meets the requirements for drinking water or clean water according to applicable regulations	
Compliance with the quality of water used for cleaning and sanitation and for personal hygiene according to clean water requirements	Good	The water used in cleaning equipment and the production environment meets the requirements for clean water in accordance to the regulations	
Availability of responsible party to keep water safe	Adequate	There is responsible party to keep the water safe, but there is no exact schedule when the inspection will be held	Inspection and maintenance needs to be carried out more routinely in order to prevent discrepancies in the quality of water used in the tempe production process
Monitoring of water quality that are going to be used	Good	Observation of the quality of water used in the production and cleaning processes has been properly inspected	
Implementation of corrective actions for water safety quality discrepancies, especially when cross contamination occurs	Adequate	The implementation of corrective actions for discrepancies in water safety quality has been carried out quite well, but there is no standard handling method	It is necessary to determine effective handling methods or corrective actions that can be carried out by all production parties involved in the event of a discrepancy in water quality
Availability of records regarding water safety SSOPs	Poor	The company has never recorded the implementation of SSOP for all sanitation areas	It is necessary to carry out documentation and records related to the implementation of SSOP in the tempe production area to ensure hygiene and sanitation of the production environment

**Table 1.** Shows the analysis of the Safety of water that comes in contact with food or food contact surfaces. The results are already satisfactory, and suggestions that can be made for the improvement of the first aspect of the SSOP are to do inspections more routinely and keep all the inspection records or the flaws in the water safety in a report.

**Table 2.** Observation of condition and cleanliness of food contact surfaces, including utensils, gloves and outer garment

Parameter	Fulfillment	Observation	Recommendation
Good condition of contact surface	Good	The condition of the surface in contact with the raw materials for production and the final product is good	
Gloves and outerwear for workers are in proper and clean condition	Good	Production personnel/employees wear protective clothing that is cleaned regularly and replaced (if only used once), such as aprons, headgear (hair net), plastic gloves, and face masks	
Cleaning and sanitation of surfaces that come in direct contact with food are carried out properly	Good	Surfaces that have direct contact with raw materials and final products are cleaned properly	
Cleaning and sanitizing surfaces that come into direct contact with food is carried out routinely	Good	Cleaning and sanitizing surfaces that come into direct contact with food is carried out routinely	
Availability of officers who are responsible for the condition of surfaces that come in direct contact with food	Poor	There are no special parties or personnel who are responsible for the condition of surfaces that experience direct contact with food, because the production team is in charge of cleaning all surfaces in each production process (carried out alternately)	If the scope or production area used is small, then all individuals can be responsible for the cleanliness of surfaces that have direct contact with food. However, it would be better if there were individuals who were routinely tasked with ensuring the condition of all surfaces used in the production process so that there was a clear division of work tasks.
Monitoring of contact surfaces that have direct contact with food	Good	Surfaces that come in direct contact with food is always monitored for cleanliness and are in good condition before use	

**Table 2.** Observation of condition and cleanliness of food contact surfaces, including utensils, gloves, and outer garment (cont.)

Parameter	Fulfillment	Observation	Recommendation
Application of corrective actions for non-conformity of surfaces in direct contact with food	Good	Good corrective actions have been carried out for the non-conformance of the surface conditions to be used, in particular through direct cleaning	
Availability of records regarding the cleanliness of food contact surface SSOPs	Poor	The company has never recorded the implementation of SSOP for all sanitation areas	It is necessary to carry out documentation and records related to the implementation of SSOP in the tempe production area to ensure hygiene and sanitation of the production environment

**Table 2.** Shows the analysis of the observation of the condition and cleanliness of food contact surfaces, including utensils, gloves, and outer garments. The results have already met the standards, however, two parameters have been done poorly. Suggestions that can be made for the improvement of the second aspect of the SSOP are to increase the self-consciousness of the employee to keep safe the cleanliness and contacts, and keep a record of every defect caused by the food contact.

**Table 3.** Observation of prevention of cross contamination

Parameter	Fulfillment	Observation	Recommendation
Application of good hand washing practices	Good	Practice good and correct hand washing has been carried out by all production personnel/employees	
Hygiene conditions of workers are maintained	Good	The hygiene conditions of production personnel/employees are always maintained during the tempe production process	
Behavior or habits of workers do not contaminate food	Good	The behavior or habits of workers while in the tempe production environment do not contaminate food	
Use of clean, complete and proper work clothing	Good	Work clothing used by production workers is clean, complete, and appropriate, including the use of various protective clothing to prevent cross contamination	
Employees are not allowed to enter and exit other process areas	Poor	Due to the limited number of production employees, production employees are still free to go in and out to other production process areas	A more detailed and clear division of tasks or work can be arranged for each individual involved in the production process, so that there is a PIC (Person in Charge) for each production area
Cleaning and sanitizing areas and tools food handling and processing good and routinely	Good	Cleaning and sanitation of all tools used and food production areas are carried out routinely every day	
Raw material cleaning before use	Good	The raw material for making tempe is cleaned well before use	
Separation of handling and activity processing of raw materials to final products in in the production area	Good	All materials and equipment used in the production process are separated in different places and containers to prevent cross contamination. Meanwhile, the final product is stored in a closed room (tempe fermentation room) which is always cleaned and sanitized before the fermentation process	
Separation of storage of food materials, materials dangerous, production equipment, equipment cleaning, packaging labels, and containers, and the final product	Good	All food storage, production equipment, and other tempe production needs do not touch floors, walls, or ceilings	

**Table 3.** Observation of prevention of cross-contamination (cont.)

Parameter	Fulfillment	Observation	Recommendation
Storage of food, equipment production, labels and packaging containers and the final product does not touch the floor, walls, and ceiling	Good	The condition of the storage room for all production material needs is always ensured clean and in good condition on a regular basis	
Condition of food storage room production equipment, labels and packaging containers and the final product is clean and good	Good	The condition of the storage room for all production material needs is always ensured clean and in good condition on a regular basis	
Implementation of corrective action if found the resulting discrepancy cross contamination	Adequate	The implementation of corrective actions for non-conformances that result in cross-contamination has been carried out quite well, but there is no standard handling method	It is necessary to determine effective handling methods or corrective actions that can be carried out by all production parties involved in the event of a non-conformity that has the potential to cause cross contamination and produce an unhygienic and sanitary final product.
Availability of records regarding SSOP prevention of cross-contamination of products	Poor	The company has never recorded the implementation of SSOP for all sanitation areas	It is necessary to carry out documentation and records related to the implementation of SSOP in the tempe production area to ensure hygiene and sanitation of the production environment

**Table 3.** Shows the analysis of the observation of the occurrence of cross-contamination. The results have already met the standards and reached satisfactorily, however, two parameters have been done poorly. Suggestions that can be made for the improvement of the third aspect of the SSOP are to have a schedule to prepare corrective measures for every cross-contamination that occurred and to keep every case on record.

**Table 4.** Observation of maintenance of hand washing, sanitizing, and toilet facilities

Parameter	Fulfillment	Observation	Recommendation
Cleaning of handwashing facilities, hand sanitizing, and toilets	Poor	Hand washing and hand sanitizing facilities are generally only used, but never cleaned regularly. Meanwhile, the toilet facilities have been properly cleaned every day	It is necessary to have a clean hand, either by washing with water or by disinfecting them, to ensure that hand washing and hand sanitation facilities do not become damp and invite pests

**Table 4.** Observation of maintenance of hand washing, sanitizing, and toilet facilities (cont.)

Parameter	Fulfillment	Observation	Recommendation
Maintenance of condition and completeness/availability of hand washing and sanitation facilities hands and toilets	Adequate	Maintenance of conditions and completeness/availability of facilities has been carried out quite well, except for cleaning of hand washing and hand sanitizing facilities	It is necessary to have a clean hand, either by washing with water or by disinfecting them, to ensure that hand washing and hand sanitation facilities do not become damp and invite pests
Dissemination of the importance of the program hand washing and sanitizing, and conditions personnel hygiene	Poor	Educative and informative socialization has never been carried out regarding the importance of hand washing and sanitation programs as well as personal hygiene of personnel, because there are only a few production employees involved in tempe production	If it is not possible to carry out socialization for a small number of employees, production employees can be given standard documents or illustrated posters that explain in full the importance of hygiene and sanitation for employees in the production process
Availability of instructions on how to wash hands properly and correctly	Good	There is a poster explaining the instructions on how to wash hands properly and correctly in the employee hand washing area which is based on official steps by the World Health Organization (WHO).	
Availability of staff responsible for hand washing facilities, room sanitation and employee toilets	Poor	Until now, there are no workers who are officially in charge and responsible for maintaining the cleanliness of the facilities for employees	Because production personnel/employees are often busy in carrying out the tempe production process, other employees (outside the production team) can be assigned to clean and maintain the condition of the employee's facilities, if possible
Monitoring the condition and activities of cleaning, sanitizing and maintaining hand washing, hand sanitizing and toilet facilities	Poor	Until now, monitoring of the conditions and activities of cleaning, sanitizing and maintaining the facilities used by employees has never been carried out	To ensure that the cleaning and maintenance activities of the employee's facilities are carried out properly, regular checks can be made of the condition of each facility using a paper picket schedule for employees, at least several times in one working day
Implementation of corrective actions for non-conformity of hand washing, hand sanitizing and toilet facilities	Good	If there is a discrepancy in the conditions of the hand washing, hand sanitizing and toilet facilities, corrective or handling actions are carried out at that time to restore the condition of the facilities.	
Availability of records regarding SSOP maintenance of hand washing, hand sanitizing, and toilet facilities	Poor	The company has never recorded the implementation of SSOP for all sanitation areas	It is necessary to carry out documentation and records related to the implementation of SSOP in the tempe production area to ensure hygiene and sanitation of the production environment

**Table 4.** Shows the analysis of the observation of maintenance of hand washing, sanitizing, and toilet facilities. The results showed that the company had managed the hand washing, sanitizing, and toilet facilities poorly. Suggestions that can be made for the improvement of the fourth aspect of the SSOP is for

the company to have a party that is in charge of sanitation of washing and toilet facilities, and also giving education to the employee about the importance of sanitation of washing hands facilities and toilets.

**Table 5.** Observation of protection of food, food packaging material, and food contact surface from adulteration with lubricant, fuel, pesticides, cleaning, components, sanitizing agent, condensate, and other chemicals, physical and biological contaminants

Parameter	Fulfillment	Observation	Recommendation
Controlling the presence of non-food materials	Good	Observation and control of the presence of non-food materials has been carried out properly	
Observation and control of the presence of non-food materials has been carried out properly	Good	Non-food materials found in the environment or production areas generally cannot evaporate	
Good and safe conditions and placement of containers for non-food materials	Adequate	The placement of containers for non-food materials is good enough, but the condition is sometimes not clean (less attention is paid because it is not related to the production process, such as soybean fumigants and so on).	If cleaning is carried out for facilities intended for employees, then cleaning can also be carried out from rooms where various non-food materials are stored, so that they do not become nests of pests if they are not cleaned for too long
Separate storage of non-food materials and cleaning equipment from product packaging, food contact surfaces, food ingredients and processed food products	Good	All materials have been stored in separate locations	
Cleaning all production areas/areas within the factory properly and routinely	Good	The production area/in the factory is generally cleaned regularly before starting the production process	
Storage of food, production equipment and products is stored in a closed and secure manner	Good	Storage of food ingredients, production equipment, and final products is stored in a closed manner	
Destroy products or materials that are not used	Adequate	Materials or products that are no longer used are generally just thrown away without any product or material destruction method, because there are no specific regulations governing this procedure within the company. However, the waste generated will generally be burned together with all other waste from the trash	A special procedure for destroying unused materials or products can be established before they are disposed of in the trash, especially if the chemicals are potentially toxic, produce toxic gasses, or are flammable, which are harmful to the environment

**Table 5.** Observation of protection of food, food packaging material, and food contact surface from adulteration with lubricant, fuel, pesticides, cleaning, components, sanitizing agent, condensate, and other chemicals, physical and biological contaminants (cont.)

Parameter	Fulfillment	Observation	Recommendation
Inspection and disposal of waste bins	Good	The contents of the trash cans in the production area are generally disposed of in the public disposal area when they are full, then the contents are burned	
Separation of non-sanitary water channels with sanitary water	Good	Sanitary and unsanitary water channels have been separated	
Non-sanitary wastewater/water treatment	Poor	The resulting liquid waste is generally channeled directly into the drainage hole because the liquid waste obtained from the tempe production process is generally in the form of pure water from boiling and soaking soybeans and water from washing the equipment used (without using detergents or chemicals).	The liquid waste generated from the tempe production process can be processed first by the company before being discharged into the sewer. Various ways can be implemented to treat liquid waste based on various previous studies, which have been developed and socialized to local tempe producers. This liquid waste treatment needs to be carried out to reduce pollution of the high organic content contained in the tempe industrial wastewater in the waters.
Monitoring of conditions, use, and presence of potentially toxic materials	Good	The implementation of corrective actions for non-conformances that result in cross-contamination has been carried out quite well, but there is no standard handling method	
Application of corrective actions in the event of contamination of food ingredients, food products, product packaging or surfaces in contact with food from non-food materials	Poor	The company has never recorded the implementation of SSOP for all sanitation areas	It is necessary to carry out documentation and records related to the implementation of SSOP in the tempe production area to ensure hygiene and sanitation of the production environment

**Table 5.** Shows the observation of protection of food, food packaging material, and food contact surface from adulteration with lubricant, fuel, pesticides, cleaning, components, sanitizing agent, condensate and other chemicals, physical and biological contaminants. The results are already



satisfactory, however, there is one parameter that has been done poorly. Suggestions that can be made for the improvement of the fifth aspect of the SSOP are to manage the wastewater and do water treatment regularly.

**Table 6.** Observation of proper labeling, storage and use of toxic components

Parameter	Fulfillment	Observation	Recommendation
Availability of labels with clear and correct information on the containers of chemical origin	Good	A label with clear and correct information has been printed on the container of the material	
Examination of label clarity and material safety information on the chemical origin container	Good	Clarity of labels and chemical safety information is always carried out after receipt of materials and before storage	
Provision of clear and correct identity and information labels on chemical work containers	Good	Clear identity and information labels have been given to all chemicals used in the scope of production	
Good chemical storage and separation between food grade and non food grade	Good	Food grade and non-food grade chemicals have been stored separately	
The condition of the chemical storage room is closed and access is restricted	Good	The condition of the chemical storage room is closed and can only be accessed by production personnel/employees when needed	
Recording of every expenditure and entry of chemicals	Good	Expenditures and imports of chemicals are always recorded in detail	
Correct use of chemicals	Good	Chemicals have been used correctly	
Availability of personnel responsible for labeling, storage and use of chemicals	Good	There is an individual who is responsible for storing and labeling the chemicals used in the tempe production area	
Monitoring of activities and conditions of labeling, storage and use of chemicals	Adequate	Examination of the conditions of labeling, storage and use of chemicals is not always carried out routinely, but only periodically	Examination of the conditions of labeling, storage and use of chemicals can be further improved to prevent mistakes and confusion in the use of these chemicals
Implementation of corrective actions if there are deviations in the labeling, storage and use of chemicals	Adequate	There has never been any deviation in the labeling, storage and use of chemicals, because the chemicals used are not too much and can be handled properly	Permanent production personnel/employees must anticipate the occurrence of irregularities in the labeling, storage and use of chemicals, if unwanted events occur during the use of these substances

**Table 6.** Observation of proper labeling, storage, and use of toxic components (cont.)

Parameter	Fulfillment	Observation	Recommendation
Availability of SSOP records regarding labeling, storage, and use of chemicals	Poor	The company has never recorded the implementation of SSOP for all sanitation areas	It is necessary to carry out documentation and records related to the implementation of SSOP in the tempe production area to ensure hygiene and sanitation of the production environment

**Table 6.** Shows the observation of Proper labeling, storage, and use of toxic components. The results are already satisfactory, however, there is one parameter that has been done poorly. Suggestions that can be made for the improvement of the sixth aspect of the SSOP are to keep records.

**Table 7.** Observation of control of employee health conditions that could result in the microbiological contamination of food, packaging material, food contact surface

Parameter	Fulfillment	Observation	Recommendation
The condition of personal hygiene of workers is maintained	Good	Personal hygiene of production personnel is well maintained	
Practice good hand washing	Good	Hand washing and sanitation has been carried out properly	
Implementation of the responsibility of reporting if the employee is sick	Good	Production personnel/employees generally always report if there are certain symptoms of illness and are not allowed to work	
Control or medical examination of employee health	Poor	There has never been any control or medical examination of the employee's health condition, and generally the company only relies on reports from employees regarding their health condition	A medical examination program can be made for the health of production employees which is carried out routinely when there are conditions or situations in the environment that really require active checks, such as when there is a pandemic or when there are other employees in the same building who have certain infectious diseases
Control for sick employees	Good	Employees who are sick are generally not allowed to work until their symptoms have disappeared	

**Table 7.** Observation of control of employee health conditions that could result in the microbiological contamination of food, packaging material, and food contact surface (cont.)

Parameter	Fulfillment	Observation	Recommendation
Availability of records related to employee health control SSOP	Poor	The company has never recorded the implementation of SSOP for all sanitation areas	It is necessary to carry out documentation and records related to the implementation of SSOP in the temple production area to ensure hygiene and sanitation of the production environment

**Table 7.** Shows the analysis of the control of employee health conditions that could result in the microbiological contamination of food, packaging material, and food contact surface. The results have nearly met the standards, and the company needed to do something about it. Suggestions that can be made for the improvement of the seventh aspect of the SSOP is to have a regular checkup on the employees.

**Table 8.** Observation of exclusion of pests from the food plant

Parameter	Fulfillment	Observation	Recommendation
Implementation of a good sanitation program	Adequate	The implementation of the sanitation program implemented in the production area is quite good, but there are still various aspects of hygiene and sanitation that have not been properly achieved	It is necessary to improve employee performance in terms of fulfilling SSOP in the production area or scope. If necessary, documentation and records related to SSOP implementation can be carried out
Supervision of materials entering the factory	Good	The materials that enter the factory are generally monitored and inspected properly beforehand	
Good and safe conditions and placement of containers for non-food materials	Good	The materials that enter the factory are generally monitored and inspected properly beforehand	
Reduction or monitoring of the use of pesticides	Good	The use of pesticides has been observed and monitored properly	
Holes and pipes are closed	Good	Existing holes and channels are in a certain state	
Windows, doors and vents covered with pest control film/screens	Poor	Windows, doors and vents are not covered with pest control screens	Windows, doors, and vents can be furnished and installed with insect traps that have been used measured according to the size of each window, doors and air vents

**Table 8.** Observation of exclusion of pests from the food plant (cont.)

Parameter	Fulfillment	Observation	Recommendation
Prevention or control so that no animals roam in the factory	Good	There are no animals roaming around and in the production area	
Final product storage is well organized	Good	Storage of the final product has been well organized	
The condition of the room inside and outside the factory is clean	Good	Room conditions inside and outside the factory are always ensured to be clean, both before and after the tempe production process every day	
The condition of the doors of the production area and trash cans are closed and made of pest-resistant materials	Good	Doors from the production area and trash cans are always closed and ensure pest resistance	
Checking and monitoring the condition of the factory and its environment on a regular basis	Good	In general, inspection and monitoring of the condition or cleanliness of the factory environment is carried out every day	
Immediate extermination of pest nests	Good	No pest nests were ever found during the factory's operation	
Pest eradication activities without affecting product quality and safety	Good	No pest nests were ever found during the factory's operation	
Pest control activities are carried out regularly	Good	Pest control activities (preventing the formation of pest nests) are generally well-implemented	
Availability of parties responsible for pest control activities	Good	There is a party that is specifically responsible for routine pest control activities to prevent the formation of pest nests in production areas	
Application of corrective action if after preventive or pest control measures have been taken, the pests return to the production room	Good	Pest control activities (preventing the formation of pest nests) are generally well-implemented	
Availability of records regarding pest control SSOPs	Poor	The company has never recorded the implementation of SSOP for all sanitation areas	It is necessary to carry out documentation and records related to the implementation of SSOP in the tempe production area to ensure hygiene and sanitation of the production environment

**Table 8.** Shows the analysis of the exclusion of pests from the food. The results are already satisfactory, and suggestions that can be made for the improvement of the eighth aspect of the SSOP are to do inspections more routinely, apply some anti-insect film to the windows, and keep all the inspection records or the flaws in the pest controls safety into a report.

**Table 9.** Compiled SSOP observation table

Parameter	Fulfillment			Total criteria	Fulfillment Percentage
	Good	Adequate	Poor		
Safety of water that comes in contact with food or food contact surfaces.	6	3	1	10	90%
Condition and cleanliness of food contact surfaces, including utensils, gloves, and outer garment	6	0	2	8	75%
Prevention of cross-contamination	11	1	2	14	86%
Maintenance of hand washing, sanitizing and toilet facilities.	2	1	5	8	38%
Protection of food, food packaging material and food contact surface from adulteration with lubricant, fuel, pesticides, cleaning, components, sanitizing agent, condensate and other chemicals, physical and biological contaminants	9	2	1	12	92%
Proper labeling, storage and use of toxic components.	8	2	1	11	91%
Control of employee health conditions that could result in the microbiological contamination of food, packaging material, and food contact surface.	4	0	2	6	67%
Exclusion of pests from the food plant	15	1	2	18	89%

**Table 9.** Shows the compilation of all the eight SSOP aspects, and the fulfillment percentage is calculated using the following formula:

$$\frac{\text{Good fulfillment} + \text{Adequate fulfillment}}{\text{Total criteria}} \times 100\%$$

Based on **Table 9.**, The current average fulfillment in Rumah Tempe Pusbatara is 78.5%. According to FDA (1995), the passing average fulfillment percentage is 66.67%. However, Rumah Tempe Pusbatara intended to keep high standards and ensure the best quality product to the customer. Hence, Rumah Tempe Pusbatara set the passing marks at 85%.

### 3.3. Discussion

**Table 1., Table 2., Table 3., Table 4., Table 6., Table 7., and Table 8.** Respectively indicated that there was no record-keeping system on the SSOP. The record-keeping system needs to implement not only when there is an error, but also when the sanitation procedure was done correctly. Record keeping is important to provide evidence that the systems are being implemented correctly and to show a trend for the improvement or deficiencies in the quality system. The record-keeping system also helped with the future considerations of improvements for the production or sanitation process of the company (Dillon & Griffith, 2001).

**Table 2.** Shows the analysis of the observation of the condition and cleanliness of food contact surfaces, including utensils, gloves, and outer garments. Due to a lack of manpower, no party is in charge of the condition the cleanliness of food contact surfaces. According to FDA (1995), cleanliness of food contact surfaces is important for a better customer experience, and to prevent contamination from the food. Suggestions that can be made for the improvement of the second aspect of the SSOP are to increase the self-consciousness of the employee to keep safe of the cleanliness and contact, and to make a picket schedule to monitor the cleanliness of all the equipment.

**Table 4.** Shows the analysis of the observation of maintenance of hand washing, sanitizing, and toilet facilities. The results showed that the company had managed the hand washing, sanitizing, and toilet facilities poorly. Maintenance of hand washing and toilet facilities are important to practice good hygiene, as Rumah Tempe Pusbatara produces hygienic tempe. Hand washing also helps to reduce the transmission of diseases (Potgieter & Traore, 2019). Suggestions that can be made for the improvement of the fourth aspect of the SSOP is for the company to have a party that is in charge of sanitation of washing and toilet facilities, and also giving education to the employee about the importance of sanitation of washing hands facilities and toilets.

**Table 5.** Shows the observation of protection of food, food packaging material, and food contact surface from adulteration with lubricant, fuel, pesticides, cleaning, components, sanitizing agent, condensate and other chemicals, physical and biological contaminants. There is one parameter that has been done poorly which is water treatment. Water treatment is important for the environment so that the wastewater from the production process could be put to other use (Bonnet & Guevara, 2022). Since the company had tight budgeting, the process of the water treatment should be put pending. Meanwhile, all the wastewater from the production process is being used to make compost, since the water in the production process only came in contact with the soybeans and the metal from the machines, creating no contamination from any other biological or chemical substances.

**Table 9.** shows the compiled observation on all 8 key aspects of Rumah Tempe Pusbatara company's SSOP. The good results are shown in most of the parameters and key aspects, but the fourth and seventh (maintenance of hand washing, sanitizing and toilet facilities, and control of employee health conditions that could result in the microbiological contamination of food, packaging material, food contact surface respectively) needs improvements. The errors in the SSOP system are mostly because Rumah Tempe Pusbatara is a new company, and still doing improvements, and suggestions for the system have already been mentioned beforehand. Compared to the fulfillment percentage result from Saninta (2020) at PT. Daya Agro Mitra Mandiri, Rumah Tempe Pusbatara has slightly higher fulfillment percentage result of SSOP which is 73,19%, and 78.5% respectively.

Another interesting result was there were no reports and notes regarding the SSOP implementation, and it is strongly suggested that the company had made a new division to control SSOP and make a report. The author tried to make some reports, and the reports and current production protocol are currently used as production standards. The company already has a report on some aspects such as the safety of water and pest controls beforehand, but for the other aspects, the company needs to make another report, because reports are important to ensure the sanitation of the production process.

Some suggestions for the company to increase the aspects that are already good are waste management of the tempe production. One of the methods for processing tempe industrial wastewater is a combination of multilevel filtration techniques using bio pore technology, which can be used to make compost from organic waste contained in tempe industrial wastewater (Setiawati et al., 2019). Other processing methods have been studied before, such as making liquid organic fertilizer using tempe industrial wastewater with the addition of EM4 (Effective Microorganisms) bio activators (Prasetio and Widyastuti, 2020), to making struvite fertilizer using aeration techniques (Edahwati and Anggriawan, 2021).

Based on the recommendations provided, all the recommendations could be classified as two, which are technical recommendations and managerial recommendations (Saninta, 2020). The technical recommendations are the physical changes that affect the workflow, such as additional equipment, procedures, and production-related recommendations. Managerial recommendations are the recommendations that involve the management team, such as new formulation, availability of records, new protocols of the quality control system, and documentation.



**Table 10.** Classification of recommendations

Recommendations	Technical Recommendations	Managerial Recommendations
Inspection and maintenance needs to be carried out more routinely to prevent leaks in the water distribution pipes, and picket paper is provided to schedule inspections of the installation and water distribution pipes by the production party	✓	
Inspection and maintenance needs to be carried out more routinely in order to prevent discrepancies in the quality of water used in the tempe production proces	✓	
It is necessary to determine effective handling methods or corrective actions that can be carried out by all production parties involved in the event of a discrepancy in water quality		✓
It is necessary to carry out documentation and records related to the implementation of SSOP in the tempe production area to ensure hygiene and sanitation of the production environment	✓	
If the scope or production area used is small, then all individuals can be responsible for the cleanliness of surfaces that have direct contact with food. However, it would be better if there were individuals who were routinely tasked with ensuring the condition of all surfaces used in the production process so that there was a clear division of work tasks.	✓	
A more detailed and clear division of tasks or work can be arranged for each individual involved in the production process, so that there is a PIC (Person in Charge) for each production area	✓	
It is necessary to determine effective handling methods or corrective actions that can be carried out by all production parties involved in the event of a non-conformity that has the potential to cause cross-contamination and produce an unhygienic and sanitary final product.		✓
It is necessary to have a clean hand, either by washing with water or by disinfecting them, to ensure that hand washing and hand sanitation facilities do not become damp and invite pests	✓	
It is necessary to have a clean hand, either by washing with water or by disinfecting them, to ensure that hand washing and hand sanitation facilities do not become damp and invite pests	✓	
If it is not possible to carry out socialization for a small number of employees, production employees can be given standard documents or illustrated posters that explain in full the importance of hygiene and sanitation for employees in the production process		✓
Because production personnel/employees are often busy in carrying out the tempe production process, other employees (outside the production team) can be assigned to clean and maintain the condition of the employee's facilities, if possible		✓
To ensure that the cleaning and maintenance activities of the employee's facilities are carried out properly, regular checks can be made of the condition of each facility using a paper picket schedule for employees, at least several times in one working day		✓
If cleaning is carried out for facilities intended for employees, then cleaning can also be carried out from rooms where various non-food materials are stored, so that they do not become nests of pests if they are not cleaned for too long		✓

Recommendations	Technical Recommendations	Managerial Recommendations
A special procedure for destroying unused materials or products can be established before they are disposed of in the trash, especially if the chemicals are potentially toxic, produce toxic gasses, or are flammable, which are harmful to the environment		✓
The liquid waste generated from the tempe production process can be processed first by the company before being discharged into the sewer. Various ways can be implemented to treat liquid waste based on various previous studies, which have been developed and socialized to local tempe producers. This liquid waste treatment needs to be carried out to reduce pollution of the high organic content contained in the tempe industrial wastewater in the waters.		✓
Examination of the conditions of labeling, storage, and use of chemicals can be further improved to prevent mistakes and confusion in the use of these chemicals		✓
Permanent production personnel/employees must anticipate the occurrence of irregularities in the labeling, storage, and use of chemicals, if unwanted events occur during the use of these substances	✓	
A medical examination program can be made for the health of production employees which is carried out routinely when there are conditions or situations in the environment that require active checks, such as when there is a pandemic or when there are other employees in the same building who have certain infectious diseases		✓
It is necessary to improve employee performance in terms of fulfilling SSOP in the production area or scope. If necessary, documentation and records related to SSOP implementation can be carried out		✓
Windows, doors, and vents can be furnished and installed with insect traps that have been used and measured according to the size of each window, door, and air vents	✓	

**Table 10.** Shows every recommendation given to the company and all the recommendations had been given to the company. The technical recommendations are given to the production division, and the managerial recommendations are given to the management department. The author gave a list of important recommendations that can be done immediately, that are cost-effective, and at least fulfill the FDA standards. The company then decides what changes should be implemented in the company.

After the observation was conducted, and the suggestion had been delivered, the SSOP implementation had significantly improved. The changes that can be seen are there is the staff that took turns cleaning the picket for surface contact (**Figure 2.**), hand washing facilities, and toilet (**Figure 5.**). The other significant improvements are there were reports on SSOP (**Figure 6**).

### **3.4. Conclusion and recommendations**

SSOP implementation in Rumah Tempe Pusbatara had a fulfillment score of 78.5%, which according to the FDA standard, is already passed. Rumah Tempe Pusbatara already implemented the SSOP procedures throughout the production process, and the results of the observations are in line with the expected sanitized results. However, there are some needs to be made to have better sanitation in the future. The easiest improvements and most direct changes are the addition of reports regarding all eight aspects of the SSOP. A future suggestion for the next project of the company to develop is to have a HACCP program and keep making rapid development in all aspects of the company.

#### **IV. REFLECTION**

From what the experience author had while doing a credited internship in Rumah Tempe Pusbatara, the author learned about the process of producing tempe, the optimum condition, and especially the SSOP. The author already knew beforehand that helped during the process of the internship. Knowledge from Indonesia International Institute for Life Sciences (i3L) learning plan helped the author to understand things quickly. Additionally, the time management and soft skills learned from the BRIGHT session helped the author to have good working knowledge and ethics.

The author was able to optimize the author's strength which is fast learning, hence, the author could learn quickly about new things and was able to communicate with other co-workers. However, the author's weakness, time management imposed the author to be on a tight schedule. The author was having a hard time dealing with the schedule since the author had another schedule outside of the internship project.

The author finished the EP internship from 1 August 2022- 15 December 2022. Courses from i3L, especially the food safety and quality management course helped the author to understand the project. Integrity from i3L also contributed to keeping the author having good working ethics.

The author made changes during the internship program which are the analysis of the SSOP for the company, and all the recommendations author provided could push the companies into rapid development.

The author is grateful for the experience, the lessons, and the kindness the author received during the internship program. The author is looking forward to being invited to do more company visits, and to help the company run, and looks forward to seeing Rumah Tempe Pusbatara's brand recognition become high enough to be recognized by all people around the world.

## **V. CONCLUSION AND RECOMMENDATION**

The author already met the expected result of the internship, where the minimum working days are 80-88 days. The author learned about the production of tempe, the sanitized way of making tempe, and the SSOP quality control throughout the production process. The author also finished the projects that are being given by the company.

To increase the next internship project, there could be more projects involved in the internship, and the institution could provide recommendations or assign the student to specific companies that are in line with students' interests, willing to educate, give projects, and guide students during the internship program.

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## APPENDICES

**Figure 4.** Availability of the employee cleaning the hand washing facilities



**Figure 5.** Availability of employee that is in charge of surface contact



**Figure 6.** Availability of record keeping system

KARTU STOK KACANG KEDELAI

Bulan / Tahun : Oktober / 2022

Tanggal	Nama	Keterangan	Masuk	Keluar	Stok	Checklist	Paraf
6/10/2022	Peter	Stok awal	<del>4955,62kg</del>	—	4955,62kg	✓	B
	Peter	PO 164 (Kacang)	—	—	4955,62kg	✓	B
	Peter	PO 165	4523kg	4910,36kg	4910,36kg	✓	B
7/10/2022	Peter	PO 166	10,2kg	4900,06kg	4900,06kg	✓	B
	Peter	BS PO 166	0,2kg	4899,86kg	4899,86kg	✓	B
10/10/2022	Peter	PO 167	11,91kg	4887,95kg	4887,95kg	✓	B
		BS PO 167	0,09kg	4887,87kg	4887,87kg	✓	B
12/10/22	PEKE	PO 168	25,70kg	4862,17kg	4862,17kg	✓	B
		BS PO 168	0,02kg	4862,15kg	4862,15kg	✓	B
14/10/22	Peter	PO 169 / PO 169	7,58kg	4854,57kg	4854,57kg	✓	B
14/10/22	Asim	Kinder APB					
17/10/22	Peke	jual ke Medan (As)	5,60kg	4798,97kg	4798,97kg	✓	B

**Figure 7.** Tempeh that are still in fermentation process

