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Analysis and Design of Work Systems using Hazard Analysis and Critical Control Points (HACCP) Standards at Mr. Sarbani's Tempe Jombor Sukoharjo

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Abstract - **MSMEs have very large number of actors so they play an important role in community welfare. One popular type of MSMEs is the food producer. This study focuses on UKM Tempe Pak Sarbani (UKMTS), who produces tempe, the traditional Indonesian food and is located in Jombor Sukoharjo. UKMTS production process is directly related to the production environment because it affects the level of productivity, smoothness, and timeliness of production. The tempe production processes at UKMTS are still manual, and have not met the conditions for the application of Good Processed Food Production Methods (CPP). At UKMTS production processes do not yet meet standards and have irregular facility arrangements which greatly hinder operators in carrying out the production process. Therefore it is necessary to improve the work system and design a repair work system based on HACCP principles to meet HACCP standards for the MSME scale. Based on all the discrepancies observed, currently the application of CPPB for UKMTS is at level 4. At this level, 9 critical control points are indicated which must be made critical, monitored and improved to avoid dangers that may occur. In the last stage of implementing HACCP in UKMTS, a documentation system was created for the monitoring process.**

Keywords *– HACCP, Production, Work System, MSME (UKM).*

PENDAHULUAN

Micro, Small and Medium Enterprises (MSMEs) is a very strategic national economic zone and concerns the livelihood of many people so that it becomes the backbone of the National economy. MSMEs are also the most economic actors in the economy in Indonesia because they have proven to be the key to securing the national economy[1]. So that it has a significant position in the welfare of residents and increases residents' income [2]. This shift is from traditional economic growth that emphasizes the agricultural zone to a more modern economic zone dominated by the industrial zone as the wheel of development.

Industry is the economic activity of managing raw materials, raw materials, semi-finished objects or objects of great quality in their use. Therefore, industry is a process of creation. One of the Micro, Small and Medium Enterprises (MSMEs) that uses the production process is Mr. Sarbani's Tempe, Jombor Sukoharjo, which was founded in 1990. Micro, Small and Medium Enterprises (MSMEs) Mr.Sarbani's Tempe produces 3 quintals of tempeh every day to be marketed to the canteen of PT Sri Rejeki Isman Tbk., Sukoharjo Market, Pondok Al Uquwah, and sold around by its employees.

The production process at Mr.Sarbani's Tempe MSME is still manual. Applying work methods in operations that are different from other MSMEs, because they adjust to the skill level of human resources, and how to maintain their quality (Sarbani, 2022). Some of the processes of making tempeh include boiling soybeans, soaking soybeans for one night, grinding soybeans to break up soybean seeds using a grinding machine, washing soybeans while removing the epidermis, draining for 2 hours, giving yeast to soybeans, packaging soybeans using 4 variants of plastic, and soybeans that have been

wrapped are left for 2 days on the shelf (Sarbani, 2022).

The production process is of course directly related to the production environment because it affects the level of productivity, smoothness, and timeliness of production. So it should be possible to use production policy procedures in order to maintain optimal production system productivity conditions. This can improve the quality of good products, and can work efficiently according to the production process[3]. From the BPOM information that displays that of the 4,007 creation facilities that were inspected, as many as 2,271(56, 68%) facilities among others did not meet the requirements, so they were unable to employ good manufacturing practices (GMP) invariably. Moreover, household food industries (IRTP) accounted for 75.91% of the total facilities that did not meet the requirements. From research of Muhandri & Kadarisman (2012), The characteristics or features that must be considered for a convenient processed food product include the quality of raw materials, process procedures, post-process contamination, and determination of critical control points. So this must be a concern for all MSME person.

But this is inversely proportional to the conditions in Mr Sarbani's Tempe MSME. The production process at Pak Sarbani's Tempe MSME is still constrained by the Standard Operational Procedure (SOP) and has not met the prerequisites for implementing the stages of Good Processed Food Production (CPP). This becomes critical waste, namely excess transportation during the production process that has no value added [5]. In addition, the uncertain time results in a decrease in work productivity because there is no standardized reference in the production process. Cleanliness assurance is still lacking because the production location is one location with a place to raise livestock, so the smell disturbs the operator, and the environmental conditions around the production process are also disturbed.

METHOD

Design, Place and Time

This research was conducted at Mr Sarbani's Tempe MSME Jombor Sukoharjo, in August 2022. The object of research is the product and production conditions in the Mr Sarbani's Tempe MSME Jombor Sukoharjo.

Number and method of taking subjects (surveys)/materials and tools

The tools and materials used in this study are logbooks, pens, PC, and interview sheets with workers.

Type and method of data collection (survey)/stages of research (laboratory)

The stages carried out in the research include: 1) Problem formulation, carried out to find case studies that will be resolved at the analysis and discussion stage. 2) Literature study and observation, carried out to find the theoretical basis that supports research and observation is carried out for observations about what is needed in data processing. 3) Data collection, carried out to find the data needed in the research.

Data processing and analysis

Processing, analyzing and designing work systems to meet Hazard Analysis and Critical Control Points (HACCP) standards at the MSME scale, including: 1) Problem formulation, carried out to find case studies that will be resolved at the analysis and discussion stage. 2) Literature study and observation, carried out to find the theoretical basis that supports research and observation is carried out for observations of what is needed in data processing. 3) Data collection to find the data needed in the research. 4) Data processing and analysis techniques from the results of data that has been obtained using the HACCP method. 5) Discussion, carried out to explain the process of designing work systems, improvements, and production time. 6) Conclusions and suggestions, carried out to describe the results of data processing as a whole, as well as suggestions given to future researchers to develop this research. The research framework for analyzing and designing work systems to meet Hazard Analysis And Critical Control Points (HACCP) standards at the Small Business scale details are show in Figure 1.

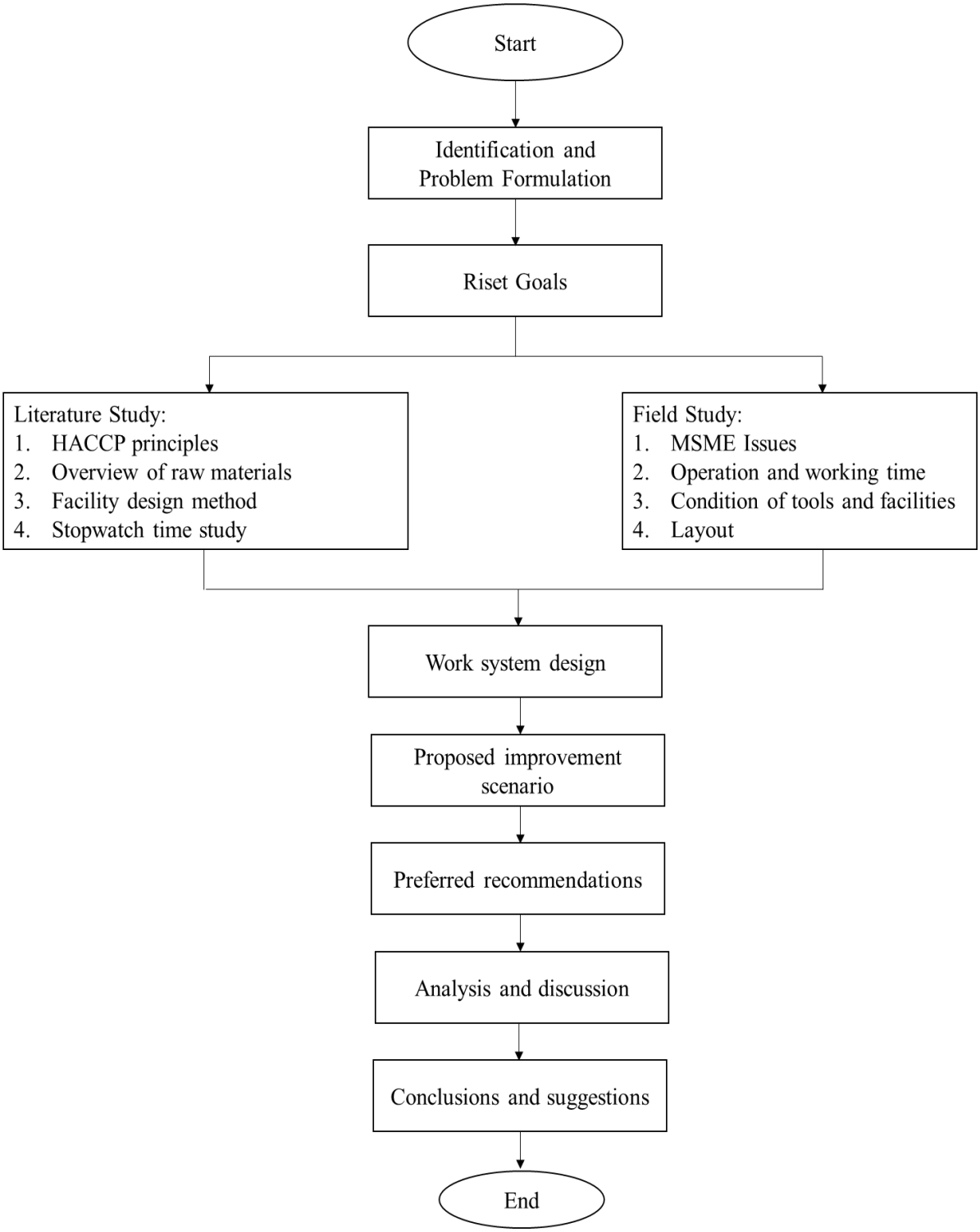

Figure 1. Research framework for analyzing and designing work systems to meet HACCP standards

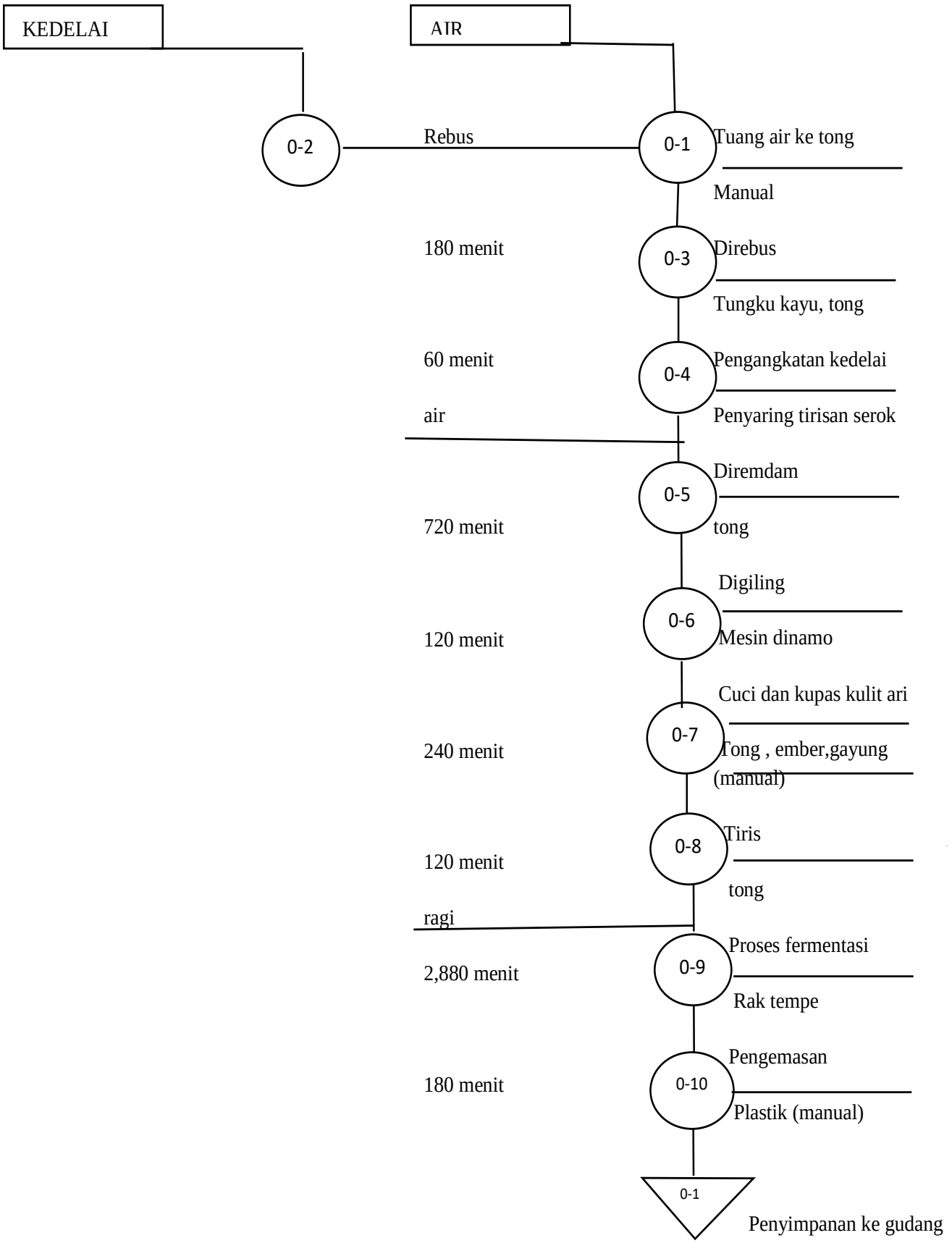

Figure 2. Operation Process Chart

RESULTS AND DISCUSSION

Process Chart

Mr Sarbani's Tempe MSME during the production process there are several stages, starting from the process of boiling soybeans to the fermentation process. This can be shown in the operation process map presented in Figure 2.

Assessment of CPPB Implementation in Mr. Sarbani's Tempe SMEs

Implementation of the Good Processed Food Creation Method (CPPB) is a prerequisite in the implementation of the HACCP system. In the CPPB-Household Industry requirements as stipulated by BPOM, the conformity evaluation is composed of 4 levels, namely "must", "should", "should", and "can", which are applied to the entire scope related to the process of creating, packaging, storing, and or transporting household food industry.

After completing the assessment stage, the implementation of CPPB-IRT in Mr.Sarbani's Tempe SME is located at level 4 (four). The evaluation is based on the number of non-conformities encountered, namely: 1) really as many as 3 elements, including the workplace environment that is poorly maintained and dirty because it becomes 1 room with a cowshed so that it creates an unpleasant odor for workers, equipment is not maintained, in dirty condition, and does not guarantee its usability, 2) Critical non-conformity as many as 2 elements, there is no closed garbage disposal; water from boiling and washing soybeans is placed in the production room bucket just like that. It can be concluded that Mr. Sarbani's Tempe SME has 5 elements of non-conformity with CPPB-Household Industry criteria. To improve the application of CPPB-Household Industry in Mr. Sarbani's Tempe, the details are presented in Table 1.

Table 1. Suggestions for Improving CPPB-Household Industry in Pak Sarbani Tempe SMEs

No	CPPB Elements	Suggested improvements
1	poorly maintained and dirty workplace environment	Provide a separate partition from the cowshed to maintain the cleanliness of the production room, and reduce unpleasant odors in the production room.
2	equipment is not maintained, is in a dirty condition, and its effectiveness is not guaranteed	Maintenance and care of production equipment, always washed after use in order to be effective in the application of sanitation.
3	No covered waste disposal sites	Facilitate a place or location for covered garbage disposal
4	The water from boiling and washing soybeans is placed in a bucket in the production room just like that.	Soybean washing and boiling wastewater storage in a different place from the production room so as not to disturb the comfort of employees.

Implementation of HACCP in Mr.Sarbani's Tempe SMEs

The study of the application of HACCP in Tempe Pak Sarbani SMEs that produce tempeh is carried out through the stage of assessing the truth in the field and comparing with the HACCP reference released by the National Standardization Agency (BSN) regarding the Hazard Analysis System and Critical Point Control (HACCP) and guidelines for its implementation. This study is intended to create a management system for monitoring and controlling the safety of tempeh products produced. The implementation of HACCP is preventive, scientific, rational and systematic with the aim of recognizing, monitoring and managing hazards starting from the preparation of raw materials, throughout the process of creation and processing, storage, and marketing.

The implementation of the HACCP system in Mr. Sarbani's Tempe SME goes through a process in accordance with the stages in the implementation of HACCP. HACCP implementation, among others: 1) Creation of the HACCP team, 2) Product description, 3) Identification of intended use, 4) Flow chart, 5) Flow chart verification, 6) Hazard analysis, 7) Determine critical control points, 8) Establish critical limits, 9) Establish monitoring procedures, 10) Establish revision actions. The implementation of HACCP steps and principles at Mr.Sarbani's Tempe SME is used to provide recommendations for preventive action at each critical control point.

Mr. Sarbani's Tempe SME has 3 employees. In the early sessions, coaching was attempted as well as the provision of basic knowledge and skills about

quality, food safety, and good and correct methods of creating processed food. The HACCP team at Mr. Sarbani's Tempe SME was built independently with the owner of the SME as the chairman and members of the employees. In order for the implementation of the system to run well, it needs to start with the commitment of the owner as the person responsible for the quality and safety of the products produced. SME owners share instructions and work procedures for implementing food quality and safety systems. This was attempted with short teaching, modeling, supervision and assessment of the implementation of the HACCP in stages.

The next step is to conduct a product description to provide identification of the products produced by Mr.Sarbani's Tempe SMEs. Mr. Sarbani's SME produces tempeh as a food ingredient. The description of tempeh produced by Mr.Sarbani's SME is presented in Table 2.

Table 2. Product Description

Description	Information
General Name	Mr. Sarbani's Tempe
How to Consumption	Need to cook before consumption
Type of Packaging	Plastic-leaves
Customer	Sukoharjo market, grocery stalls, Pondok Al Uquwah, Sritex canteen

Based on table 2 above, it is known that the raw material for Tempe is soybean. It is necessary to identify the hazards of raw materials so that hazard prevention can be carried out. Hazard identification on raw materials is detailed in table 3.

Table 3. Hazard Identification (Raw Materials)

No	Materials	Type of hazard	Hazard source	Action
1	Soybean	Reaksi enzimatis	Room temperature, and humidity	Stored at 10˚ C and 9% moisture content to maintain seed quality Recommended relative humidity for soybean storage between 70-75%
2		Heat and ultraviolet	Light	Reduce lighting so as not to reduce palmitic, oleic, and linoleic acid levels that may affect overall seed quality
3		Aspergillus, Penicilium fungi	Pests	Stored in stable room conditions, i.e. temperature between 20˚ C and Rh < 50%
4		Water content, gravel, twigs, leaves, plastic, packaging	Shipping process from supplier to SME	Manual inspection (visually), or using a machine

CCP Determination

The determination of CCPs in Mr. Sarbani's Tempe SME is the first step in identifying critical activities that are likely to cause harm. The tempeh production process has a category of critical points that require control with details presented in Figure 2. After analyzing the critical points of danger in each tempeh manufacturing process, then proceed with Determining critical limits, monitoring methods and frequencies for each critical point, and corrective actions that should be taken in case of non-conformity. Corrective actions at each critical stage of tempeh making in Mr. Sarbani's Tempe SME are presented in Figure 3.

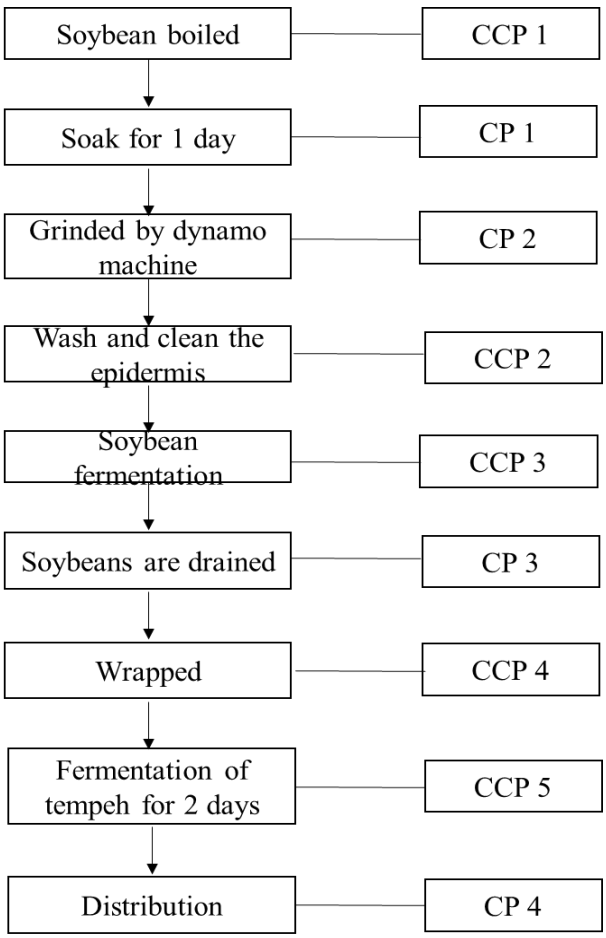

Figure 3. Critical points that require control

After identifying the critical points in Figure 3 above, the next corrective action is carried out for the Tempe making process of Mr. Sarbani's SME, which is presented in Table 4.

Table 4. Corrective actions for Mr. Sarbani's Tempe making process

Step	Critical limit	Monitoring		Corrective Action
		Method	Frec.	
Boil	Tools used are clean, environment sanitized	Check the stainless vat for boiling and the cleanliness of employees and the environment	Every production	Monitoring
Soak	Equipment used is clean, environmental sanitation	Make sure equipment is clean, such as collection buckets and use clear water	Every production	Monitoring
Grind with dynamo	Equipment used is clean, environmental sanitation	Make sure the utensils are clean, with no soybean residue still attached.	Every production	Monitor the grinding container must be clean, check the machine condition
Wash	The water source used is clean, colorless, and free of microbes	Replace really clean water regularly	Every production	Monitoring the use of quality water
Ragi	Use tempe yeast according to the specified portion	Pay attention to the limit of yeast storage time, and use original quality yeast as tempe fermentation material.	Every production	Monitoring the level of yeast used
Sliced	The equipment used is clean, and the storage area is clean from dust, and other impurities that can reduce the quality of tempe	Make sure the storage room is clean and in good condition	Every production	Visually observe the cleanliness of the equipment, and periodically control the state of the soybeans
Packing	Packaging should be clean, appropriate in size, and pay attention to the cleanliness of the production environment	Make sure the packaging used is really clean'	Every production	Monitor packaging for cleanliness
Fermentation	Watch for the growth of fermented mushrooms on the forge to mature completely, within 2 days	Check the fermentation progress and visually see the tempeh mold to ensure the level of maturity.	Every production	Monitoring the doneness of tempe
Distribution	Product does not come into direct contact with floors, walls, and other equipment.	Pay attention to the cleanliness of the tools used for distribution	Every production and distribution	Monitor quality, quantity, cleanliness.

Documentation of HACCP Implementation

The last stage of the implementation of the HACCP system at Mr, Sarbani's Tempe SMEs, is to record and document all work in the implementation process. Good documentation can help determine whether or not the implementation of the HACCP system has been processed properly.

In order for the implementation of the HACCP system to be carried out until the early steps of implementing this system are tried with the commitment of the SME owner who has influence. The next step is to introduce the HACCP system with a simple method to the workers by sharing examples and exemplary in its implementation. After that after the system is started there needs to be monitoring and familiarization in all participating teams. The form that is made must be simple and easy to understand, each team feels that this activity is easy to do, and becomes a routine for each team on duty. It is hoped that the implementation, evaluation and revision of the implementation of the HACCP system in Pak Sarbani's Tempe UKM can be tried well.

CONCLUSION

The implementation of HACCP in Mr. Sarbani Tempe SMEs begins with assessing the execution of the Good Processed Food Creation Method (CPPB),

which is a prerequisite for the implementation of HACCP system. The implementation of CPPB in Mr. Sarbani Tempe SMEs is executed at level 4 based on the number of non-conformities encountered. After carrying out the revision action, it continues by identifying the hazard determinations that need to be controlled in each stage of the tempe creation process.

In this session, there were 9 critical control points that needed to be made critical limits, monitoring and revision actions that needed to be tried to estimate the hazards that could arise. In the final session, the implementation of HACCP in Mr Sarbani's Tempe SMEs a documentation system was placed so that the implementation of the system can be monitored, evaluated, and revision actions employed to correct any errors or mistakes that were found.

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REFERENCES

[1] K. Basuki, “Peran Usaha Mikro Kecil dan Menengah (UMKM) dalam M ensejahterakan Karyawan di Pusat Oleh-oleh Mak Denok Desa Serdang Jaya Kabupaten Tanjung Jabung Barat,” *ISSN 2502-3632 ISSN 2356-0304 J. Online Int. Nas. Vol. 7 No.1, Januari – Juni 2019 Univ. 17 Agustus 1945 Jakarta*, vol. 53, no. 9, pp. 1689–1699, 2019.

[2] M. Medriansyah, “Peran Usaha Mikro Kecil Menengah (UMKM) dalam Meningkatkan Kesejahteraan Masyarakat Menurut Perspektif Ekonomi Islam (Studi pada Usaha Tempe di Desa Sumber Jaya Kecamatan Jati Agung Kabupaten Lampung Selatan),” UIN Raden Intan Lampung, 2017.

[3] E. W. Mulyana, “Pengaruh Lingkungan Kerja Terhadap Produktivitas Produksi Pada Toko Pormil, Cibaduyut, Bandung,” Universitas Islam Indonesia, 2012.

[4] T. Muhandri and D. Kadarisman, *Sistem Jaminan Mutu Industri Pangan*. Bogor: IPB Press, 2012.

[5] N. A. N. Annisa, Sugiono, and C. F. M. Tantrika, “Pendekatan Lean Six Sigma untuk Mengurangi Waste Proses Produksi Brown Paper (Studi Kasus: PT. Kertas Leces, Kabupaten Probolinggo),” *J. Rekayasa dan Manaj. Sist. Ind.*, vol. 2, no. 2, pp. 406–417, 2014.