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Assistance in the Implementation of Hazard Analysis Critical Control Point (HACCP) and Quality Control: Food Industry Analysis

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ABSTRACT

The quality and food safety management system currently implemented is HACCP (Hazard Analysis Critical Control Point). Supporting factors that are prerequisites for the effectiveness of implementing HACCP as a quality control system is the fulfillment of basic feasibility requirements. This research uses a qualitative approach. The method used is descriptive verification to obtain an accurate and actual picture of the facts and nature of the relationships between phenomena discovered by CCP in the process flow. Problems that occur in the development of home industries such as the non-borax onion shell processing business include low quality, quality, quality control, and food safety. So, to achieve good quality puli crackers and according to the required criteria, namely SNI No.01-4307-1996, supervision and control need to be carried out at every stage of the process, starting from receiving raw materials until the product is ready to be marketed. On the other hand, a quality control concept system is needed to minimize errors in the production process and the risk of food safety hazards, one of which is by implementing the Hazard Analysis Critical Control Point (HACCP) concept. From the results, this research can be concluded that the shell processing unit at the research location at CV Marsudi Luhur has not implemented a quality control system and HACCP properly. Research result It is hoped that this can be used as a basis for further research on quality and safety assurance of food and environmental quality for making non-borax onion shells around the Sukoharjo district.

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Introduction

Small and Medium Enterprises (SMEs) are part of Indonesian economy's pillars, because face the problem of low productivity levels that can affect business competitiveness both locally, regionally and internationally. (Poernamasari, 2023) SMEs come from asmall community economic sector with a local scale, local resources, and simple production processesthe product sold locally. The role of SMEs in the economy includes supporting national economic growth, distributing development results and creating jobs, reducing unemployment and alleviating povert. SMEs also play a role in analyzing business opportunities, influencing consumers in making decisions, and being able to seize market share and new markets.This is what makes SMEs a vital engine driving the economy. Data published by the Ministry of Cooperatives and SMEs of the Republic of Indonesia (Ministry of Cooperatives and SMEs, 2022) stated that Central Java Province is ranked first in total SMEs for 2010-2022. Based on this data, it can be seen that Central Java province has the largest number of SMEs, thus the development of SMEs in Central Java needs to be increased to create a positive impact on the Indonesian economy (Achsa et al., 2023).

Puli crackers are a traditional Javanese food. These puli crackers are made by frying using medium-hot coals so that they can develop perfectly when cooked the brownish-yellow color is a sign that the crackers are cooked. The basic ingredients for puli crackers come from rice that is cooked almost cooked, mixed with garlic flavoring and liquid salt. However, problems that occurred in the development of home industries include Puli crackers the safety of the food to make sure that the crackers were fried using non-borax oil. Borax is a chemical compound in the form of transparent crystalline powder or white granules that are colorless, odorless, and slightly sweet (Hartanti, 2017). The addition of borax to food is usually to improve elasticity and crunchiness, and provides a savory taste and density, especially in types of food that contain starch.

Bleng is a food additive whose use has been prohibited by the Ministry of Health because contains borax so it can harm human health and even cause death. Solid bamboo contains 12% borax, 60% table salt, 28% sodium carbonate, and 0.4% minerals, such as iron and calcium (Mas'ud, 2014). According to Minister of Health Regulation No.722/Menkes/Per/IX/88 concerning Food Additives, borax is declared a dangerous ingredient and is prohibited for use in making food, because it is toxic to all cells and can hurt human health. However, there are still many people who use solid fertilizer/borax (Mutiah and Ayyun, 2020).

To protect people from consuming borax, it is necessary to make non-borax karak, where in this research cassava starch was used as a substitute. The quality or quality of non-borax onion shell products is determined by the characteristics of each product and the ingredients from which it is made (Nurkhamidah *et al*, 2018). A quality control concept system is needed to minimize errors in the production process and the risk of food safety hazards, one of which is implementing the *Hazard Analysis Critical Control Point* (HACCP) concept.

HACCP is a food safety management system, with a strategy to prevent hazards and risks that occur at critical points in the food production chain (Rejeb, 2018). Because HACCP is known as an effective food safety system, by implementing HACCP consistently, food companies will be able to give customers confidence in the food safety guarantees they provide. As well as giving a good impression that the food industry fulfills a strong and professional commitment to ensuring food safety (Ryandono et al., 2022). So it is hoped that the quality of the products produced will be guaranteed through better food safety monitoring.

As a result, this study was interested in analyzing and providing suggestions and input to the home industry of Solo Marsudi Luhur from Mojolaban, Sukoharjo in implementing quality control and the HACCP (*Hazard Analysis Critical Control Point)* concept in the Small and Medium Industry of Karak Non-Borax. The theoretical contribution of this research is that MSMEs will get an HACCP design and quality assurance for companies to be able to supervise non-borax onion peel production activities. Meanwhile, the theoretical contribution of this research is that food companies will be able to give customers confidence in the food safety

guarantees they provide. As well as giving a good impression that the food industry fulfills a strong and professional commitment to ensuring food safety. So it is hoped that the quality of the products produced will be guaranteed through better food safety monitoring.

Literature Reviews

Rice Crackers

Crackers are a simple side dish and are used as a simple side dish and as a side dish, because they taste savory and delicious which can increase appetite (Sudaygara et al., 2021). Judging from the raw materials, many types of crackers can be produced, such as rice crackers, fish crackers, shrimp crackers, soybean crackers, and others with variations in the shape of the crackers depending on the creativity of the maker (Ruhana *et al*, 2023).

According to SNI (1996), Karak or rice crackers are dry food products, which are made from cooked rice (Oryza *sativa) with the addition of salt and permitted food additives, both in raw and fried form.* The conditions that have been determined can be seen in Table 1 below:

Table 1 Quality Requirements for Rice Crackers (SNI 01-4307-1996)

No	Test Criteria	Unit	Condition
1.	Circumstances		Normal
1.1.	Smell		Normal
1.2.	Flavor		Normal
1.3	Color		Normal
1.4	Apparitions		Crispy
1.5	Wholeness	% w/w	Min. 95
2.	Foreign objects		There can't be
3.	Water	% w/w	Max. 12
4.	Ash without salt	% w/w	Max. 1
5.	Food additives		
5.1	Dye		Following SNI 01-0222-1995 and Regulation Men Case No. 722/Min. Case/Per/IX/88 There is no
5.2	Borax		
6.	Metal contamination:		
6.1.	Lead (Pb)	mg/kg	Max. 2.0
6.2.	Copper (Cu)	mg/kg	Max. 30.0
6.3.	Tin (Sn)	mg/kg	Max. 40.0
6.4.	Zinc (Zn)	mg/kg	Max. 40.0
6.5.	Mercury(Hg)	mg/kg	Max.0.03
7.	Arsenic (Pb)	mg/kg	Max. 1.0
8.	Microbial contamination		
8.1.	Total plate numbers	Col/g	Max. 1 x 10^{6}
8.2.	*E. coli*	APM/g	< 3
8.3.	Mold	Col/g	Max. 1 x 10^{5}

Source: BSN, 1996.

According to Sudaygara and Dinullah *et al* (2021), the quality of Karak or puli crackers is largely determined by several factors as follows.

1. Appearance
   Several elements determine the appearance, namely the color and shape of the crackers, which are closely related to one another. In general, consumers prefer puli crackers that are thin, light yellow (cream), not too big, and crunchy.
2. Taste
   puli crackers generally only have a distinctive and salty taste, because spices are rarely added to them when made.
3. Durability
   Good quality puli crackers are fried in good cooking oil and can be stored for quite a long time.
4. Packaging
   Good packaging will help extend the shelf life/storage of Puli crackers. With good packaging, Puli crackers will be protected from various types of contamination from dust, liquid, and dirt, and will not easily get soggy.
5. Crunchiness/Hardness
   When compared with other crackers, traditional puli crackers still have a higher level of hardness, which will hinder consumption.
6. Nutritional Element Content
   Consuming various types of food is done to be able to obtain and absorb the nutritional elements contained in the food. These nutritional elements are needed by the body to carry out the body's metabolism, growth, and development. Therefore, crackers with complete and high nutritional content are one option.

HACCP

The HACCP system is based on science and systematics, identifying hazards and controlling them to ensure food safety. HACCP is a tool for assessing hazards and establishing control systems that focus on prevention rather than relying mostly on final product testing. Each HACCP system accommodates changes such as advances in equipment design, processing procedures, or technological developments. HACCP can be applied to the entire food chain from primary products to final consumption and its application must be guided by scientific evidence of human health risks. Apart from improving food safety, implementing HACCP can provide other important provisions. Furthermore, the implementation of the HACCP system can assist inspections by authorized institutions and promote international trade, through increasing food safety confidence.

Hazard Analysis Critical Control Points (HACCP) is a quality assurance system that is based on awareness or appreciation that dangers can arise at the production stage but controls can be implemented to control these dangers. The main key to HACCP is the anticipation of hazards and identification of control points that prioritize preventive measures rather than relying on final product testing. This system is not a guarantee of food safety without risk but is designed to minimize the risk of food safety hazards. This system is also considered to protect raw materials from the production process against contamination by hazards (Winarno, 2004).

According to Prayitno and Sigit (2019), the HACCP system consists of seven principles that function to identify certain hazards and the preventive actions that need to be taken to control them.

1. Principle 1: Identify potential hazards associated with food production at all stages, from farming, handling, processing in factories, and distribution, to the point where the food product is consumed. Increase the likelihood of a hazard occurring and determine preventive measures to control it.

2. Principle 2: Determine the point or stage of operational procedures that can be controlled to eliminate a hazard or reduce the possibility of the hazard occurring. CCP (Critical *Control Point*) means every stage in food production and/or factories which includes raw materials received and/or produced, harvested, transported, formulated, processed, stored, and so on.
3. Principle 3: Establish critical limits that must be achieved to guarantee that CCP is present.
4. Principle 4: Establish a CCP control monitoring system utilizing testing or observation.
5. Principle 5: Establish corrective actions to be implemented if monitoring results indicate that a particular CCP is not under control.
6. Principle 6: Establish verification procedures that include additional testing and adjustment procedures that confirm that the HACCP system is operating effectively.
7. Principle 7: Develop documentation regarding all appropriate procedures and records for these principles and their application

Methodology

This research uses a qualitative approach. Qualitative research is a research process to understand human or social phenomena by creating a comprehensive and complex picture that can be presented in words, reporting detailed views obtained from informant sources, and carried out in a natural setting. is qualitative research because it does not start from theoretical deduction, but starts from the field, namely based on empirical facts (Fadli, 2021). In this study, researchers obtained data from informants, namely daily workers and owners of the MSMEs as well as residents around the MSMEs Research activities were carried out at the Central Laboratory of the Faculty of Mathematics and Natural Sciences, Sebelas Maret University, Surakarta, and at CV Karak Bawang Non-Borax Non-MSG "Ibu Marsudi" in Dowulung hamlet RT 02 / RW V, Dukuh village, Mojolaban subdistrict, Sukoharjo district.

The method used is descriptive verification to obtain an accurate and actual picture of the facts and nature of the relationship between phenomena found by CCP in the process flow and significant dangers in the form of foreign object contamination as well as chemical and microbiological contamination in the product. Preventive measures taken include separating products and marking deviant products as well as repairing the auto stop system and monitoring by the team HACCP Non-Borax Onion Karak. In addition, a hazard risk analysis method, a method for determining the significance of hazards, as well as a decision tree diagram for determining critical control points are used (Citraresmi and Wahyuni, 2018). The principles of the HACCP system used in this research were adapted from SNI 01-4852-1998 consisting of 7 principles or steps which can be seen in the following diagram:

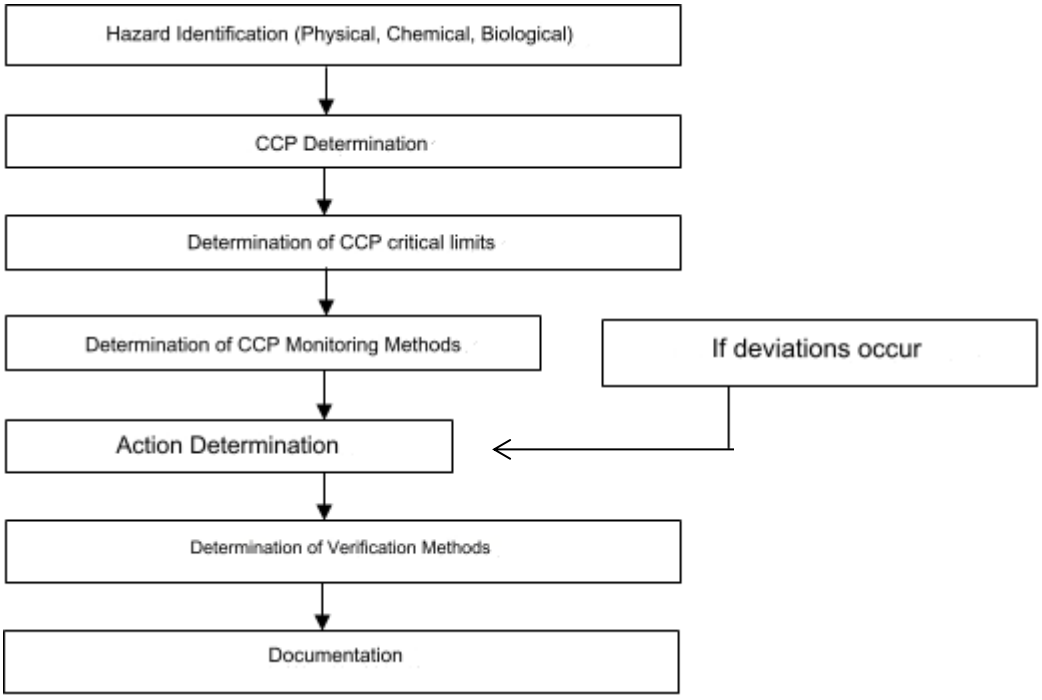

Figure 1 Decision tree

Results and Discussion

A. Quality Control

Quality control or QC is a process carried out to check, measure, test, and ensuring that the products made are in accordance with established standards company in business. This standard itself will emerge from the results of meetings and adjustments with market demand, and the value to be conveyed in the product (Arisandi et al., 2022). In practical terms the process, and the staff tasked with carrying out this process, are parts important for the company. This is due to the expected work results of this process can help the products made to remain at the targeted quality, and continue increases over time. When the QC process goes well and according to procedures, the product is released to the market will be guaranteed quality and quality. Customers will feel satisfied, and the companywill continue to earn income from product sales (Ekonomi, 2019). Not only control and ensure product quality, the task of QC staff is to determine product standards in accordance with what the company wants to achieve. This standard setting is not only oriented towards customer satisfaction, but also productivity, effectiveness and efficiency processes that occur within the company.After preparing the product standards that the company will make, the next task is QCis to monitor and ensure product quality is appropriateset (Budiman et al., 2021). Collaboration with the quality assurance department will occur, in order to meet targets from this second task so that the products released to the market can be of truly high quality (Yudha et al., 2022).

Raw material quality control is intended to monitor raw materials and raw material specifications for making non-borax onion shells. Quality control is carried out by comparing the raw materials used and the specified requirements. One way to carry out quality control is to manually see the appearance of the raw materials used including color, taste, texture, cleanliness and can be seen from the level of maturity of the raw materials (Ahmad and Fitria, 2021). In delivering the HACCP and quality control implementation material, he was accompanied by 2 food technology lecturers and testing was carried out by chemical laboratory technicians at Sebelas Maret University, Surakarta.

Table 2 Specification and Quality Control to Improve the Non-Borax Garlic Production Process

Making process	Parameter	Critical Limit	Control Procedures	Corrective Action
Washing	- Equipment cleanliness - Rice is free from foreign objects and impurities	- Equipment condition is clean - Rice is free from foreign objects and impurities	- Wash tools with soap every time and after use - In process of making non-borax onion shells, workers' hands must be clean / wear gloves - Workers must be careful during washing process	- Observation of the cleanliness of equipment, workers, and equipment before or after use as well as careful observation of raw materials that have been washed
Steaming	- How to steam - Equipment cleanliness - Condition/texture of rice - Steaming time	- The steaming process can be controlled - Equipment condition is clean - Soft rice texture - Steaming time 2 hours	- Steaming uses tools with clearer time and temperature controls - Tools and workers' hands are washed with soap before and after use	- The steaming process uses a tool equipped with temperature and time settings - Observation of the cleanliness of tools, workers, and equipment before or after use
Pulverization	- Equipment cleanliness - Worker sanitation - Environment sanitation - Product texture	- Clean mashing tool - Worker hygiene is maintained - A closed room without direct contact with air	- Wash the pounding tool with clean water and soap - Workers wear full clothing and maintain personal hygiene	- Observe the cleanliness of the equipment before or after use - Workers wear full clothing - The room for the pounding process is separate and does not have direct contact with outside air
Milling	- Equipment cleanliness - Worker sanitation - Environment sanitation - Product texture	- The printer is clean and works well - Worker hygiene is maintained - The dough is not contaminated with outside air and the environment during the process - The product texture is smooth and even	- Use tools that are clean and can work properly - Implementation of good sanitation for the environment and workers - The equipment used is expected to be closed so that it is not contaminated with outside air and the surrounding environment	- Tool cleaning is carried out regularly - Always wash your hands using disinfectant soap - During the process it is expected that the tool will work in a closed manner - Pay attention to environmental sanitation where the process takes place
Printing	- Printing room - Sanitize tools	- Closed printing		

	- Printer size - Environment sanitation	room - Clean dough holder mold - Printer size 60x30 cm - Clean environmental	- The printing process in a room that does not have direct contact with outside air - Please clean the mold every time and after - Clean the environment at the processing site	- Mold cleaning is carried out periodically - Always wash your hands using disinfectant soap - Pay attention to environmental sanitation where the process takes place

Making process	**Parameter**	**Critical Limit**	**Control Procedures**	**Corrective Action**
Cooling	- Cooling room - Worker sanitation - Karak texture - Temperature	- No air pollution - Worker hygiene is maintained - The texture of the Karak is a bit hard after cooling - Room temperature	- Use a closed room and there is no contamination from the outside air - Implementation of good sanitation - Check the temperature to match the desired product results	- Cooling is carried out using a special closed tool to prevent contamination from air pollution - Always wash your hands using disinfectant soap
Cutting	- Size uniformity - Dough cutting room - Sanitize tools - Worker sanitation - Drying room - Temperature and time	- Character size is uniform - No air pollution - Tools are free from contamination - Worker hygiene is maintained - No air pollution	- Be careful when cutting the dough - Use a closed room and there is no contamination from the outside air - Implementation of good sanitation	- Observations were made of tools and workers - Pay attention to size uniformity with the sorting process - Use of a special room that does not have direct contact with outside air
Drying	- Drying method	- Room temperature - Time 3 days - The steaming process can be controlled	- Use a closed room and there is no contamination from the outside air - Check temperature to match desired product results - Steaming uses tools with clearer time and temperature controls	- Cooling is carried out using a special closed dryer to prevent contamination from air pollution - The steaming process uses a tool equipped with temperature and time settings
Packaging	- Packaging Safety - Neatness of packaging	- Packaging can protect the product well - The packaging is tightly closed	- Use of primary packaging with PP plastic	- Packaging product using primary packaging with PP plastic accompanied by trademark, composition, and

expiration date.

Source: Observation Results

Controlling the quality of the final product is important so that product quality remains guaranteed, which can be well received by consumers and meets the specified quality characteristics (Sonalia and Hubeis, 2020). In controlling the quality of the final product, several analyses are carried out, the results of which will be compared with SNI 01-4307-1996 (Table **5**). SNI 01-4307-1996 is an SNI regarding rice crackers. This aims to find out whether the results of the non-borax onion carcass test at IRT "CV Solo Marsudi Luhur" can meet the SNI parameter standards or not. Test analysis carried out included water content, ash content without salt, borax, total plate number, mold, and yeast. The test results for non-borax onion peel can be seen in Table 6. The final quality testing of non-borax onion shells does not fully meet SNI standards. The test parameters that were not met were the analysis of the total plate number test and the mold and yeast tests. For more details, it is as follows:

Table 3 Results of Test Analysis of Non-Borax Onion Karak Products

Types of Analysis	Analysis Results	Test According to SNI
Circumstances:		
Smell	Neutral	Normal
Flavor	Neutral	Normal
Color	Like	Normal
Appearance	Like	Crispy
Wholeness (%w/w)	99.9%	Min 95%
Water content	11.36%	Max. 12%
Ash Content Without Salt	0.37%	Max. 1%
Total Plate Numbers	$9.3x10^{6}$	Max. $1x10^{5}$
Kapang and khamir	$14.3x10^{7}$	Max. $1x10^{4}$
Borax	Not apparently	Not apparently

Source: Analysis Results

The test results on the parameters above showed that non-borax onion shells in Mojolaban, Sukoharjo in the analysis of total plate number testing and mold and yeast testing do not meet the requirements according to SNI 01-4307-1996 standards. SNI states that the maximum mold that can be present in a sample is $1x10^{4}$. The characteristics of mold and yeast that can grow are that the mold is not shiny, tends to be flat, grows upwards, and is not slimy. Apart from that, the mold is white and has hyphae or fine threads. The white color that we often encounter is mycelium (a collection of hyphae). the non-borax onion peel sample had a yeast mold value that exceeded the standard so the mushroom sample was not suitable for consumption. High numbers of yeast molds are dangerous for consumer health. These conditions allow the growth of certain types of mold, such as the Aspergillus species (sp). Aflatoxin produced by Aspergillus sp. is toxic because it can cause cirrhosis and liver carcinoma.

The number of molds and yeasts is large, and there is the presence of the fungus Aspergillus sp. shows a decline in the quality of traditional medium cannot grow at hot temperatures so during incubation the mold is incubated at room temperature because at that temperature the mold can grow optimally, namely at a temperature of 20 ^{o}C-30 ^{o}C. The growth of mold and yeast is also influenced by improper storage so it is easy to be contaminated by the external environment.

b. Hazard Analysis Critical Control Point (HACCP)

HACCP is a control system that is preventative or preventive against the possibility of poisoning or disease through food. Hazard Analysis Critical Control Point is an analysis carried out on materials, products or processes to determine which components, conditions or process stages must receive strict supervision with the aim of ensuring that the product The resulting product is safe and meets the specified security requirements The HACCP system is not a zero-risk food safety guarantee systemor no risk, but designed to minimize the risk of food safety hazards. The HACCP system is also considered a management tool used for protect the food supply chain and production processes against microbiological, chemical and physical contamination (Nur hamzah et al., 2023). Food science experts argue that HACCP provides important elements in a security management systemand GMP (Good Manufacturing Process) systematically and easily implemente. HACCP looks at the production/product process from start to finishFinally, determining where hazards may arise, controlling and monitoring,write this down by recording the activity, and try to do it regularlycontinuous and effective (Okky, 2023).

HACCP is a systematic approach to identifying, controlling, and reducing hazards in food ingredients or products that can endanger consumers. What is meant by danger is a physical, chemical, and biological component or factor which, if not controlled, has the potential to cause human health problems (Vatria, 2020). The design or concept of *Hazard Analysis Critical Control Point* (HACCP) in the small industry of making non-borax onion shells at IRT "CV Solo Marsudi Luhur" aims to design a working system based on HACCP that is appropriate to the business unit level as well as to minimize danger or contamination of the product non-borax onion shells so that the quality of the non-borax onion shells obtained is not dangerous for consumers.

The scope of the HACCP implementation method in the non-borax onion shell small industry includes observation of the main raw materials and additional raw materials (onions, salt, and water), observation of the production process, as well as analysis of final product testing (Pt *et al*, 2020) which is adjusted to the quality parameters of the shell non-borax onions are the quality requirements of SNI 01-4299-1996. The main principle of HACCP is to analyze hazards and determine the critical point of the hazard so that preventive action can be taken. The stages of implementing HACCP are identifying hazards arising from physical, chemical, and microbiological hazards. Then this study determined *the Critical Control Point* (CCP), critical CCP limits, monitoring methods, and corrective actions that must be taken by the manufacturer. The next activity is the verification of the overall processes.

Product Description

The first step, namely identifying the product, aims to find out more details about the composition, components, specifications, packaging, storage conditions, and so on. The product that will be identified is a non-borax garlic carcass from IRT "CV Solo Marsudi Luhur" which can be seen in **Table 4** below:

Table 4 Product Description of Non-Borax Garlic Karak "CV Solo Marsudi Luhur"

Types of products	Non-Borax Onion Karak
Main Raw Materials	Pera Rice
Additional Raw Materials	Sugar, salt, garlic, and water
Packaging	0.5 mm PE plastic packaging
Shelf life	3 months
Storage suggestions	Stored in completely closed and dry packaging, and avoid direct contact with the sun and the temperature of the refrigerator
Labeling	use a label on the plastic packaging containing the name of the IRT and the location of the IRT along with product advantages

Sensitive Populations	None can be consumed generally
How to use	Requires frying treatment first before consumption

Source: Observation results

Preparation of a Flow Chart for the Process of Making Non-Borax Onion Karak

A flow diagram is a process flow that covers all stages of the production process. The process flow diagram presents the stages of operations which are continuous with each other and the process flow diagram will identify important process stages starting from receiving raw materials to becoming the final product. This flow diagram plays an important role in determining hazards and determining critical points. All production stages must be listed in the process flow. Flow diagram of the production process for making non-borax onion shells which includes washing, steaming, pounding, grinding, molding, cooling, cutting, drying, and packaging to obtain the final product of non-borax onion shells.

Hazard Analysis

Hazard analysis is an important stage in planning the implementation of HACCP. Hazard analysis is carried out by compiling a list containing all the potential hazards related to each stage, carrying out an analysis of the potential hazards that have been identified, analyzing the hazards in the raw materials and the stages of the process of making non-borax onion shells also using a *decision tree*. Hazard identification can be done at every stage of the process. What is meant by danger is all kinds of aspects of the food production chain that are unacceptable because they are the cause of food safety problems. These food safety hazards include the undesirable presence of biological, chemical, or physical contamination in raw materials and processing stages. Analysis of hazards in raw materials can be seen in Table 5, accompanied by the emergence of hazards and control measures following the results of *the decision tree.*

Table 5. Analysis of Main Raw Materials and Additional Raw Materials

No	Raw material	Identify hazards		Reason	Control measures
		Type	Danger		
Main Raw Materials					
1.	Pera rice	Physique Chemistry Biology	- Sand - Dust - Pesticide - Mold and insects	- Purchasing process from market supply to receipt of IRT "CV Solo Marsudi Luhur" - Incorrect handling of raw materials	- Improvements in receiving raw materials from suppliers. - Selection of raw material suppliers. - Manual inspection is like visual. - Buy safe rice. - Store raw materials at room temperature (not damp). For a short period and store well.
Additional Raw Materials					
1.	Garlic	Physique Chemistry Biology	- Dust - Onion skins - - Microbial contaminati on (fungus)	- Purchasing process from market supply to receipt of IRT "CV Solo Marsudi Luhur"	- Storage is carried out in a closed container in a dry place and free from contamination. - It is best not to store garlic for too long so that its quality characteristics are maintained. - Storage in optimal and dry conditions.

			- Insect	- Low-quality garlic - Incorrect handling of additives	- Be selective in buying, it's best to buy from a trusted agent. - Peel garlic cloves more thoroughly - Garlic that has been damaged should not be used.

No	Raw material	Identify hazards		Reason	Control measures
		Type	Danger		
2.	PDAM water	Physique	- There are foreign objects - (dust)	Error in handling	- Regular checking of water quality at the start of production - Choose a water reservoir that is clean from foreign object contamination and meets good criteria. - *water treatment* & sanitation processes
		Chemistry	- Chlorine		
		Biology	- Moss - Mosquito larvae		
3.	Salt	Physique	- Dust - Gravel - Sand	- Low salt quality - The packaging material used is damaged (torn) - Handling Wrong	- It is best not to store salt for too long so that its quality characteristics are maintained. - Storage is carried out in a closed container in a dry place and free from contamination. - Be selective in buying, it's best to buy from a trusted agent. - Determine specifications regarding the quality and quality of the salt to be used and that contaminated salt should not be used
		Chemistry	-		
		Biology	-		
4.	Material plastic	Physique	- There is a foreign object - (dust) - Hole	- The packaging materials used are not suitable - Wrong handling	- Determination of specifications/quality standards for packaging materials correctly (clean and not easily torn) - Correct handling of packaging materials - Storage at room temperature (not damp) avoiding sharp objects and limited stacking
		Chemistry	Plastic monomers for packaging materials		
		Biology		-	

Source: Research results

In a HACCP study, after carrying out a product description, the next step is to analyze the dangers that may arise in the raw materials. Hazard analysis is carried out by registering all the dangers contained in raw materials and then tabulating these dangers in a table accompanied by sources of danger and preventive

measures. Raw material analysis is intended to ensure that the raw materials received and processed meet the requirements and do not contain sources of danger, thereby reducing product quality (Awuchi, 2023).

The raw materials designated as critical control points for biological, chemical, and physical quality of the raw materials for making non-borax onion shells which include CCP are rice and water. In the raw material of rice, there are physical dangers in the form of pesticides and small stones (gravel) that cannot be removed in the non-borax onion shell production process stages. One factor is the purchase of low-quality rice directly from farmers and storage.

In water, the physical danger is chlorine which is used to purify water. These dangers cannot be eliminated during the production process stages. Even though other raw materials are not considered a critical point, all main raw materials and additional raw materials used always need to be controlled to maximize the use of safe and high-quality main raw materials and additional raw materials so that non-borax onion peel is obtained which is safe for consumption. At every stage of the non-borax onion peel production process, there are physical, chemical, and biological hazards. Therefore, the need to establish a CCP is very important to determine the critical point of the manufacturing process so that control efforts can be carried out to reduce potential hazards. CCP is known for the cutting, drying, and packaging manufacturing processes.

The cutting process is CCP because this process has dangers that cannot be eliminated. The biological hazards are microbial and insect contamination caused by this process being carried out in an open area so that it is easily affected and contaminated by outside air. Meanwhile, in the pounding process, there are chemical hazards caused by metal contamination which is contamination from the water reservoir for washing the dough-cutting tools. This is because the tools used are rusty and have never been washed and dried.

In the drying process, there are also physical dangers, namely dust and gravel. Dust is present because the cooling area is not in a closed drying device. Drying is carried out in an open space and near the road. So dust can stick to non-borax onion peel. The biological danger is the presence of insects and microbes, namely flies. Because non-borax onion shells are dried in the open for a long time, it can take up to days to get dry non-borax onion shells.

The packaging becomes the CCP stage. Packaging is intended specifically for removal reducing potential dangers. Packaging is a way to prevent food from absorbing water vapor from the surrounding air which can accelerate the growth of microbes. However, a packaging process that is not carried out properly and hygienically can reduce the quality of the packaged product, such as a packaging cover that is not tightly enough, allowing the product in the package to be contaminated by dangerous contaminants (Rejeb, 2018).

In the process of packaging non-borax onion shells, the type of packaging used is too thin so it is easily torn. Apart from that, shells that are still hot are sometimes put directly into the packaging, triggering the emergence of microbes caused by the damp conditions in the packaging. Control of conditions during the cutting process. In IRT the cutting process is still carried out semi-manually, that is, using more efficient cutting tools but still using human power.

This raises potential environmental hazards, namely that the cutting process is carried out in an open room and the tools used to wash the cutting tools are rusty. Situations like this can make the product dangerous if consumed (Mafruchati et al., 2023). Metal contamination in the form of lead, copper, and zinc is very dangerous for the body and if consumed by the body will be carcinogenic. Corrective action to obtain a product that meets the target value is to use tools made from raw materials that have the potential to cause metal contamination such as stainless steel or tools made from plastic (Mafruchati et al., 2022).

Tree drying is a process whose danger cannot be eliminated in the next process. This causes drying including CCP. As a result, this stage requires control and correction factors so that the product meets the target value. The critical limits include dust and microbial contamination from the open environment and insects (flies) which can reduce the quality of non-borax onion peel products. This is caused by an environment that is

not kept clean and the drying process is carried out in an open room. There is no tool to protect the product from insect contamination. So insects can contaminate the product. From the CCP determination process, drying is included in the CCP because if deviations occur during the process it will cause danger. The desired target values include a slightly harder texture of the shake from the previous process and no product contamination. The corrective action when deviations occur is that cooling should be carried out in a special closed drying device such as an oven to avoid a dirty environment that causes contamination that can endanger the product so that the quality obtained does not meet standards.

Ways to control CCP in the packaging process for making non-borax onion shells include controlling the packaging conditions, controlling the condition of the packaging used, and controlling the condition of the non-borax onion shells to be packaged (Di et al., 2017). Apart from that, it is also necessary to monitor during the packaging process so that the non-borax onion peel meets the target value. Monitoring can be done by monitoring environmental conditions during the packaging process as well as monitoring the condition of the packaging and onion shells according to the target value.

According to Crompton (1979), in plastic packaging, physicochemical changes in the container and food are impossible to avoid. The food industry is only able to reduce the rate of change to a minimum level so that it still meets consumer requirements. As a measure to control the emergence of dangers in the packaging used, this can be done by establishing quality specifications, the quality criteria for the packaging used are clean, intact, and using safe materials.

Conclusion

The conclusion that can be drawn based on the results of research on Quality Control and HACCP Concept Planning (Hazard Analysis Critical Control Point) in making Non-Borax Onion Karak at IRT "CV Marsudi Luhur Solo" in Mojolaban, Sukoharjjo is the process of making non-borax onion karak at IRT "CV Marsudi Luhur Solo" includes washing, steaming, pounding, grinding, printing, cooling, cutting, drying and packaging. Quality evaluation in the manufacture of non-borax onion peel, some of which still do not meet the specified requirements.

The main raw material, rice, and additional raw materials such as water, do not meet the specified requirements. Then at the process stage, there are still things that do not comply with the provisions so control needs to be carried out. In the final product, control is still required to meet standard requirements. Standards that comply with the requirements are tests on water content, ash content without salt, appearance, and borax. However, in testing the total plate numbers and mold and yeast were still not following the standard requirements .

Creating a quality control concept for non-borax onion karak products includes determining specifications for the raw materials used, controlling each stage of the production process carried out, and controlling the final product by testing water content, ash without salt, total plate number, borax, mold, and yeast according to the requirements of the final product. non-borax onion peel so that the quality is guaranteed. The process of making non-borax onion shell products which is a CCP (Critical Control Point) is a cutting, drying, and packaging process because the next stages cannot reduce the dangers caused by an uncontrollable limit and the raw materials are rice and water. Control measures are summarized in the HACCP plan. HACCP becomes a control system in the effort

Prevention of problems in food quality is based on critical points that have been reviewed in the handling and production process stages. HACCP is applied to prevent the dangers of biological, chemical, and physical contamination and minimize the occurrence of risks or dangers by carrying out control measures at critical points in the production process From the results of the analysis of CV Marsudi's non-borax onion peel products, it is necessary to implement a quality assurance system and HAACP to further increase

competitiveness and be able to run a business efficiently. Also, the application of HACCP instruments is carried out to maintain food safety and quality. The HACCP system needs to implement the appropriate elements of the HACCP system.

Author's Contribution

All authors have contributed to the final manuscript. The contributions of each author are as follows, Safira for collecting data, drafting manuscripts and drafting drawings, drafting key conceptual ideas and provided critical revisions of articles; Sri Purnaningsih: collecting data; and Rukmi Nur Aini, provided excellent guidance and All authors discussed the results and contributed to the final manuscript.

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Declaration

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