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Identification of Hazard Analysis Critical Control Point (HACCP) on Wingko Crispy Products at the Teaching Factory of SMK Negeri 1 Lamongan

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ABSTRACTS

Wingko Crispy is a superior, innovative product of traditional Wingko, produced at the Teaching Factory of SMK Negeri 1 Lamongan. The Hazard Analysis Critical Control Point (HACCP) system has not been formally implemented at the Teaching Factory, which is the basis for this research. This study aims to identify Critical Control Points (CCPs) in Wingko Crispy production. The method used is a descriptive qualitative approach, with HACCP applied through observation, interviews, and documentation carried out in January–February 2026 and CCP determination using a decision tree. The study found three CCPs: receiving coconut raw materials that may have Aspergillus flavus toxins, roasting with a critical limit of the product core temperature ≥75°C measured with a probe thermometer, and storing finished products with critical limits of temperature ≤30°C, RH ≤70%, moisture content ≤5%, and water activity ≤0.85.

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1. INTRODUCTION

Food safety is a fundamental aspect of the food processing industry, applying not only to large-scale industries but also to education-based production units such as the Teaching Factory (Tefa) in Vocational High Schools (SMK). The increasingly competitive industrial landscape demands adequate skills to meet workforce needs, leading SMK Negeri 1 Lamongan to establish the Teaching Factory program as a vehicle for strengthening student competence while also functioning as a production unit that produces food products marketed directly to consumers (Murwanti, 2022). One of the flagship products of Tefa is Wingko Crispy, an innovation on traditional wingko made with glutinous rice flour, grated coconut, eggs, and sugar, baked until a crispy texture is achieved (Wahyuni et al., 2023). As a ready-to-eat food product marketed directly to the public, Wingko Crispy bears the same food safety responsibilities as other food products in the food industry.

From a food safety perspective, the main raw materials used in Wingko Crispy have high-risk characteristics, warranting a structured control system. Grated coconut contains high moisture and fat content, making it an ideal substrate for bacterial growth, particularly *Staphylococcus aureus* and *Bacillus cereus* (Rahayu & Nurwitri, 2012), and is also susceptible to contamination by the carcinogenic aflatoxin-producing mold *Aspergillus flavus* (Gemede, 2025). Eggs, as a high-risk raw material, serve as a growth medium for *Salmonella* sp. that can cause salmonellosis in consumers (Risdayanti et al., 2023). Based on SNI 01-4311-1996 on Wingko Cake, the moisture content of the product must not exceed 30% (w/w), as high moisture content directly increases water activity (aw) that supports the proliferation of pathogenic microorganisms (Buckle et al., 1978/2009). Furthermore, a field survey found that Tefa management had not fully implemented personal hygiene standards during production, and the Hazard Analysis Critical Control Point (HACCP) system had not been formally implemented, meaning contamination risks at each production stage had not been systematically and measurably controlled.

The HACCP system is a science-based, proactive approach that systematically identifies biological, chemical, and physical hazards at each production stage, then establishes CCPs as mandatory control points to prevent, eliminate, or reduce hazards to acceptable levels (Codex Alimentarius Commission [CAC], 1991; Thaheer, 2005). This system has been proven effective across various scales and types of food products. The application of HACCP in small- to medium-sized pempek enterprises demonstrated improved product safety and quality (Pramana et al., 2022). CCPs were successfully identified in cake production processes in Bangladesh (Jubayer et al., 2022), and four critical CCPs were established in banana cake production at airline catering (Budi & Mahmudiono, 2021). However, to date, no HACCP study has specifically examined Wingko Crispy products or coconut-based products produced in the SMK Teaching Factory environment, creating a scientific gap that needs to be addressed. This study aims to determine CCPs and identify CCP controls in the production of Wingko Crispy at the Teaching Factory of SMK Negeri 1 Lamongan.

2. MATERIALS AND METHODS

This study employed a descriptive qualitative method with the HACCP approach. The research location was the Teaching Factory of SMK Negeri 1 Lamongan, Jl. Panglima Sudirman No. 84, Lamongan, East Java. Data collection was conducted from January to February 2026.

Primary data were obtained through direct observation of all Wingko Crispy production stages, structured interviews with the Teaching Factory Coordinator and production staff, and

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photographic documentation. Secondary data were sourced from books, scientific articles, government regulations, and relevant prior studies. Research instruments comprised observation sheets and structured interview guides, developed in accordance with HACCP guidelines (Badan Pengawas Obat dan Makanan RI, 2016; CAC, 1991).

Data analysis techniques employed two methods: (1) Risk Assessment Matrix Analysis, which is an evaluation of hazard significance based on the dimensions of likelihood of occurrence and severity of impact, categorized as low (L), medium (M), and high (H); and (2) Decision Tree Analysis, which is a series of four logical questions (P1–P4) to determine the CCP or non-CCP status at each production stage (CAC, 1991).

3. RESULTS AND DISCUSSION

3.1. Determination of CCPs for Wingko Crispy

The determination of CCPs in the Wingko Crispy production process at the Teaching Factory of SMK Negeri 1 Lamongan was structured with reference to the seven fundamental principles of the HACCP system and its twelve implementation steps as established by the Codex Alimentarius Commission (CAC) (Yulianti et al., 2022). The following presents the CCP determination in the Wingko Crispy production process at the Teaching Factory of SMK Negeri 1 Lamongan:

3.1.1. HACCP team

Formation of the HACCP Team is the first step in HACCP implementation. The selection of HACCP team members for the Wingko Crispy product was aligned with the skills, knowledge, and experience relevant to each member's area of responsibility, ensuring that the HACCP system could be implemented effectively and developed well. This team composition demonstrates the multidisciplinary approach recommended in HACCP guidelines. Successful HACCP implementation has been shown to depend heavily on team diversity, particularly the ability to integrate experts from food production, sanitation, and food safety (Sari et al., 2024). The composition of the HACCP team for the Wingko Crispy product is presented in Table 1.

Table 1. HACCP team.

Name	Role/Position	Team Position
Anastasya Vina Wardhani	Quality Control (QC) Project Leader	Executive Coordinator
Mauren Gita Miranti, S.Pd., M.Pd.	Culinary Expert	Executive Member
Dr. Hj. Sri Handajani, S.Pd., M.Kes.	Sanitation & Hygiene Expert	Executive Member
Hanif Naufal Ahmi, S.Pi., M.T.P.	Food Technology Expert	Executive Member

3.1.2. Product description

A product description is an explanation of a product that covers details such as composition, shelf life, packaging, method of use, and storage. Additional information includes the production date, expiry date, manufacturer, and other relevant general data (Mafaza & Kumalasari, 2022). The product description of Wingko Crispy is presented in Table 2.

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Table 2. Product description of Wingko Crispy.

Description Parameter	Description
Product Brand	Wingko Crispy
Product Description	Wingko Crispy is a superior product of SMK Negeri 1 Lamongan made from grated coconut, glutinous rice flour, granulated sugar, eggs, and coconut water that is baked, resulting in a crispy texture and savory coconut flavor.
Product Use	Ready-to-Eat Product
Target Consumer	The product can be consumed by everyone and is not specifically intended for particular population groups; not recommended for infants under 2 years of age.
Ingredients	Coconut, Glutinous Rice Flour, Granulated Sugar, Eggs, Coconut Water, Butter, Salt, Vanilla
Product Composition (Specification, formulation)	Coconut: 50%, Glutinous Rice Flour: 20%, Granulated Sugar: 10%, Eggs: 5%, Coconut Water: 5%, Butter: 5%, Salt: 3%, Vanilla: 2%
Product Storage Requirements	Store in a dry place
Preparation and Serving Procedure	Open the sealed cover on the packaging; the product can be enjoyed directly.
Packaging	For 60 g packaging: paper aluminum foil laminate pouch; for 450 ml packaging: plastic-based jar
Transportation and Distribution	Products are transported by vehicle and distributed to souvenir centers in Lamongan.
Warning Label	No specific warning label. It is recommended to include allergen warning labels.

3.1.3. Production process flow

The Wingko Crispy production process flow chart at the Teaching Factory of SMK Negeri 1 Lamongan covers every production stage. It is designed in accordance with SNI No. 01-4852-1998, which requires the flow diagram to reflect the entire production sequence from receipt of raw materials to product delivery. The compilation of this flow diagram aims to simply explain the production stages and steps in the processing of Wingko Crispy products from raw material receipt to distribution. The Wingko Crispy production flow diagram is presented in Figure 1.

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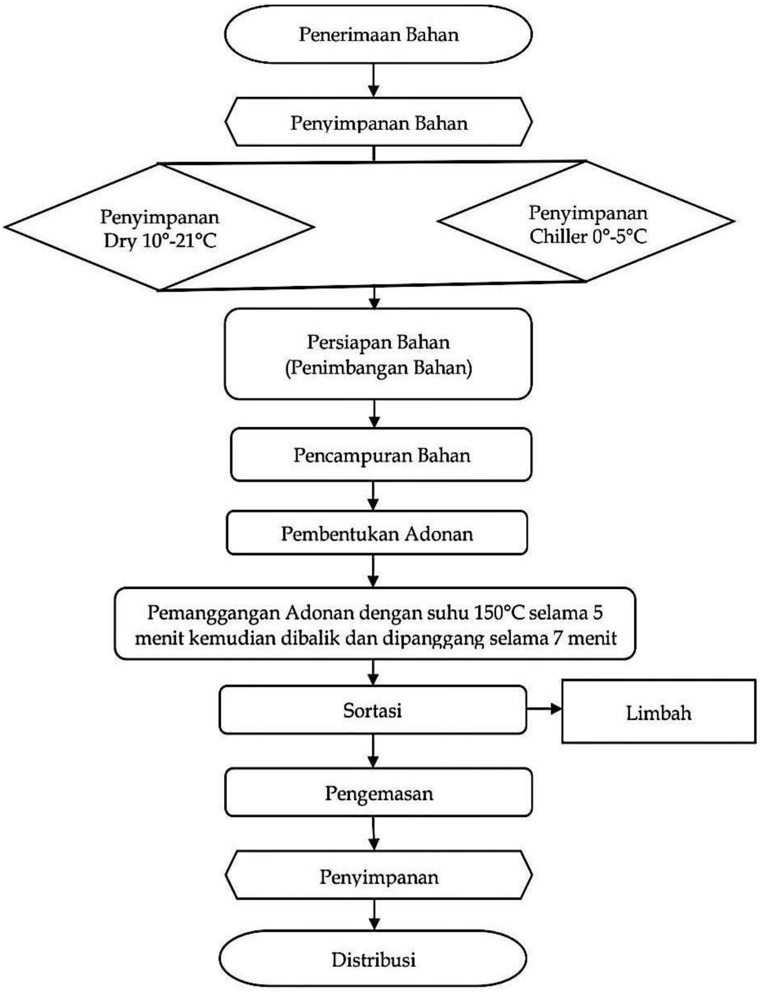

Figure 1. Wingko Crispy production flow diagram.

3.1.4. Hazard analysis

Hazard analysis is critically important for raw materials, composition, each production process stage, product storage and distribution, and consumer use (CAC, 1991). The purpose of hazard analysis is to identify all potential hazards that may occur in a processing process from the beginning to the point of consumer receipt (CAC, 1991). Hazard analysis in the Wingko Crispy production process is conducted first to identify causative factors and potential hazards, then categorize them as biological, chemical, or physical, and establish the risk or significance of the identified hazards, as well as preventive measures (Hasibuan et al., 2020).

Biological hazards are risks posed by living organisms, both visible (macrobiological) and invisible (microbiological), such as bacteria, fungi, parasites, algae, and viruses (Yulianti et al., 2022). Chemical hazards are chemical substances, both naturally occurring and toxic, that can affect consumer health in the short or long term if ingested (Lestari, 2020). Physical hazards are foreign objects that should not be present in food and can cause health problems, injuries, or wounds if consumed, such as gravel, staple wires, glass shards, metal fragments, wood splinters, fish bones, bone fragments, scales, and plastic (Yulianti et al., 2022). The hazard analysis for Wingko Crispy production is presented in Table 3.

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Table 3. Hazard analysis.

Stage	Hazard		Justification	Hazard Significance			Preventive Action
	B/C/P	Type		Likelihood	Severity	Significant	
Receipt of glutinous rice flour	B	Mold	Improper storage	M	M	NS	Storage SOP
	C	Benzoyl peroxide	Food additive in flour	L	M	NS	Supplier guarantee
	P	Foreign object contamination	Storage room contaminants	M	L	NS	Visual inspection
Receipt of eggs	B	Salmonella sp., *E. coli*	Pathogens on eggshell	H	H	S	Egg washing
	P	Shell, chicken manure, straw	Contaminants from cage environment	M	M	NS	GMP washing
Receipt of granulated sugar	B	Insects	Hygroscopic sugar attracts insects when container is open	L	M	NS	Storage SOP
	P	Foreign object contamination	Packaging, warehouse environment	L	M	NS	Storage SOP
Receipt of coconut	B	Mold	Coconut is prone to mold	L	H	S	Fresh coconut (just in time)
	P	Foreign object contamination	Fragments carried during peeling/grating	L	M	NS	Proper peeling & washing, visual inspection, appropriate mesh grater
Receipt of margarine	C	Fat oxidation	Rancidity due to storage	L	M	NS	Storage SOP
	P	Foreign object contamination	Improper handling	L	M	NS	Check brush condition
Receipt of coconut water	B	*Salmonella* sp., *E. coli*, *S. aureus*	Rich in sugar & nutrients; easily contaminated by microbes if temperature is uncontrolled	H	H	S	Fresh coconut water (just in time)
	C	Pesticide residues	Contamination from tree/container environment	M	M	NS	Supplier guarantee
	P	Foreign object contamination	Foreign objects enter during splitting	M	L	NS	Visual inspection
Receipt of salt	P	Foreign object contamination	Improper handling & storage	L	M	NS	Storage SOP
Receipt of vanilla	B	Mold	Improper storage	L	L	NS	Storage SOP
	P	Foreign object contamination	Storage conditions	L	M	NS	Storage SOP
Preparation (weighing)	B	*S. aureus*, *Salmonella* sp., *E. coli*	Direct contact between materials and workers	M	H	S	Personal sanitation
	C	Detergent residue	Incomplete rinsing	M	M	NS	Food-grade cleaning agents
	P	Foreign object contamination	Unserviced weighing scales	M	M	NS	Equipment maintenance SOP
Dough mixing	B	*S. aureus*, *E. coli*, Coliform	Dough contacts hands/equipment/environment	L	H	S	Personal sanitation
	P	Eggshells, gravel	Foreign objects from PPE/damaged equipment	L	M	NS	GMP
Molding	B	*S. aureus*, *E. coli*, Coliform	Unhygienic molds become microbial growth media	L	H	S	Equipment cleaning SOP

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	P	Contaminants	Damaged molds produce fragments into product	L	M	NS	Equipment maintenance SOP
Roasting	B	*Salmonella* spp., *E. coli*, *S. aureus*, *B. cereus*, and mold	Pathogens must be inactivated by heat; if core temperature is not reached, microbes survive	L	H	S	Temperature 150°C (5 min, flip, 7 min)
	C	Acrylamide (overbaking)	Excessive baking produces hazardous compounds	L	M	NS	Temperature & time control
	P	Foreign object contamination	Damaged baking tray	L	M	NS	Equipment maintenance SOP
Sorting (hand gloves)	B	*S. aureus*, *E. coli*	Contaminated gloves	L	H	S	Single-use gloves
	P	Foreign object contamination	Torn gloves	L	L	NS	Inspect gloves before use
Packaging (aluminium foil pouch)	B	*S. aureus*, *B. cereus*, *Aspergillus* spp. spores	Open/dirty packaging	L	M	NS	Storage SOP
	C	Printing ink, monomer migration	Non-food-grade plastic	L	M	NS	Supplier guarantee
Packaging (plastic jar)	B	*S. aureus*, *B. cereus*, mold	Unwashed jar	M	M	NS	Equipment cleaning SOP
	C	Ethylene, styrene, BPA	Plastic monomers & BPA	M	M	NS	Food-grade and BPA-free packaging
	P	Foreign object contamination	Jar damage	L	M	NS	Jar selection
Packaging (hand gloves)	B	*S. aureus*, *E. coli*	Contaminated gloves	L	H	S	Single-use gloves
Storage (room temperature)	B	*B. cereus*, *S. aureus*, *Aspergillus* spp. mold	Uncontrolled temperature & humidity	M	M	NS	Storage SOP
	C	Fat oxidation (rancidity)	Temperature & oxygen accelerate coconut fat oxidation	M	M	NS	Storage SOP
Distribution (transportation)	B	*S. aureus*, *E. coli*	Dirty vehicle	L	H	S	Clean the vehicle
	C	Chemicals transported simultaneously	Chemical leakage contaminates product	L	H	S	Prohibit chemical co-transport
	P	Vibration causes packaging damage	Damaged packaging allows foreign object entry	L	M	NS	Product arrangement

Note: B = Biological, C = Chemical, P = Physical, L = Low, M = Medium, H = High, S = Significant, NS = Not Significant, GMP = Good Manufacturing Practice

Significant hazards in Wingko Crispy production primarily arise from biological contamination in raw materials and during the production process. The primary biological hazard in eggs is the presence of *Salmonella* sp., particularly *S. enteritidis* and *S. typhimurium*, and *E. coli* found on the eggshell surface and within the egg contents (Bahramianfard et al., 2021). Contamination occurs through two pathways: vertical contamination from the reproductive system of infected laying hens before egg laying, and horizontal contamination

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from the cage environment adhering to the shell (Kabui et al., 2024). Coconut water is a liquid raw material with a high biological hazard profile because its composition, rich in sugars, electrolytes, and nutrients, makes it a highly supportive substrate for microbial growth if not used or stored immediately or at uncontrolled temperatures (Peterle et al., 2024). Furthermore, the mold *A. flavus* on coconut has the potential to produce carcinogenic aflatoxins if coconut is stored in humid conditions prior to use (Gemede, 2025).

At process stages such as weighing, mixing, molding, and sorting, biological hazards remain significant due to direct contact with workers, equipment, and the environment, which enables cross-contamination and recontamination. Significant hazards were also identified at the roasting and distribution stages. During roasting, the primary risk is the inability of the heat process to inactivate microorganisms if the required temperature and time are not met, allowing pathogens to survive in the product. *B. cereus* spores are capable of surviving the cooking process at high temperatures. They can re-germinate and grow actively at room temperature after roasting, particularly when products are not promptly packaged or stored under appropriate conditions after baking (Navaneethan & Effarizah, 2023). Meanwhile, at the distribution stage, biological contamination can occur due to unhygienic transportation conditions, as well as potential chemical hazards from exposure to other materials during transport. Overall, significant hazards in the Wingko Crispy production process are primarily associated with the high likelihood of microbial contamination and inadequate hygiene control at each production stage, which can directly impact the safety of the final product.

3.1.5. Determination of CCPs

CCPs were determined using a decision tree at each production process stage, from raw material receipt through final product storage.

Table 4. CCP determination for Wingko Crispy products.

Stage	Hazard	P1	P2	P3	P4	Category
Receipt of glutinous rice flour	B (Mold)	Yes	No	No	-	Not a CCP
Receipt of eggs	B (*Salmonella* sp., *E. coli*)	Yes	No	Yes	Yes	Not a CCP
Receipt of granulated sugar	B (Insects)	Yes	No	No	-	Not a CCP
Receipt of coconut	B (Mold)	Yes	No	Yes	No	CCP
Receipt of coconut water	B (*Salmonella* sp., *E. coli*, *S. aureus*)	Yes	No	Yes	Yes	Not a CCP
Receipt of vanilla	B (Mold)	Yes	No	No	-	Not a CCP
Preparation	B (*S. aureus*, *Salmonella* sp., *E. coli*)	Yes	No	No	-	Not a CCP
Dough mixing	B (*S. aureus*, *E. coli*, Coliform)	Yes	No	Yes	Yes	Not a CCP
Molding	B (*S. aureus*, *E. coli*, Coliform)	Yes	No	Yes	Yes	Not a CCP
Roasting	B (*Salmonella* spp., *E. coli*, *S. aureus*, *B. cereus*, and mold)	Yes	Yes	Yes	No	CCP
Sorting	B (*S. aureus*, *E. coli*)	Yes	No	No	-	Not a CCP
Packaging	B (*S. aureus*, *B. cereus*, spores, mold, *E. coli*)	Yes	No	No	-	Not a CCP
Storage	B (*B. cereus*, *S. aureus*, *Aspergillus* spp. mold)	Yes	No	Yes	No	CCP
Distribution	B (*S. aureus*, *E. coli*)	Yes	No	No	-	Not a CCP

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Based on the results of the CCP determination across the Wingko Crispy production process stages, three processes were identified as CCPs, namely: receipt of coconut raw materials, roasting, and storage.

3.2. Control of CCPs for Wingko Crispy

Following the establishment of the CCP production process flow, critical limits and monitoring were set to evaluate the effectiveness of CCP control processes, along with corrective actions for deviations from critical limits. This aims to ensure the safety of the Wingko Crispy products produced (Awuchi, 2023; Hasibuan et al., 2020). The CCP control measures for Wingko Crispy production are presented in Table 5.

Table 5. CCP controls for Wingko Crispy products.

Stage	Actual Hazard	Critical Limit	Control Measures
Receipt of Coconut Raw Material	Coconut is prone to mold and rancid odor if not immediately used	Free from mold; no rancid odor	Reject damaged coconut; implement FIFO
Roasting	Dough not fully cooked; some portions are burnt	Minimum product core temperature 75°C	Use a probe thermometer to measure product core temperature and continue roasting if not yet achieved; separate burnt products.
Storage	Growth of mold spores and microbes due to storage at high room temperature, uncontrolled humidity, and excessively long storage periods	Room temperature ≤30°C, Relative humidity (RH) ≤70%, Product moisture content ≤5%, Water activity (aw) ≤0.85, Airtight packaging, and within product shelf life	Separate products showing signs of damage (moldy, rancid smell, damaged packaging); improve storage conditions if temperature or RH exceeds critical limits; products that do not meet critical limits shall not be distributed.

3.2.1. Receipt of grated coconut raw material

Figure 2. Receipt of grated coconut raw material.

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Coconut, as the primary raw material, is highly susceptible to biological deterioration, particularly mold (fungal) growth and rancidity due to fat oxidation if not promptly processed (Durand et al., 2023; Gemede, 2025). The critical limit established at this stage is a coconut that is visually free of mold and emits no rancid odor. Critical limits at CCPs can be established based on sensory parameters such as visual appearance and aroma (*aroma and visual appearance*) as long as they can be objectively measured and verified by designated personnel (U.S. Food and Drug Administration [FDA], 2022). Control measures, including rejecting damaged coconuts and implementing the First In First Out (FIFO) system, reflect a systematic effort to maintain consistency in raw material quality. The FIFO system ensures that materials stored for longer periods are used first, preventing them from exceeding the freshness limit and directly preventing the use of raw materials that have passed their usable period and may be contaminated (Awuchi, 2023; Liivat, 2025).

3.2.2. Roasting

Figure 3. Roasting.

The roasting process is both the most critical and the most challenging stage in the entire Wingko Crispy production process. At this stage, hazard control not only prevents contamination but also serves as a verification step to kill disease-causing microorganisms that may have been carried over from raw materials. The critical limit for the Wingko Crispy roasting CCP is established at a minimum product core temperature (*internal product temperature*) of 75°C, measured with a probe thermometer at the deepest central part of the Wingko Crispy (FDA, 2022). The establishment of the critical limit value of core temperature ≥75°C is based on WHO international standards, which stipulate that food containing high-risk ingredients such as eggs and their processed products must be cooked to a minimum core temperature of 70°C to inactivate pathogens (Romeo et al., 2024; San Onofre et al., 2021).

For flour-egg-fat-based dough products with characteristics similar to Wingko Crispy, effective inactivation of *Salmonella* can only be guaranteed when the product core temperature is measured and documented for every batch, rather than relying solely on visual observation of product doneness (Unger et al., 2021). The actual roasting conditions found based on observation results at the Teaching Factory of SMK Negeri 1 Lamongan—namely, an oven temperature of 150°C for the first 5 minutes, after which the product is flipped and baked again for 7 minutes at the same temperature (total ±13 minutes per batch)—represent

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the operating parameters (*operating limit*) that have been applied based on empirical production practice.

The control measures consist of two aspects: continuing the roasting process until the required temperature and cooking time are reached, and segregating overcooked products from the distribution channel (Food and Agriculture Organization of the United Nations & World Health Organization, 2023). Separation of burnt products is critically important, not only for organoleptic quality considerations, but also because excessive heating can generate hazardous chemical compounds, such as acrylamide, which is carcinogenic, particularly at very high temperatures (Govindaraju et al., 2024; Perera et al., 2021).

3.2.3. Storage

Figure 4. Storage.

The actual biological hazard identified at the Wingko Crispy storage stage is the growth of mold spores such as *Aspergillus* spp. and *Penicillium* spp., as well as the proliferation of sporogenic microbes resulting from storage conditions at high room temperature and uncontrolled humidity over extended periods. Low-moisture baked products can still experience biological and chemical deterioration during storage if temperature conditions and water activity are not consistently controlled (Karuppuchamy et al., 2024). The critical limits at the Wingko Crispy storage CCP, established to ensure product safety, are a room-temperature critical limit of ≤30°C and a relative humidity (RH) critical limit of ≤70%, measured using a Thermo-Hygrometer. These two parameters work synergistically to retard mold growth and fat oxidation in the product during storage (Awuchi, 2023). The critical limit for product moisture content of ≤5% was established with reference to SNI 2973:2011 on Biscuits, which stipulates a maximum moisture content of 5% for flour-based dry baked goods (Ishak et al., 2023). The water activity (aw) critical limit of ≤0.85 was established based on FDA standards, which state that food with an aw value below 0.85 does not support the growth of bacterial pathogens, including *Staphylococcus aureus*, which is the most tolerant pathogen to low aw among foodborne bacterial pathogens (FDA, 2023). Packaging must be airtight, and products must be stored within the established shelf life.

The control measures established when critical limits are not met consist of several steps. If room temperature or RH exceeds critical limits, products in such conditions must be identified and temporarily separated while storage conditions are remediated (Atambayeva

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et al., 2022; Hasibuan et al., 2020). Separation of products showing signs of deterioration, such as mold, rancid odor, or damaged packaging, is critically important not only to prevent cross-contamination of unaffected products but also because molds on coconut-based products can produce mycotoxins when aw conditions support their growth (Gemede, 2025).

4. CONCLUSION

This study successfully identified three CCPs in the production of Wingko Crispy at the Teaching Factory of SMK Negeri 1 Lamongan through the application of the HACCP system, encompassing team formation, product description, hazard analysis, and CCP determination using a decision tree. The first CCP is the receipt of coconut raw materials with the actual hazard of aflatoxin toxins from the mold *Aspergillus flavus*, controlled through organoleptic inspection (free from mold and no rancid odor), rejection of non-compliant materials, and implementation of the FIFO system. The second CCP is roasting, which represents the only biological *kill-step* in the production process, with a critical limit of product core temperature ≥75°C measured using a probe thermometer, and corrective actions consisting of continuing the roasting process until the critical limit is achieved and separating burnt products from the distribution channel. The third CCP is finished product storage, with four synergistic critical limit parameters: room temperature ≤30°C, relative humidity ≤70%, product moisture content ≤5%, and water activity ≤0.85, monitored daily by quality control staff using a Thermo-Hygrometer.

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