International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Implementation of Hazard Analysis and Critical Control Points (HACCP) to Ensure Food Safety in the Free Nutritious Meal Program: A Case Study at the Cipinang Muara 2 Nutritional Fulfillment Service Unit

Vindi Athira[1], Ratnawati Prayogi[2], Audrey G. Tangkudung[3], F.X Irwan Tanamas[4]

[1,2,3,4] Master of Management Program, Faculty of Economics, Institut Bisnis dan Multi Media ASMI, Jakarta, Indonesia

Email : vindiathira@gmail.com

Abstract

Food safety in large-scale nutrition programs requires preventive, measurable, and documented controls. This study analyzes Hazard Analysis and Critical Control Points (HACCP) implementation at the Cipinang Muara 2 Nutritional Fulfillment Service Unit (SPPG), East Jakarta, which serves 2,999 beneficiaries daily under Indonesia's Free Nutritious Meal Program. A descriptive qualitative case study used field observation, in-depth interviews with the HACCP team and food handlers, and operational records; data were analyzed through collection, condensation, display, conclusion drawing, and triangulation. Biological, chemical, and physical hazards were assessed by probability and severity and evaluated using the HACCP decision tree. Key controls included rice cooking at 100°C for at least 30 minutes, processing water and side dishes at approximately 90°C, and fruit washing with food-grade chlorine solution at a maximum of 200 ppm. Implementation was supported by a formal HACCP team, training, monitoring, verification, laboratory testing, and corrective actions. Main challenges were worker discipline, production pressure, limited space, and documentation consistency. Overall, HACCP strengthened preventive control and food-safety culture; sustained SSOP compliance, training, verification, and internal audits remain essential.

Keywords: HACCP, food safety, Free Nutritious Meal Program, SPPG.

INTRODUCTION

Improving human-resource quality toward Indonesia's Golden Indonesia 2045 vision has been linked to efforts to strengthen national nutritional status. The government

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

established the National Nutrition Agency (Badan Gizi Nasional/BGN) under Presidential Regulation No. 83 of 2024 to organize nutritional fulfillment on a broad scale. Within this policy context, the Free Nutritious Meal Program (Makan Bergizi Gratis/MBG) was designed as a large national nutrition intervention. The thesis reports that the program targeted 82.9 million beneficiaries in 2026 and had reached 55.1 million beneficiaries through 19,188 Nutrition Fulfillment Service Units (SPPG) across 38 provinces by 2025 (Badan Gizi Nasional, 2026).

The scale of the program creates a major food-safety management challenge. Mass catering involves the preparation of thousands of portions in a limited production window, and the production chain extends from procurement and receiving to storage, preparation, cooking, portioning, packaging, and distribution. At each stage, hazards may arise from biological contamination, chemical residues or unsuitable materials, and physical foreign objects. The risk is amplified when food handlers have heterogeneous levels of experience, infrastructure is constrained, or monitoring and documentation are inconsistent. The thesis therefore positions food safety not simply as a technical kitchen issue but as a management requirement involving human resources, organizational discipline, facilities, supplier control, documentation, and continuous supervision.

Food safety is a prerequisite for protecting consumers from biological, chemical, and physical hazards. Indonesian Law No. 18 of 2012 emphasizes the obligation to provide safe, high-quality, and nutritionally balanced food. Njatrijani (2021) highlights poor hygiene and sanitation, contaminated raw materials, misuse of hazardous substances, and non-compliance with limits on food additives as recurring food-safety challenges. In a large public feeding program, a preventive system is therefore needed to identify hazards before they reach consumers rather than relying only on final-product inspection.

Hazard Analysis and Critical Control Points (HACCP) is a systematic preventive approach that identifies significant hazards, determines stages at which control is essential, establishes critical limits, monitors compliance, specifies corrective actions, verifies system effectiveness, and maintains records. The Codex General Principles of Food Hygiene place HACCP within a broader hygiene-management framework in which prerequisite programs and sanitation procedures support the effective control of hazards (Food and Agriculture Organization & World Health Organization, 2023). In the thesis, Standard Sanitation Operating Procedures (SSOP) and other operational procedures are treated as essential supporting controls, especially for hazards that can be managed before or after a particular stage and therefore are not classified as CCPs.

Previous studies cited in the thesis indicate that HACCP implementation in institutional and mass-food production is affected by the quality of hazard analysis, food-handler competence, hygiene and sanitation, documentation, and management support.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

Mafaza and Kumalasari (2022) describe HACCP application as a structured process for identifying significant hazards and controlling them at critical points. Qomarudin et al. (2023) emphasize that human-resource competence contributes to successful integrated quality management and HACCP implementation. Vatria (2022) likewise stresses the role of CCP determination in food-safety assurance, while Noordianty (2024) highlights sanitation as a continuing requirement for maintaining food quality and safety.

Against this background, the present article is derived from a case study of the Cipinang Muara 2 SPPG in Jatinegara, East Jakarta. The unit has operated since March 2025 and produces meals for 2,999 beneficiaries each day. The research examines how HACCP is implemented in the actual production environment, what opportunities and challenges emerge, and what corrective and organizational measures are used to maintain food-safety control.

Research Objectives

1. To analyze the implementation of HACCP as a food-safety assurance system in the Free Nutritious Meal production process at the Cipinang Muara 2 SPPG.
2. To identify the opportunities and challenges encountered in implementing HACCP in a high-volume institutional food-production environment.
3. To examine the corrective, monitoring, training, and organizational measures used to address implementation challenges and maintain control of food-safety hazards.

RESEARCH METHOD

This study used a descriptive qualitative method with a case-study approach. The purpose was to describe and evaluate in depth the implementation of HACCP in the food-production process at the Cipinang Muara 2 SPPG. The qualitative design emphasized interpretation of practices and conditions in their natural operational context rather than statistical measurement (Hadiningrat et al., 2025; Pahleviannur et al., 2022).

The research subjects were parties directly involved in the food-production chain and quality supervision, particularly the SPPG food-safety/HACCP team and volunteer food handlers. The object of the study was the application of the 12 HACCP implementation steps and seven HACCP principles, including sanitation-related Standard Operating Procedures used in the production of Free Nutritious Meals.

Data were collected using three complementary techniques. First, field observation was conducted across the production flow, from raw-material receiving and storage to preparation, processing, portioning, and distribution. Second, in-depth interviews were conducted to explore staff commitment, understanding, role allocation, monitoring practices, constraints, and corrective actions. Third, documentary review covered

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

temperature records for storage and cooking, health-feasibility documentation, HACCP planning documents, monitoring forms, checklists, logbooks, and other operational records. The study was conducted at the Cipinang Muara 2 SPPG in Jatinegara, East Jakarta, during the thesis-research period from April to July 2026.

Data analysis followed four stages: data collection, data condensation, data display, and conclusion drawing. Interview data, field notes, observations, and documents were selected and condensed into meaningful categories; the results were presented narratively and through process descriptions and matrices; and conclusions were verified through triangulation to strengthen the validity of the findings (Sugiyono, 2022). Hazard identification also used probability and severity assessment, followed by the HACCP decision tree to determine whether significant hazards should be managed as CCPs or through prerequisite controls such as SSOP.

RESULTS AND DISCUSSION

Organizational and Operational Context of HACCP Implementation

The Cipinang Muara 2 SPPG operates as a centralized production kitchen responsible for planning menus, procuring ingredients, preparing and cooking food, portioning, and distributing meals. The unit serves 2,999 beneficiaries per day, requiring the food-safety system to function under high-volume and time-sensitive conditions. The thesis describes a formal HACCP structure in which the Head of SPPG also leads the HACCP team and coordinates functions covering quality, production, nutrition, logistics, distribution, and occupational safety. This division of responsibilities supports traceable decision making and makes hazard identification, monitoring, corrective action, and verification part of the operating system rather than isolated quality-control tasks.

The study found that personnel development was an important enabling factor. Structural staff had received HACCP-related training before carrying out their duties, and management gradually provided the equipment, documentation, and facility improvements needed to meet applicable standards. This finding is consistent with Armstrong's (2024) view that human resources are central organizational assets and with Qomarudin et al. (2023), who link competence development to the effectiveness of HACCP-based quality systems. In practice, technical training at the SPPG covered food-safety procedures, personal hygiene, sanitation, critical-point control, and the production-flow documentation required for HACCP implementation.

Management commitment was also reflected in the availability of operating procedures, monitoring forms, sanitation facilities, production equipment, and internal control records. The research indicates that these resources helped transform HACCP from a compliance document into a preventive management mechanism. This is particularly

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

important in a mass-feeding context because daily production targets can create pressure to prioritize speed; clear organizational roles and documented controls provide a counterbalance by making food safety an explicit operational responsibility.

Hazard Identification, Risk Assessment, and Critical Control Points

Hazard analysis was conducted throughout the production chain. The study classified hazards into three major categories: biological or microbiological hazards, chemical hazards, and physical hazards. Biological concerns included organisms such as Salmonella, Staphylococcus aureus, Bacillus cereus, coliforms, Escherichia coli, and Listeria monocytogenes depending on the product and processing stage. Chemical hazards included pesticide residues, heavy metals, non-food-grade materials, and improper use of processing chemicals, while physical hazards included stones, sand, glass, plastic, and other foreign objects. The probability and severity of each hazard were assessed to distinguish significant from non-significant risks and to prioritize control efforts.

The HACCP decision tree was then used to determine whether a significant hazard required control at a CCP or could be adequately managed through prerequisite programs, supplier controls, later processing stages, or SSOP. This distinction is important because HACCP does not require every hazardous stage to become a CCP. Instead, resources are concentrated on stages where loss of control could directly compromise food safety and where a specific measurable limit can be applied (Vatria, 2022).

The thesis provides detailed CCP plans for rice, side dishes, and fruit. Thermal processing is the principal control for cooked foods, whereas fruit requires a non-thermal washing control because it may be served without subsequent heating. The key documented critical limits and associated controls are summarized in Table 1.

Table 1. Key HACCP Control Findings and Critical Limits Reported in the Case Study

Process / Product	Main Hazard-Control Focus	Critical Limit / Control	Monitoring and Immediate Correction
Rice cooking	Biological hazards including S. aureus, Salmonella, aerobic plate count, B. cereus, and coliforms	Final process temperature 100°C; minimum cooking time 30 minutes	Monitor temperature and cooking time for every batch; rework the affected batch until the critical limit is achieved.
Water used in cooking	E. coli and coliform contamination	Cooking temperature 90°C	Monitor with a thermometer during every cooking cycle;

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Process / Product	Main Hazard-Control Focus	Critical Limit / Control	Monitoring and Immediate Correction
			repeat heating when the limit is not achieved.
Side dishes (meat/fish /chicken/eggs and related cooking)	Biological hazards such as Salmonella, Enterobacteriaceae, S. aureus, L. monocytogenes	Internal product temperature approximately 90°C during frying, sautéing, boiling, or steaming	Thermometer-based monitoring for every cooking cycle; re-cook until the product reaches the required condition.
Ground seasoning / mixed seasoning cooking	Biological contamination including Salmonella, S. aureus, Enterobacteriaceae, and C. perfringens	Internal processing temperature approximately 90°C	Monitor cooking temperature; reprocess when the critical limit is not met.
Fruit washing	Microbiological contamination and pesticide residues	Food-grade chlorine solution at a maximum concentration of 200 ppm	Measure washing-solution concentration for each washing process; repeat washing when needed and discard fruit that remains non-compliant.

The rice CCP plan combines a 100°C final cooking temperature with a minimum 30-minute cooking time. The thesis reports daily verification through cooking reports and periodic microbiological validation before and after the CCP process. The side-dish CCP plan relies on high-temperature processing, thermometer monitoring, daily review of cooking records, thermometer calibration, and periodic laboratory analysis. For fruit, the maximum 200 ppm food-grade chlorine limit is monitored during washing, with verification of washing records and laboratory testing used to validate microbial and pesticide-residue control. These arrangements illustrate the integration of critical limits, monitoring, corrective action, verification, validation, and documentation required by HACCP.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Monitoring, Verification, and Corrective Actions

Monitoring was carried out through direct observation in the production area and through checklists, forms, and logbooks. The study describes monitoring as an early-warning mechanism: operators and responsible staff compare actual conditions with established critical limits so that deviations can be recognized before unsafe products are distributed. Daily, weekly, and monthly evaluation practices were used to reinforce operator compliance and to identify weaknesses in the implementation of procedures.

When a deviation from a critical limit was found, the SPPG applied a systematic corrective-action sequence. The process could include temporarily stopping production, recording the chronology of the event, tracing the cause, reporting to the responsible person, quarantining the product, repeating a processing step, discontinuing the process, or discarding materials that did not meet safety requirements. This approach places food safety above production targets and creates a record that can be used to prevent recurrence. Penatas et al. (2025) similarly emphasize corrective action and quality-management learning as mechanisms for reducing recurring non-conformities.

Verification and internal audit supported the corrective system. The SPPG reviewed the effectiveness of SOP implementation, monitoring results, and laboratory-test data; internal audits were conducted periodically; and retesting could be used when laboratory results were inconsistent. In the thesis, this cycle is interpreted as continuous improvement because the HACCP system is adjusted and reinforced on the basis of objective evaluation rather than being treated as a one-time certification exercise. This is consistent with Noordianty (2024) and Dhani (2026), who emphasize the continuity of monitoring, verification, documentation, and improvement in food-quality control.

Opportunities, Challenges, and Food-Safety Culture

The research identified several opportunities that support HACCP implementation. First, management commitment was visible in the provision of facilities, operational documents, and training. Second, the existence of a clear HACCP organizational structure improved coordination and accountability. Third, standardized SOPs reduced dependence on individual cooking habits by giving workers a common operational reference. Fourth, risk-based control allowed limited supervisory resources to be concentrated on the stages with the greatest food-safety impact. Finally, routine use of personal protective equipment (PPE), sanitation procedures, and monitoring records helped develop a food-safety culture in which safe behavior became part of daily work rather than a response only to inspection.

At the same time, the study found persistent challenges. Human behavior was the most prominent. Differences in workers' prior cooking experience created initial resistance,

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

and consistent discipline in the use of PPE, hygiene, sanitation, and SOPs remained essential. Walansendow et al. (2025) similarly emphasize that kitchen hygiene standards depend heavily on consistent operator behavior. The thesis also reports limitations in production-space facilities, which can complicate the separation of clean and dirty areas and increase the need for strong cross-contamination controls.

A second challenge was operational pressure. The MBG production process must prepare a large number of meals within a limited time so that distribution schedules are met. When a deviation occurs, the HACCP system may require production to pause for investigation, rework, quarantine, or disposal. The decision process therefore creates a practical tension between service speed and the non-negotiable requirement to protect food safety. Khatmawati and Putri (2026) describe similar supply-chain pressures in large nutrition programs, where continuity and timely delivery must be balanced with control requirements.

A third challenge was the consistency of monitoring and documentation. The larger the production volume, the more records must be completed and reviewed. Incomplete or delayed records weaken traceability and make it more difficult to reconstruct events during an investigation or audit. Rizkina and Jumiono (2026) also underline the importance of sanitation and HACCP documentation in maintaining traceable food-production control. For this reason, the study recommends continued training, strict SSOP and Good Manufacturing Practice implementation, regular internal audits, and, for future development, the possible use of digital temperature-monitoring technologies to strengthen real-time traceability.

Table 2. Synthesis of Opportunities, Challenges, and Organizational Responses

Opportunities / Strengths	Challenges	Response Identified in the Study
Management commitment; formal HACCP structure; documented SOPs; trained personnel	Differences in worker experience and resistance to standardized practices	Repeated training, competency evaluation, direct supervision, and reinforcement of PPE/hygiene discipline
Risk-based monitoring and defined CCPs	High production volume and strict distribution deadlines	Continuous monitoring, rapid escalation, temporary process stoppage, rework, quarantine, or disposal when limits are exceeded

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

Opportunities / Strengths	Challenges	Response Identified in the Study
Routine records, laboratory testing, and internal verification	Large documentation burden and traceability risk	Checklists/logbooks, daily review, periodic internal audits, laboratory verification, and continuous improvement
Developing food-safety culture	Production-space limitations and cross-contamination risk	Strengthened SSOP/GMP, sanitation discipline, and clearer separation of clean and dirty activities where feasible

Managerial Implications

The case demonstrates that HACCP implementation in a mass-feeding program is inseparable from management practice. Technical control of temperature, sanitation, and product handling depends on role clarity, training, communication, accountability, and record discipline. In this sense, HACCP is not merely a food-science tool; it is also an organizational control system. The development of food-safety culture is especially important because written procedures alone cannot prevent contamination if operators do not consistently follow them.

For SPPG management, the most immediate implications are to maintain a complete HACCP plan with stage-specific critical limits, ensure that frontline personnel can take immediate corrective action, strengthen SSOP and GMP throughout non-CCP stages, conduct regular food-safety training, and perform periodic internal audits. These recommendations are directly aligned with the thesis findings and are intended to preserve preventive control while the production system operates at large scale.

CONCLUSION

The study concludes, first, that hazard identification across the full production chain—from raw-material receiving to final distribution—successfully mapped three principal risk categories: physical, biological or microbiological, and chemical hazards. Early identification is essential because uncontrolled hazards can reduce product quality and endanger beneficiaries. The probability-severity approach helped prioritize hazards for further control and supported risk-based decision making.

Second, use of the HACCP decision tree enabled the production process to distinguish stages requiring CCP control from hazards that could be eliminated, reduced, or controlled at later stages or managed effectively through disciplined SSOP and other prerequisite

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

procedures. The detailed CCP plans show the practical importance of measurable critical limits, continuous monitoring, immediate corrective action, verification, validation, and documentation. In the Cipinang Muara 2 case, these controls were supported by organizational commitment, staff training, laboratory testing, and internal evaluation. Maintaining food-safety performance therefore requires not only technical HACCP documentation but also sustained worker discipline, adequate facilities, reliable records, and a continuous food-safety culture.

REFERENCES

Armstrong, M. (2024). Armstrong's handbook of strategic human resource management (7th ed.). Kogan Page.

Badan Gizi Nasional. (2026, January 23). MBG 2026 targetkan 82,9 juta penerima, fondasi Indonesia Emas. https://www.bgn.go.id/news/berita/mbg-2026-targetkan-829-juta-penerima-fondasi-indonesia-emas

Dhani, A. U., & Pt, S. (2026). Manajemen mutu pangan. Dira Media Kreasindo.

Firman, F., Noviandra, A., & Kustanti, S. F. R. (2026). Pengembangan model smart-safety UMKM: Optimalisasi higiene sanitasi, keselamatan kerja, dan kepatuhan hukum perlindungan konsumen di Kelurahan Teritip. Bima Abdi: Jurnal Pengabdian Masyarakat, 6(1), 471–480.

Fitriyah, H., Lirizka, S. P., et al. (2026). Sanitasi dan keamanan pangan: Dari produksi hingga konsumsi. PT Cipta Digital Edukasi.

Food and Agriculture Organization, & World Health Organization. (2023). Codex Alimentarius: General principles of food hygiene (CXC 1-1969). FAO; WHO.

Hadiningrat, K. P. S. S., Yuwono, T., Djonisajoko, T., Sahary, F. T., Rowi, A. S., Anggraeni, N. D., & Satria, B. (2025). Makan bergizi gratis: Program akselerasi menuju Generasi Indonesia Emas Tahun 2045. CV Feniks Muda Sejahtera.

Hadiningrat, K. P. S. S., Yuwono, T., Sahary, F. T., & Djonisajoko, T. (2025). Riset kualitatif, suatu pendekatan praktikal Jilid 1. CV Feniks Muda Sejahtera.

Khatmawati, H., & Putri, Y. E. (2026). Model rantai pasok berkelanjutan pada Program Makan Bergizi Gratis berbasis pangan lokal di Kabupaten Sumbawa. Integrative Perspectives of Social and Science Journal, 3(01 Januari), 418–437.

Mafaza, A., & Kumalasari, I. D. (2022). Analisis penerapan Hazard Analysis Critical Control Point (HACCP) pada proses produksi Oriflakes di PT Serelia Prima Nutrisia, Yogyakarta. Agroindustrial Technology Journal, 6(2), 175–187.

Njatrijani, R. (2021). Pengawasan keamanan pangan. Law, Development & Justice Review, 4(1).

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

Noordianty, S. (2024). Kajian literatur: Penerapan aspek sanitasi terhadap mutu dan produk pangan. Karimah Tauhid, 3(7), 7312–7316.

Pahleviannur, M., Grave, A., Saputra, D., Mardianto, D., Sinthania, D., Hafrida, L., et al. (2022). Metodologi penelitian kualitatif. Pradina Pustaka.

Penatas, G. B. D., Nu'man, A. H., & Bachtiar, I. (2025). Perancangan sistem manajemen mutu untuk menurunkan tingkat keluhan pelanggan di PT Sunrise Abadi. Bandung Conference Series: Industrial Engineering Science, 5(2), 281–290.

Qomarudin, A., Fitriyah, H., & Hermawan, S. (2023). Implementasi keberhasilan sistem manajemen mutu terpadu Hazard Analysis and Critical Control Point melalui peningkatan kompetensi sumber daya manusia. Jurnal Bisnis dan Manajemen, 10(1), 37–44.

Rizkina, D., & Jumiono, A. (2026). Penerapan keamanan dan sanitasi pangan pada produksi nuget dengan metode HACCP. Agritekh (Jurnal Agribisnis dan Teknologi Pangan), 6(2), 164–177.

Sugiyono. (2022). Metode penelitian kuantitatif, kualitatif, dan R&D. Alfabeta.

Vatria, B. (2022). Penerapan sistim Hazard Analysis and Critical Control Point (HACCP) sebagai jaminan mutu dan keamanan pangan hasil perikanan. Manfish Journal, 2(2), 104–113.

Walansendow, A., Lagarense, B. E. S., & Lagarense, H. D. Y. (2025). Penerapan standar hygiene dan sanitasi dalam operasional dapur hotel: Studi kasus F&B Product Hotel Aryaduta Manado. Jurnal Hospitaliti, 4(1).

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.