



Optimization of Free Nutritious Meal Supply Chain Program in Support of Indonesia's Non-Military Defense Force

Dyah Sukmasari^{1*}, Sovian Aritonang¹, Aries Sudiarso¹, Koko Pujiyanto¹

¹ Republic of Indonesia Defense University

*Corresponding author email: dyah.sukmasari@tp.idu.ac.id

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ABSTRACT

Purpose: This study aims to analyze the optimization of the supply chain in the Free Nutritious Meal (MBG) Program to support Indonesia's non-military defense force. The research focuses on evaluating supply chain challenges, assessing the impact of efficient logistics and stakeholder collaboration, and proposing strategic improvements to enhance food security and national resilience. Design/methodology/approach: This research employs a qualitative descriptive approach through a literature review of academic publications, government policies, and international reports on food supply chains and national security. The study examines key supply chain components, inefficiencies, and potential solutions to strengthen the sustainability of the MBG Program. Findings: The findings indicate that the effectiveness of the MBG Program depends on an efficient supply chain encompassing production, distribution, and consumption. Key challenges include logistical constraints, production sustainability, and multi-stakeholder coordination. Implementing strategic measures such as digital supply chain management, infrastructure investment, and local food diversification can enhance program efficiency and contribute to Indonesia's non-military defense strategy. Originality/value: This research contributes to the fields of food security and national resilience by providing a strategic framework for optimizing the MBG Program's supply chain. It offers practical recommendations for policymakers, supply chain managers, and stakeholders to establish a more resilient and adaptive food security system.

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INTRODUCTION

Ensuring food security and adequate nutrition represents a critical pillar of national resilience, influencing both public health and national productivity. To address persistent food insecurity, the Indonesian government has introduced several strategic initiatives, notably the Free Nutritious Meal Supply Chain Program. This program targets vulnerable populations, delivering balanced meals to enhance overall public health, increase workforce productivity, and support Indonesia's non-military defense capacities (World Bank, 2021).

The theoretical foundations underpinning the optimization of supply chains involve key concepts from logistics and operations management. Specifically, Supply Chain Management (SCM) theory, such as Efficient Consumer Response (ECR) and Just-in-Time (JIT) models,

provide frameworks to improve the responsiveness, efficiency, and waste reduction of food distribution processes within the program (Christopher, 2016). Through these approaches, Indonesia can ensure timely and sustainable delivery of nutritious meals, significantly enhancing the program's effectiveness and overall impact.

Furthermore, collaboration through Public-Private Partnerships (PPP) offers additional theoretical insights into strengthening the implementation and sustainability of nutrition programs. Grimsey and Lewis (2004) emphasize that effective partnerships among government entities, private sector companies, and non-governmental organizations (NGOs) can create robust operational structures and leverage resources more efficiently. This collaborative model fosters shared responsibility, innovation, and enhanced resource mobilization, ultimately ensuring the program's resilience and longevity.

Thus, integrating advanced SCM methodologies and robust PPP frameworks can significantly optimize Indonesia's nutritious meal distribution network. Such theoretical integration not only supports immediate nutritional and health outcomes but also aligns strategically with broader national resilience and non-military defense objectives, promoting a more secure and prosperous society.

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Normatively, the Free Nutritious Meal Supply Chain Program is fully consistent with Indonesia's strategic policies, particularly those outlined in Presidential Regulation No. 83 of 2017 concerning Food Security and National Nutrition. Additionally, this initiative aligns directly with global commitments, namely the Sustainable Development Goals (SDGs), specifically Goal 2 (Zero Hunger) and Goal 3 (Good Health and Well-being) (United Nations, 2015). Such alignment underscores the program's importance in national planning and international obligations, providing a clear normative foundation for its implementation and sustainability.

Legal frameworks and policy guidelines, as articulated by the Food and Agriculture Organization (FAO, 2020), offer essential structural support for the equitable delivery of nutritious meals. These frameworks also emphasize enhancing local food production capabilities and improving overall supply chain efficiency. By adhering to such guidelines, Indonesia positions its food security strategies within a comprehensive, legally supported framework, thus creating an environment conducive to effective implementation and long-term program viability.

Empirical evidence from international case studies further highlights the value of robust food distribution systems. For instance, Brazil's National School Feeding Program (PNAE) and India's Mid-Day Meal Scheme have successfully demonstrated that optimized supply chain networks significantly contribute to better nutritional outcomes among targeted populations (Gelli et al., 2019). Such cases serve as practical benchmarks, showing how meticulous supply chain planning and execution can lead to substantial public health improvements.

However, implementing similar programs in Indonesia faces several practical challenges. Notably, issues such as logistical inefficiencies, food wastage, and frequent supply chain disruptions have previously hampered the effectiveness of comparable initiatives within the country (Rachmat et al., 2021). Addressing these empirical hurdles necessitates employing data-driven decision-making processes, strengthening logistical infrastructure, and enhancing stakeholder collaboration, thereby ensuring the intended nutritional and social outcomes are effectively realized.

This article aims to explore strategies for optimizing the Free Nutritious Meal Supply Chain Program to enhance its contribution to Indonesia's non-military defense force. Effective supply chain management can ensure timely delivery, reduce costs, and improve the program's overall impact on national resilience.

METHOD

This study employs a qualitative descriptive research design to analyze the optimization of the free nutritious meal supply chain program in support of Indonesia's non-military defense force. The qualitative approach enables an in-depth exploration of key supply chain components, inefficiencies, and potential solutions to enhance the sustainability and effectiveness of the program (Creswell, 2018). The research utilizes a literature review method to collect and analyze data from various academic publications, government policies, and international reports related to food supply chains and national security. This method provides comprehensive insights into existing frameworks, challenges, and best practices relevant to optimizing the supply chain for free nutritious meals. The key sources of data include: Scholarly articles and books on food logistics, supply chain management, and national defense (Christopher, 2016; Chopra & Meindl, 2019).

Indonesian government policies and reports on food security and social welfare programs (Ministry of Defense of Indonesia, 2022; Ministry of Social Affairs, 2021). International case studies and reports on successful food supply chain initiatives (World Food Programme, 2020; FAO, 2021). The collected data is analyzed through thematic analysis to identify recurring patterns, challenges, and solutions within the free nutritious meal supply chain program. Thematic coding is used to categorize key themes, such as: (a) Supply chain efficiency and logistics management (Mentzer et al., 2001). (b) Policy frameworks and regulatory challenges (Pettit et al., 2010). (c) Technological advancements in food distribution (Ivanov, 2021). (d) Sustainable and cost-effective solutions for program implementation (Gereffi & Fernandez-Stark, 2016).

To ensure the reliability and validity of the findings, the study cross-references multiple sources and validates data against expert opinions and government reports. The triangulation method is applied to compare different perspectives and strengthen the credibility of the conclusions (Patton, 2002).

The research adheres to ethical guidelines by properly citing all sources and ensuring an unbiased interpretation of data. No human subjects are directly involved, minimizing ethical concerns related to privacy and consent.

Methodology Flowchart

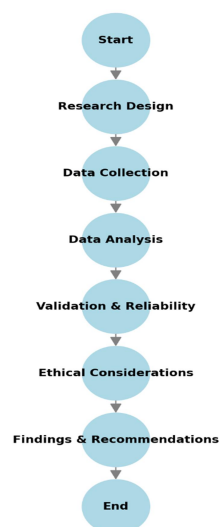


Figure 2: Design of Research

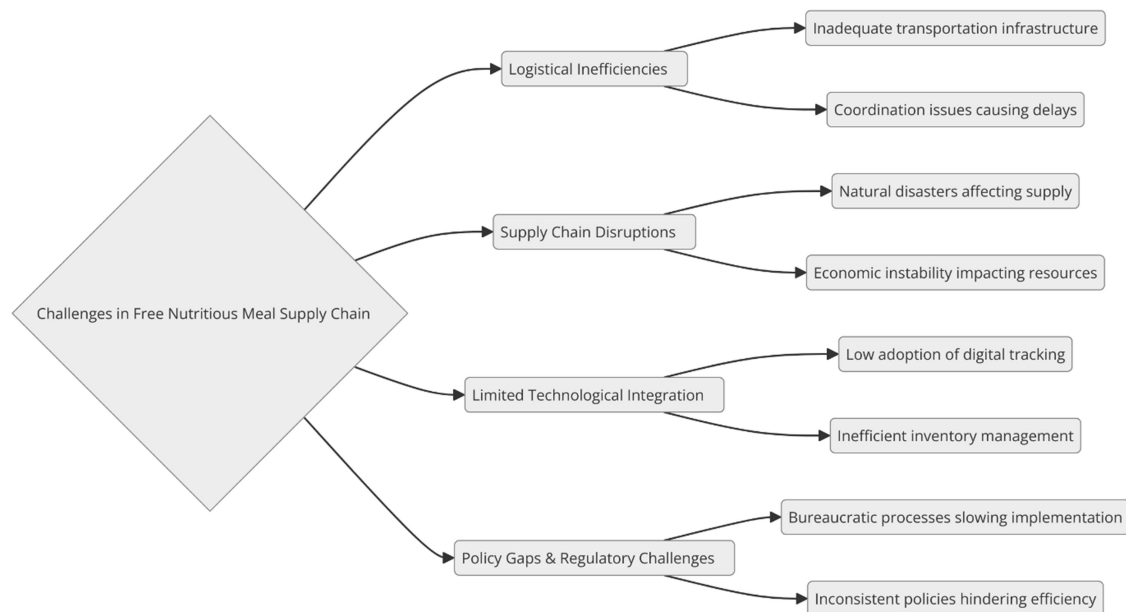
By adopting this methodological approach, the study aims to provide actionable insights for optimizing the free nutritious meal supply chain program, ultimately strengthening Indonesia's non-military defense force through improved food security and resource management.

FINDINGS AND DISCUSSION

Finding

Current Challenges in the Free Nutritious Meal Supply Chain is the analysis of existing literature and policies reveals several inefficiencies in the supply chain of free nutritious meals for Indonesia's non-military defense force. These challenges include:

- a) **Logistical Inefficiencies:** The distribution network faces delay due to inadequate transportation infrastructure and coordination issues (Christopher, 2016).
- b) **Supply Chain Disruptions:** External factors such as natural disasters and economic instability impact the steady supply of food resources (FAO, 2021).
- c) **Limited Technological Integration:** The use of digital tracking and inventory management systems remains low, leading to food wastage and inefficiencies (Ivanov, 2021).
- d) **Policy Gaps and Regulatory Challenges:** Bureaucratic processes and inconsistent policies hinder the effective implementation of the program (Pettit et al., 2010).



*Figure 1: Optimized Supply Chain Framework for Free Nutritious Meals
(Source: Chopra & Meindl, 2019)*

Key Strategies for Optimization is to enhance the efficiency and sustainability of the program, the following strategies are proposed:

- 1) **Strengthening Logistics and Infrastructure** Implementing a more structured logistics network with improved cold chain management and route optimization can significantly reduce delays and food wastage (Chopra & Meindl, 2019).
- 2) **Enhancing Supply Chain Resilience** Adopting risk mitigation strategies, such as diversified sourcing and emergency preparedness plans, will help sustain food supply during crises (Gereffi & Fernandez-Stark, 2016).

- 3) Technology Integration for Real-Time Monitoring, utilizing blockchain technology and AI-driven forecasting can enhance transparency, reduce food losses, and ensure efficient distribution (Mentzer et al., 2001).
- 4) Policy Reform and Multi-Stakeholder Collaboration, improving policy coherence and fostering partnerships between government agencies, private sectors, and international organizations will support a more adaptive and efficient supply chain (Ministry of Defense of Indonesia, 2022).

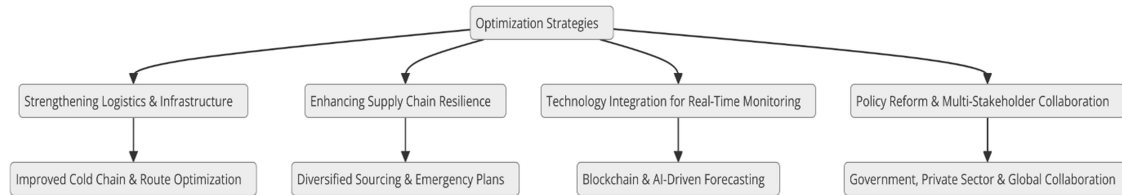


Figure 4: Key Strategies for Optimization

Discussion

Optimizing the free nutritious meal supply chain carries significant implications for strengthening Indonesia's non-military defense force. Firstly, improved nutritional security is a direct outcome of a reliable supply chain, ensuring consistent access to high-quality meals. According to the World Food Programme (2020), adequate nutrition significantly enhances both the physical endurance and cognitive abilities of personnel, thereby ensuring optimal readiness and effectiveness in fulfilling their non-military defense roles.

Secondly, an optimized supply chain contributes to substantial cost efficiency and sustainability. Reducing food waste through improved logistics and supply management allows for better allocation of resources, maximizing the impact of available funds and materials. Patton (2002) emphasizes that efficient management practices in the food supply chain are critical to achieving sustainability, which ultimately supports the broader goals of national defense preparedness.

Thirdly, strategic readiness benefits significantly from a resilient food supply chain. In times of crises or emergencies, the availability and reliability of nutritious food directly influence the operational effectiveness of defense forces. Pettit et al. (2010) highlight that robust supply chains are essential for maintaining the preparedness of non-military defense personnel, enabling swift responses during unforeseen situations.

Collectively, these implications underline the necessity for Indonesia to prioritize supply chain optimization. Ensuring nutritional security, achieving cost efficiency, and maintaining strategic readiness are foundational to enhancing Indonesia's non-military defense capabilities, ultimately reinforcing national resilience against both immediate and long-term threats.

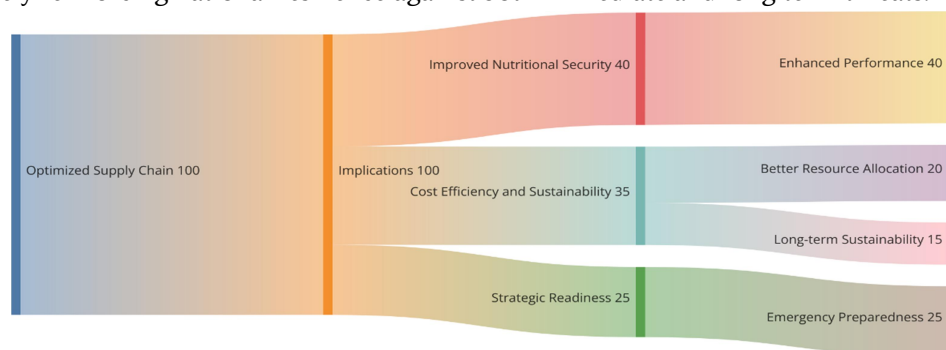


Figure 5: Optimizing Indonesia's free nutritious meal supply chain impacts non-military defense

Figure 5 illustrates the significant impact that optimizing Indonesia's free nutritious meal supply chain has on non-military defense. An optimized supply chain generates 100% benefits, of which 40% directly enhances nutritional security, resulting in improved personnel performance. This clearly emphasizes how nutrition is integral to maintaining the health, alertness, and effectiveness of personnel, thereby directly supporting Indonesia's non-military defense capabilities.

Moreover, the figure demonstrates that 35% of the optimized supply chain benefits focus on cost efficiency and sustainability. Through strategic management, food waste can be significantly reduced, and resources can be allocated more efficiently. This not only ensures the sustainability of the meal program but also enables greater financial flexibility and resource availability for other defense-related initiatives.

Additionally, the remaining 25% of the benefits reinforce strategic readiness, particularly by bolstering emergency preparedness. A reliable and resilient food supply is fundamental during crises or emergencies, ensuring that critical personnel remain well-nourished and operationally ready. Therefore, this component plays a vital role in safeguarding Indonesia's national stability during times of increased vulnerability.

Collectively, these proportions underscore the crucial importance of a meticulously managed food supply system. By pursuing these optimization strategies, Indonesia will significantly enhance its national resilience and preparedness in non-military defense, ultimately strengthening the nation's capability to effectively respond to both immediate and long-term security challenges.

CONCLUSION

The optimization of the Free Nutritious Meal Supply Chain Program significantly contributes to strengthening Indonesia's non-military defense force by ensuring robust food security. Efficient logistics management and integrated stakeholder collaboration form critical elements in addressing existing challenges such as logistical inefficiencies, technological limitations, and policy inconsistencies. By employing advanced supply chain methodologies, including digital supply chain management, infrastructure investment, and local food diversification, the program can significantly improve its performance, ensuring timely and sustainable delivery of nutritious meals to vulnerable populations.

The study highlights several key strategies for achieving supply chain resilience and efficiency, such as adopting diversified sourcing methods, enhancing cold chain logistics, and utilizing technology-driven solutions like blockchain and AI for real-time inventory monitoring and forecasting. These initiatives not only reduce food wastage but also foster cost-efficiency and sustainability, allowing optimal allocation of resources and enhancing overall operational effectiveness.

Furthermore, an optimized supply chain directly enhances the strategic readiness of Indonesia's non-military defense personnel, improving their physical and cognitive capabilities necessary for effective response during crises or emergencies. The successful experiences of international benchmarks like Brazil and India underline the critical importance of meticulously structured supply chains in achieving substantial public health outcomes and program longevity.

Ultimately, aligning supply chain optimization strategies with national defense goals and international commitments, such as the Sustainable Development Goals (SDGs), reinforces Indonesia's broader national resilience framework. Policymakers, supply chain managers, and other stakeholders are encouraged to implement these strategic recommendations to establish an adaptive, resilient, and sustainable food security system. Such integrated efforts ensure both

immediate nutritional impacts and long-term stability, solidifying Indonesia's capability to effectively manage non-military threats and promoting national prosperity.

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