



Strengthening Logistics and Distribution Systems in the Implementation of Free Nutritious Meal Programs in Secondary Schools

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ABSTRACT

The Free Nutritious Meal (MBG) Program is a strategic policy to improve the nutritional status and health of students. However, its effectiveness at the school level is often constrained by operational factors, especially the logistics and distribution system that is not optimal, as indicated at SMAN 2 Bitung City. This study aims to evaluate the implementation of the logistics and distribution system of the MBG Program and formulate a strengthening strategy based on the direct experience of stakeholders. The research uses a qualitative approach with an instrumental case study design. Data were collected through in-depth interviews with 12 key informants (SPPG managers, teachers, students, parents, and logistics providers), passive participatory observation, and documentation studies. The data were analyzed thematically using Braun and Clarke's models. The research findings crystallize in three main themes. First, operational disruption due to routine distribution delays, especially on Fridays, which disrupted study schedules and reduced the benefits of the program for students. Second, fragmented coordination and reactive communication between actors, supported by weak handover point infrastructure and information systems. Third, the opportunity for transformation towards a responsive system, characterized by a collective awareness of the need for simple technology and cross-sector collaboration to create a more reliable and efficient supply chain. The conclusion of this study is that the logistical constraints of MBG are systemic and rooted in weak communication and coordination governance. System strengthening not only requires technological intervention, but first requires the construction of a structured collaboration platform among all stakeholders. Strategic recommendations in the form of the implementation of an integrated communication system and the structuring of supply chain management are proposed to improve the timeliness, accountability, and ultimately success of the program in achieving its nutrition and education goals

INTRODUCTION

Indonesia faces complex nutritional challenges, with the prevalence of stunting still significant and impacting the quality of human resources (BPS, 2023; Ministry of Health, 2024). In response, the Government launched the Free Nutritious Eating (MBG) Program as a strategic intervention to improve the nutritional status of school children and support cognitive development (Rahmah et al., 2025; Basuki et al., 2026). Conceptually, the program is in line with the theory of human development (Sen, 1999) and human capital (Becker, 1993), which views investment in child nutrition as the foundation of long-term economic productivity.

Various preliminary studies confirm that MBG exerts a multidimensional positive impact. Research shows an increase in student attendance, study concentration, nutritional status, and a reduction in the economic burden of the family (Rahmah et al., 2025; Eyes & Nadia, 2025). Furthermore, this program has the potential to trigger an economic multiplier effect through the empowerment of local Micro, Small, and Medium Enterprises (MSMEs) as food providers (Widyasari et al., 2025; Herdiana, 2025).

However, behind this potential, a number of implementation evaluations reveal systemic challenges, particularly in the logistics and distribution aspects, that erode the effectiveness of the program. Herdiana (2025) identifies rigid and suboptimal distribution chains as the main inhibiting factors. Qualitative studies at the school level report delays in food delivery, untimely distribution, and unpreparedness of storage infrastructure in schools, leading to decreased food quality, food waste, and disruption to students' learning schedules (Eyes & Nadia, 2025; Widyasari et al., 2025). This phenomenon shows that there is a significant gap between top-down policy planning and operational capacity and coordination at the field level.

LITERATURE RIVIEW

This logistical problem is exacerbated by governance fragmentation and regulatory weaknesses. Basuki et al. (2026) assessed that coordination between ministries/institutions (Ministry of Education, Health, Social Affairs, and the National Nutrition Agency) still overlaps and is not integrated in a clear command system. More crucially, this national-scale program still operates without a comprehensive special legal umbrella, causing procedural inconsistencies and difficulties in supervision (Basuki et al., 2026). This condition reflects a failure to meet the prerequisites for effective policy implementation, namely adequate communication, resources, and bureaucratic structure (Keban, 2004; Edward III's theory in Febryanti et al., 2025).

Therefore, this study focuses on an in-depth analysis of logistics and distribution aspects as the main obstacles to the implementation of MBG. This focus is based on empirical findings that bottlenecks in supply chains not only reduce nutritional impacts, but also create budget inefficiencies and disrupt learning environments. This research proposes a solution approach through supply chain management optimization and adoption of appropriate technologies. Several studies provide early indications of this potential solution. Widyasari et al. (2025) and Maulana et al. (2025) highlight the need for

technology-based innovations, such as information systems for monitoring distribution and consumption. Meanwhile, the idea of actors in the field to improve coordination and utilize local networks (Eyes & Nadia, 2025) shows that there is local wisdom that can be integrated into a more structured system. By analyzing the root causes of logistics problems and exploring solution models that combine modern supply chain management principles with local contexts and affordable technologies, this study aims to provide concrete policy and operational recommendations. This recommendation is expected to improve the efficiency, timeliness, and accountability of MBG distribution, so that the program's noble goal of creating a healthy and intelligent generation can be achieved optimally and sustainably.

METHODOLOGY

This study uses a qualitative approach with an instrumental case study design to explore in depth the implementation of the logistics and distribution system of the Free Nutritious Meal Program at SMAN 2 Bitung City. The purposive sampling technique was used to capture 12 key informants representing all direct stakeholders in the logistics chain, namely SPPG Managers (2), Principals (1), Coordinating Teachers (2), Logistics Providers (2), Students (3), and Parents (2), until they reached the point of data saturation. Data collection was carried out in a triangulated manner through semi-structured in-depth interviews that were recorded, passive participatory observation of the distribution process (especially on weekdays and Fridays as critical cases), and documentation studies in the form of photographs and communication notes. The data analysis uses Braun and Clarke's thematic model through six stages: data familiarization, initial code, theme search, theme review, theme definition, and report production, which results in three main themes related to operational disruption, fragmented coordination, and system transformation opportunities. The validity of the data is maintained with the principle of credibility through triangulation of sources and methods as well as member checks; diversion through rich context descriptions; dependency through trail audits; and certainty through the storage of raw data. The ethical aspects of the research have been fulfilled by obtaining ethical approval (No. DP.04.03/FXXX.28/597/2025), the implementation of informed consent, and ensuring the confidentiality of informant identities. This method was chosen to produce a holistic, contextual, and direct experience-based understanding to formulate recommendations for strengthening the logistics system that are applicable.

RESULT

Overview of Research Locations

SMA Negeri 2 Bitung City is a public high school strategically located in Bitung City, North Sulawesi. This school is known as one of the educational institutions that has produced many great alumni and has a focus on a religious, nationalist, and healthy school environment. NPSN is 40103070. This school is located at Jl. Siswa No. 203, Madidir Ure Village, Madidir District, Bitung City,

North Sulawesi, Postal Code 95515 and has an Accreditation rating based on a decree from BAN-PDM in 2023.

SMA Negeri 2 Bitung is under the auspices of the Regional Government of North Sulawesi Province. This school runs a regular high school education program and is registered in the Basic Education Data (Dapodik) of the Ministry of Education and Culture. The school provides a variety of extracurricular facilities and activities to support the teaching and learning process and self-development of students. Information regarding specific facilities, extracurriculars, school agendas, and announcements can be accessed through the school's official website. Official Website: <https://sman2bit.sch.id/web/> and Official Instagram: @smanegeri2bitung.

Research Results

Based on thematic analysis of in-depth interview data with key informants, observations, and documentation, three main themes and sub-themes were found that describe the complexities, challenges, and opportunities for strengthening the logistics and distribution system of the MBG Program.

- **Theme 1: Operational Disruption Due to Vulnerable Distribution Chains**

This theme reveals how fragility in the logistics chain creates a direct disruption to school operations and the beneficiary experience. Sub-Theme 1.1: Delays as an Accepted Routine Disorder Delays are not considered incidents, but have become an "accepted" part of implementation, especially on days with special patterns.

"On Fridays, food usually arrives late, while the children go home early. Sometimes they only get food after they get home, so they can't enjoy it at school." (Principal & Teacher)
"So often only teachers are left. So what about those foods, Mr. Scott? Is it returned if the children do not eat? ... So the way is to just have all the teachers in the school." (Teacher)

Sub-Theme 1.2: Psychological and Educational Impact on Students Being late is not only an empty stomach, but affects enthusiasm, belief in the program, and teaching time indiscipline.

"Because MBG said sometimes they come late, so they have acid reflux disease, sometimes they have stomach acid, even though MBG is not there yet, so they bring food from home." These students' statements indicate that schedule uncertainty forces them to look for alternatives, which can reduce confidence in the reliability of the program.

- **Theme 2: Fragmented Coordination and Reactive Communication**

This theme highlights unstructured coordination mechanisms, relying on personal and reactive communication after problems have occurred. Sub-Theme 2.1: Communication Model "Waiting for Information" There is no fixed system of procedures for sharing critical information, such as changes in the number of students attending.

"They provide information, but later after it has been put together but sometimes they inform before that day oh before that day, so there are famous obstacles in one of them, because when we have distributed, of course, the school must receive and distribute the beneficiaries..." (SPPG Manager)

"Communication between the school and the MBG provider exists. Then even if it is outside the news that the children do not get. That's not like that." (Parents)

Sub-Theme 2.2: Lack of Communication Infrastructure and Defined Handover Points Coordination is not supported by adequate physical and digital infrastructure. Food is often placed in an inappropriate place.

"... once we came at 12 in the morning, the food was immediately placed on the floor whether MBG did not provide a proper place before the food was placed on the floor..." (Parents)

"If for the advice from the school, it is more precisely about the conditions in the field as I said earlier, when there are students who did not come to school at that time, they are more responsive to the situation..." (SPPG Manager)

- **Theme 3: Transformation Opportunities Towards Responsive and Connected Logistics Systems**

This theme summarizes the shared awareness of the need for change and the solutions that emerge from various stakeholders.

Sub-Theme 3.1: Collective Awareness of the Need for Simple Technology Both from the provider and school sides, there is an awareness that manual methods have reached their limits.

"What do you want it to be like? ... Actually, if we are more inclined to go to school. At school, there is a canteen. So, for example, at school they are given direct trust to the school, so for example in the canteen here. Make sure we will share this canteen." (Teacher).

This guru's idea reflects the desire to shorten supply chains and control processes locally.

Sub-Theme 3.2: Imagination about Integrated and Accountable Systems The informant imagines a system capable of connecting all points and providing real-time data.

"My advice is to ensure that food delivery is done on time and well arranged, so that all students get the right food at the right time. In addition, the variety of menus needs to be considered further..." (Parents). These expectations of parents reflect the need for predictability and reliability.

Sub-Theme 3.3: Prerequisites for Cross-Sector Collaboration for Sustainability Sustainable logistics solutions are understood to require the involvement of institutions outside of schools and SPPGs.

"... Of course, coordination at the PD level, which is called the local government, especially the local government, must be more intense like we are in this SPPG, yes, of course it must be intensely coordinated with the rural parties, the happiness parties, so that this program can be well controlled and there is also cross-sector SKPD, in this case related agencies..." (SPPG Manager).

This manager's view suggests that systemic solutions require a broader governance framework.

Thematic Synthesis: Inviting the Gap Between Expectations and Reality

The analysis of these three themes crystallizes a synthesis: There is a wide gap between program expectations (nutritious meals are available in time to

support learning) and the reality on the ground filled with uncertainty and inefficiency.

1. The current system is reactive: Problems are resolved after they have occurred (e.g., food delays, new solutions are sought). The ideal system should be proactive and predictive.
2. Information Not Flowing, Food Bottlenecked: Student attendance data, distribution status, and quality feedback are intermittent. A smooth flow of information is a prerequisite for smooth physical distribution.
3. Solutions Are at the Level of Awareness, Not Yet Implemented: All parties are aware of the problem and even have solution ideas (technology, intensive coordination), but there is no structured mechanism to translate that awareness into collective and systemic action.

In general, strengthening the logistics and distribution system of the MBG Program is no longer just a technical need, but a necessity to restore trust and ensure that the educational value of the program (discipline, reliability) is not eroded by operational inefficiencies. The transformation towards a responsive and connected system must begin with building a structured communication and collaboration platform among all key actors, before being strengthened with contextually appropriate technology adoption.

DISCUSSION

The results of this study reveal that the effectiveness of the Free Nutritious Meal Program (MBG) is highly dependent on the strength of the logistics system, distribution, and coordinated governance. These findings strengthen the theoretical framework of policy implementation and public management that emphasizes the importance of effective coordination, resources, and communication (Keban, 2004). Analysis of various studies shows that in addition to the positive impact on nutrition and student attendance, MBG is still faced with systemic challenges such as distribution delays, coordination fragmentation, uneven food quality, and regulatory weaknesses (Herdiana, 2025; Basuki et al., 2026; Widyasari et al., 2025).

The findings regarding fragmented and reactive coordination are in line with George Edward III's policy implementation theory (in Febryanti et al., 2025), which states that good communication and bureaucratic structure are critical variables of success. A study by Basuki et al. (2026) confirms that the overlap of authority between the Ministry of Education, Health, and Social Affairs, as well as the absence of a single coordinating agency, leads to undirected and non-uniform implementation between regions. This reflects weaknesses in "information resources" and "communication" in Edward's (1980) model, which ultimately impacts the quality of implementation. In addition, the lack of supporting infrastructure in schools, such as proper storage, indicates a failure in fulfilling "physical resources" as a prerequisite for effective implementation (Keban, 2004).

Logistical and distribution issues that have an impact on students' operational and psychological disruptions are also in the spotlight. Herdiana (2025) identified that the rigid distribution chain and the suboptimal mapping of

the target area are serious obstacles. Qualitative studies by Eyes and Nadia (2025) and Widyasari et al. (2025) found that distribution delays, menu mismatches with local tastes, and lack of menu variety lead to student rejection and food waste. This phenomenon is in line with the findings of Maulana et al. (2025) who concluded that system design inconsistency is the root of implementation failure, not just a lack of goodwill. Repeated delays not only result in waste, but also erode discipline and certainty for students, contrary to the program's objectives.

On the other hand, this study also reveals the multidimensional positive impact of MBG. Eyes and Nadia (2025) and Rahmah et al. (2025) reported improvements in students' nutritional status, learning energy, concentration, attendance, and social interaction. This program also contributes to reducing the economic burden on families and empowering the local economy through the involvement of MSMEs (Widyasari et al., 2025; Herdiana, 2025). However, this potential for economic empowerment is often hampered by unclear technical rules for the involvement of MSMEs and the community (Herdiana, 2025).

Weaknesses in regulation and governance are another fundamental challenge. Basuki et al. (2026) criticized that MBG still operates without a comprehensive special legal umbrella, relying on Presidential Decree No. 83/2024 which does not regulate in detail the distribution mechanism, menu standards, and accountability. The absence of a strong legal basis risks leading to inconsistent implementation, difficulties in budget oversight, and vulnerability to irregularities. The study also highlights potential conflicts of interest and the dominance of certain actors (such as the military and police) in program governance, which can reduce transparency and accountability.

Despite facing various challenges, the seeds of solutions and innovations emerged from the implementation level. Teachers and managers in the field recognize the need for a better system and propose solutions such as the involvement of school canteens, intensive coordination with relevant agencies, and the use of technology for monitoring (Widyasari et al., 2025). These ideas are in line with the recommendations of Yanti et al. (2025) and Ebenso et al. (2025) which emphasize the use of local resources and improved communication as the key to sustainability. Strengthening logistics systems through simple technologies, such as integrated communication applications or live tracking, can be a form of optimization recommended in many studies.

Thus, this discussion concludes that the effectiveness and sustainability of MBGs depend on the ability to overcome systemic challenges in the fields of logistics, coordination, regulation, and governance. Policy recommendations that emerged from the synthesis of various studies include: (1) Strengthening a comprehensive and specific regulatory framework; (2) Establishment of a centralized coordination and communication system involving all stakeholders; (3) Improvement of logistics and distribution systems by taking into account geographical conditions and local wisdom; (4) Improving food quality supervision and food safety; (5) Involvement of the community and MSMEs in a structured and transparent manner; and (6) The implementation of a data-based periodic evaluation system. With this holistic and collaborative approach, MBG

has the potential to realize its optimal impact as a long-term investment in the quality of Indonesia's human resources.

CONCLUSIONS AND RECOMMENDATIONS

The conclusion of this study is that the main obstacle of the MBG Program at the school level is systemic-logistical, not just a momentary technical problem. Weaknesses in the aspects of coordination, technology, and supply chain management are the root of the problem that must be addressed immediately. A simple technology-based approach and better structuring of logistics management are conceptually proven to be an effective solution to improve the efficiency, timeliness, and ultimately success of the MBG program as a whole. The implementation of a gradual strengthening strategy (from quick wins to an integrated system) is highly recommended to be implemented at SMAN 2 Bitung City and can be used as a model for other schools.

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