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Management and Utilization of Students' Leftover Food to Reduce Food Waste in the Free Nutritious Meal (MBG) Program: An Islamic Economics Perspective and Integrative Educational Insight

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Abstract
This study aims to examine how the management and utilization of students' leftover food in the Free Nutritious Meal (MBG) Program is viewed through an Islamic economics perspective and its integrative educational value. This study employs a library research design. The analysis shows that the utilization of leftovers from the Free Nutritious Meal (MBG) program reflects core principles of Islamic economics by transforming food surplus into ethically productive resources rather than waste. Practices such as converting leftovers into animal feed, compost, maggot protein, or reprocessed food demonstrate the avoidance of isrāf (wastefulness) and promote moderation (wasatiyyah) in consumption. These efforts ensure that public resources intended for social welfare continue to generate value beyond their primary use. From an Islamic economic perspective, MBG leftover utilization realizes maṣlaḥah (public benefit) by producing multidimensional outcomes, including environmental cleanliness, cost efficiency, educational enrichment, and social welfare. The responsible management of leftovers reflects amanah (trust and accountability), as schools and communities actively assume stewardship over public resources. Collectively, these practices form an emerging Sharia-compliant circular economy, where resources circulate through productive cycles in line with ethical and sustainability principles. Moreover, collaborative management of MBG leftovers strengthens ta'āwun (cooperation) and social solidarity, while achieving iqtiṣād (balanced efficiency) and 'adl (justice) without exploitation. By engaging students and communities in ethical consumption and production, these initiatives foster akhlaq iqtisadiyyah, embedding Islamic economic values into everyday behavior. Overall, MBG leftover utilization illustrates how public nutrition programs can operationalize Islamic economic ethics at the grassroots level, addressing food waste, sustainability, and social responsibility in an integrated and practical manner. The utilization of leftovers from the Free Nutritious Meal (MBG) Program serves as an integrative educational practice that simultaneously strengthens student character, promotes environmental sustainability, and enhances economic efficiency. Through hands-on activities such as composting, waste sorting, animal feed production, and food reuse, students internalize ethical values—responsibility (amanah), moderation (wasatiyyah), cooperation (ta'āwun), and environmental stewardship (khilāfah)—through daily experience rather than abstract instruction. These practices foster creativity, problem-solving, leadership, and integrity in consumption behavior, while positioning schools as experiential and interdisciplinary learning spaces that integrate scientific, economic, civic, and religious perspectives. At both institutional and social levels, MBG leftover management encourages accountability, ethical governance, and community influence, transforming schools into role models of sustainable practice. Overall, MBG leftover utilization elevates the program into a comprehensive educational instrument where character formation, ethical resource management, and sustainable public welfare are deeply interconnected.

Keywords: *Food Waste Management; Free Nutritious Meal (MBG); Free Nutritious Meal (MBG) Program; Islamic Economics, Students' Leftover Food*

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INTRODUCTION

Food waste has emerged as one of the most pressing challenges in contemporary food systems, posing serious environmental, economic, and social consequences. Globally, large quantities of edible food are discarded at various stages of production, distribution, and consumption, while many populations continue to face food insecurity and malnutrition. This paradox highlights inefficiencies in resource utilization and raises ethical concerns regarding sustainability and social justice. In developing countries, including Indonesia, food waste at the consumption level has become increasingly visible, particularly in institutional settings such as schools, hospitals, and public food assistance programs. The Free Nutritious Meal Program (MBG) is a national intervention program and is a priority program as an effort to reduce cases of child stunting, which are still high in Indonesia (Desiana, 2025).

In response to nutritional challenges among school-aged children, the Indonesian government has introduced the Free Nutritious Meal (MBG) Program, aimed at improving students' nutritional intake, health status, and learning readiness. The Free Nutritious Meal Program (MBG) initiated by the Indonesian government through Presidential Decree No. 83 of 2024 and Decree No. 2 of 2024 aims to improve the nutritional quality of students as an effort to reduce stunting rates (Virlana & Tjoneng, 2025). The free nutritious meal program is a plan to provide nutritious meals in schools or Islamic boarding schools to improve students' nutrition (Oktawila et al., 2025). Malnutrition and food insecurity remain significant challenges, especially in Muslim-majority countries (Nuraini et al., 2025). Free nutritious meal programs have emerged as strategic efforts to improve public health, particularly among vulnerable groups such as schoolchildren and pregnant women. The MBG program is a government initiative to address nutritional problems in vulnerable groups such as school children, toddlers, and pregnant and lactating mothers (Nissa et al., 2025). The Free Nutritious Meal Program (MBG) is one of the government's strategic initiatives aimed at improving nutritional quality and public welfare, particularly for school-aged children (Santoso et al., 2025).

By providing balanced meals during school hours, the MBG program seeks to address issues of malnutrition, support cognitive development, and promote equal access to nutritious food for students from diverse socioeconomic backgrounds. While the program reflects a strong commitment to public welfare and human capital development, its large-scale implementation has also generated unintended consequences, one of which is the accumulation of students' leftover food after meal distribution.

Leftover food in school meal programs arises from multiple factors, including variations in students' appetite, differences in food preferences, portion sizes that do not always match individual needs, and student absenteeism. When not properly managed, these leftovers often become organic waste that contributes to environmental pollution, increases waste management costs, and reflects inefficiencies in the use of public funds. In the context of MBG, where meals are financed through state resources, the disposal of edible food raises concerns not only about environmental sustainability but also about economic efficiency and ethical responsibility.

Recent developments across various regions in Indonesia indicate that leftover food from the MBG program does not necessarily have to end as waste. Several schools, communities, and local governments have begun to implement innovative practices to manage and utilize students' leftover food productively. These practices include converting food remnants into livestock feed, compost and organic fertilizer, maggot cultivation, eco-enzyme production, and even reprocessing edible leftovers into new food products. Such initiatives demonstrate the potential for applying circular economy principles within educational environments, where waste is minimized, and resources are continuously reused to generate added value.

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Beyond their environmental benefits, these practices offer important educational opportunities. By involving students in activities such as food sorting, composting, livestock feeding, and sustainable food processing, schools can foster environmental awareness, responsibility, and practical life skills. Experiential learning related to food systems and waste management allows students to understand ecological cycles, resource limitations, and the consequences of consumption behavior. In this way, leftover food utilization becomes not only a technical solution to waste reduction but also a meaningful component of character education and sustainability-oriented learning.

From an Islamic economics perspective, the issue of food waste carries profound ethical implications. Islam strongly discourages isrāf (wastefulness), viewing it as a moral failing that contradicts gratitude for divine blessings. The Qur'an explicitly warns against excessive and wasteful consumption, emphasizing moderation and responsibility in the use of resources. In the context of MBG, the disposal of uneaten but still usable food can be seen as inconsistent with Islamic ethical teachings, particularly when such food could be redirected for beneficial purposes.

Furthermore, the concept of khilāfah positions humans as stewards entrusted with the responsibility to manage resources on earth in a just, balanced, and sustainable manner. This stewardship obligation extends to food resources, which must be utilized efficiently to serve both present and future generations. Managing and utilizing leftover food within the MBG program can therefore be interpreted as an act of fulfilling khilāfah, as it involves safeguarding resources, reducing environmental harm, and maximizing social benefit from existing provisions.

The framework of maqāṣid al-sharīʿah further strengthens the relevance of Islamic economics in analyzing food waste management. The objectives of Islamic law emphasize the preservation of life (ḥifẓ al-nafs), wealth (ḥifẓ al-māl), intellect (ḥifẓ al-'aql), and the environment (ḥifẓ al-bi'ah). Efficient management of MBG leftovers contributes to these objectives by preventing the loss of valuable food resources, supporting food production systems, reducing waste-related environmental degradation, and enhancing students' knowledge and ethical awareness through integrative educational practices. Thus, leftover food utilization aligns not only with sustainability goals but also with the broader ethical vision of Islamic economics.

Despite the growing number of grassroots initiatives and media reports highlighting innovative uses of MBG leftovers, academic research that systematically examines these practices through an Islamic economics lens remains limited. Most existing studies on food waste focus on technical waste management, consumer behavior, or environmental impacts, with less attention given to ethical, religious, and educational dimensions. Similarly, studies on school feeding programs often emphasize nutritional outcomes without sufficiently addressing the issue of post-consumption waste and its broader implications.

There are previous studies related to the Free Nutritious Meal Program (MBG). Pradita et al. (2025) examine the Makan Bergizi Gratis (MBG) program as a government social policy designed to enhance public welfare, particularly for low-income communities vulnerable to malnutrition and poverty, while assessing its role as an instrument of economic redistribution and grassroots social solidarity from the perspective of fiqh siyasah. The findings reveal that the MBG program has successfully reduced the economic burden on low-income families, increased children's school attendance, and strengthened social cohesion; however, persistent challenges remain, including distribution delays, budget limitations, and insufficient transparency in fund management. From a fiqh siyasah analysis, these results indicate that the effectiveness of public policy is closely linked to amānah (integrity), accountability, and just governance, highlighting the need for participatory and transparent mechanisms to ensure that the MBG program genuinely promotes maṣlaḥah in

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accordance with the maqāṣid al-sharīʻah, while also contributing academically by integrating empirical evidence with Islamic political jurisprudence. Ansori & Sukendar (2025) examine the juridical aspects of using zakat funds for the Free Nutritious Meal Program (MBG) based on the perspective of zakat jurisprudence (fiqh) and national legislation, particularly Law Number 23 of 2011 concerning Zakat Management. The findings reveal that the allocation of zakat funds for the MBG program is not in accordance with the principles of Islamic law nor with the prevailing positive regulations in Indonesia. This is due to the following reasons: (1) according to sharia, zakat may only be distributed to eight eligible categories (asnaf) as outlined in Surah At-Tawbah: 60, while the MBG program is inclusive and not limited to those categories; (2) participants in the program who are still under the care of financially capable parents do not qualify as poor or needy based on fiqh criteria; and (3) Law No. 23 of 2011 explicitly restricts zakat distribution to the designated asnaf groups. Nuraini et al. (2025) examine and synthesize existing scholarly literature on the Makan Bergizi Gratis (MBG) program from the perspective of maqāṣid al-sharīʻah, with particular emphasis on how the program aligns with the objectives of protecting life (ḥifẓ al-nafs), intellect (ḥifẓ al-ʿaql), wealth (ḥifẓ al-māl), and social welfare. The findings reveal that such programs positively impact nutritional security, educational outcomes, and social development. When implemented based on Islamic values—such as ensuring halal-thayyib food standards and involving community-based initiatives through zakat and waqf—their sustainability and effectiveness are significantly enhanced. In conclusion, integrating Maqashid Syariah into free meal programs not only strengthens health and education outcomes but also serves as a comprehensive strategy for sustainable development aligned with Islamic ethical values. Alifah (2026) analyzes the Free Nutritious Meals (MBG) policy introduced during the administration of Prabowo Subianto through the lens of Islamic political jurisprudence (fiqh siyasah), particularly the principle of tasarruf al-imām ʻala al-raʻiyyah manūṭun bi al-maṣlaḥah (a ruler's actions must be based on public welfare). The MBG program is a strategic initiative to address Indonesia's persistent issues of stunting and malnutrition, especially among students and impoverished communities. The findings indicate that MBG embodies the essence of maṣlaḥah and can be classified as a legitimate policy in Islamic governance, provided it is implemented justly, proportionally, and prioritizes marginalized groups. The study recommends comprehensive needs mapping, participatory policy evaluation, and integration of maqāṣid al-sharīʻah values to ensure that MBG truly serves as an instrument of social justice and public welfare.

Previous studies on the Makan Bergizi Gratis (MBG) program have predominantly focused on its macroeconomic, juridical, and policy legitimacy dimensions within Islamic frameworks. Pradita et al. (2025) analyze MBG as a public welfare policy from a fiqh siyasah perspective, emphasizing justice, accountability, and governance outcomes, yet their study does not address operational inefficiencies at the micro level, particularly issues related to food waste and the management of students' leftover food. Similarly, Ansori and Sukendar (2025) concentrate on the legal permissibility of using zakat funds for MBG, offering an important normative critique but leaving aside practical implementation challenges such as resource inefficiency and post-consumption food management within schools.

Furthermore, Nuraini et al. (2025), through a Systematic Literature Review, demonstrate that MBG aligns with the maqāṣid al-sharīʻah in promoting nutrition, education, and social welfare; however, their analysis remains conceptual and policy-oriented, with limited attention to behavioral practices, educational interventions, and food utilization strategies that could enhance program sustainability. Likewise, Alifah (2026) affirms the legitimacy of MBG under the principle of tasarruf al-imām ʻala al-raʻiyyah manūṭun bi al-maṣlaḥah, yet the study primarily evaluates policy justification and governance ethics,

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without examining environmental consequences, such as food waste, or the role of schools as educational spaces for ethical consumption.

Collectively, these studies reveal a significant gap in the literature concerning the management and utilization of students' leftover food within the MBG program. Specifically, there is a lack of research that integrates food waste reduction practices, Islamic economic ethics (isrāf, khilāfah, and maqāṣid al-sharī'ah), and educational value formation at the school level. The absence of such an integrative, micro-level perspective limits the understanding of how MBG can evolve from a nutrition policy into a sustainable, value-based, and environmentally responsible program.

This study offers theoretical and practical novelty by shifting the focus of MBG research from policy legitimacy and funding debates to the management and utilization of students' leftover food as a critical yet underexplored dimension of program effectiveness. Unlike prior studies, this research explicitly positions food waste reduction as an ethical, economic, and educational issue within the framework of Islamic economics, emphasizing the prohibition of isrāf (wastefulness), the principle of khilāfah (human stewardship of resources), and the achievement of maqāṣid al-sharī'ah, particularly ḥifẓ al-nafs, ḥifẓ al-māl, and ḥifẓ al-bī'ah (environmental protection).

Moreover, this study introduces an integrative educational insight by conceptualizing schools not merely as beneficiaries of food assistance but as agents of ethical transformation, where students are educated to practice responsible consumption, food appreciation, and social responsibility. By linking leftover food management strategies—such as portion control, redistribution, and food literacy education—with Islamic economic values, this research extends the discourse on MBG beyond welfare provision toward sustainable Islamic social policy.

Thus, the novelty of this research lies in its interdisciplinary integration of Islamic economics, environmental sustainability, and education, offering a micro-level, value-based framework for optimizing the MBG program. This contribution not only fills an empirical and conceptual gap in existing MBG studies but also provides actionable insights for policymakers, educators, and Islamic social institutions seeking to enhance the program's long-term sustainability and alignment with Islamic ethical principles.

METHOD

This study employs a library research design. Library research is a qualitative research approach that relies on systematically collecting, reviewing, and analyzing existing scholarly sources rather than generating primary data from fieldwork (Fitria, 2023). The data used in this approach consist of written documents such as academic journal articles, books, policy papers, and official reports relevant to the research topic. Library research is selected for this study for several reasons. First, the research focuses on conceptual analysis of food waste management, the utilization of students' leftover food, and the implementation of the Free Nutritious Meal (MBG) Program from the perspectives of Islamic economics and integrative education, which are best explored through existing theories, principles, and documented practices. Second, this approach allows the researcher to synthesize interdisciplinary insights from Islamic economic thought, food waste management literature, and educational studies. Third, library research provides a strong theoretical foundation to evaluate ethical values, sustainability principles, and educational implications without being limited by specific locations or time-bound field data.

The data in this study were collected using document analysis. Document analysis is a systematic procedure for reviewing and evaluating written materials to extract meaningful information relevant to the research objectives. Documents serve as reliable sources of secondary data because they represent established knowledge, empirical findings, and

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normative frameworks (Fitria, 2024). The types of documents used in this research include peer-reviewed national and international academic journal articles related to food waste management, the utilization of leftover food, school meal programs, Islamic economics, sustainable consumption, and integrative educational approaches, which serve as the primary academic data sources. In addition, books and scholarly monographs on Islamic economics, Islamic business ethics, sustainable development, food security, and educational theory are used to strengthen the conceptual and normative framework of the study. Importantly, this research also systematically analyzes news articles from various reputable online newspapers and digital media outlets, consisting of more than a dozen reports that document real-world practices of managing and utilizing leftover food from the Free Nutritious Meal (MBG) Program in schools and communities. These news articles provide empirical descriptions of grassroots implementation, innovations, and impacts that are often not captured in formal policy documents or academic publications.

The data analysis in this library research is conducted using a qualitative, descriptive, and thematic analysis approach. The analysis process involves several stages. First, the collected documents are carefully read and organized according to their relevance to food waste management, leftover food utilization, Islamic economic principles, and educational integration. Second, key concepts, arguments, and findings are identified and categorized into thematic units, such as ethical responsibility in Islamic economics, efficiency and redistribution of food resources, and the educational role of sustainability awareness. Third, the researcher interprets and synthesizes these themes to construct an integrated analytical framework that connects food waste reduction practices in the MBG Program with Islamic economic values and educational insights. Finally, conclusions are drawn by comparing and critically evaluating different scholarly perspectives to formulate coherent arguments and recommendations relevant to sustainable food management and value-based education.

FINDINGS AND DISCUSSION

This section presents the empirical findings of the study on the management and utilization of students' leftover food within the Free Nutritious Meal (MBG) Program, viewed from the perspective of Islamic economics and integrative education.

Table 1. Empirical Findings on the Utilization of MBG Leftover Food

No	Source (Year)	Result	Impact
1	Kompasiana (2025)	MTsN 1 Bantul collected uneaten MBG food (rice, vegetables, side dishes) and processed it into natural feed for free-range chickens kept on school grounds, with active teacher guidance and student participation as part of a zero-waste initiative.	Fifteen chickens successfully produced chicks (kuthuk), indicating sufficient nutritional value of the repurposed feed; the practice reduced food waste, supported small-scale food production, fostered environmental responsibility, character education, and student understanding of ecological cycles.
2	Radar Jogja (2025)	A teacher at SMAN 1 Kebumen collected, sorted, dried, and mixed leftover MBG food—mainly rice and vegetables—with bran to produce feed for mentok (ducks), demonstrating grassroots food surplus management.	The reuse significantly reduced livestock feed expenses, minimized organic waste at the school level, reinforced sustainable habits among educators and students, and promoted a culture of resourcefulness and circular food use.
3	Kompas Surabaya (2025)	SMPN 13 Surabaya processed leftover MBG food into catfish (lele) feed and organic compost through teacher–student	The initiative reduced organic waste, supported aquaculture and soil fertility, contributed to local food production, and provided experiential learning in

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		collaboration as part of a circular waste management strategy.	sustainability and ecological reuse for students and staff.
4	Kuningan Mass (2025)	At SDN 2 Babakanreuma, residents collected uneaten MBG food left after distribution and reused it as livestock feed instead of allowing it to become waste.	The practice reduced organic waste volume at the school, lowered household livestock feed costs, and generated environmental and socio-economic benefits through informal community-based reuse.
5	Duta TV / Radar Banjarmasin (2025)	SMPN 1 Banjarmasin collected leftover MBG food and processed it into organic compost used to fertilize school gardens, involving students in waste separation and composting activities.	Organic waste sent to disposal sites was reduced, soil quality in school green spaces improved, and students gained hands-on learning about decomposition, waste reduction, and environmental stewardship.
6	Sinergia Mediatama (2025)	The Municipal Government of Madiun implemented a pilot circular economy program by aggregating leftover MBG food from multiple schools and using it as feed for livestock such as ducks and fish.	Initial trials showed positive results in livestock nutrition and food waste reduction; the program demonstrated scalability potential, reduced disposal costs, and promoted institutional-level circular economy practices.
7	Dewiku (2025)	Students in Lampung Tengah collected leftover bananas from MBG meals and processed them into banana cake (kue bolu) to be shared with classmates.	The initiative reduced food waste, fostered creativity, teamwork, culinary skills, and sustainability awareness, and generated positive social engagement and learning outcomes among students.
8	Pantura7 (2025)	Youth innovators in Lumajang transformed MBG food leftovers into eco-enzyme, liquid fertilizer, and maggot feed through fermentation and organic processing techniques.	Organic waste generation was reduced, value-added products supported agriculture and livestock, potential income opportunities emerged, and youth gained skills in environmental innovation and entrepreneurship.
9	SMAN 1 Bringin (2025)	Students actively participated in the MBG program, consuming balanced meals and demonstrating responsible attitudes toward nutrition, as reported by the school.	The program increased awareness of healthy eating habits, improved student satisfaction and well-being, and supported learning readiness, though reuse of leftovers was not the primary focus.
10	Regional Espos (2025)	At SMA Banyumanik Semarang, accumulated MBG leftovers were collected and repurposed as chicken feed rather than being discarded as waste.	Waste buildup was reduced, poultry received a practical nutrition source, feeding costs were lowered, and the school community practiced informal circular resource use.
11	TangerangNews (2025)	In Tangerang Selatan, leftover MBG food was reused as livestock feed and as raw material for maggot cultivation coordinated by local authorities and residents.	Organic waste volume decreased, sustainable livestock and maggot-based feed systems were supported, and new economic opportunities emerged from waste-to-resource conversion.
12	MAN 2 Bantul (2025)	MAN 2 Bantul implemented a zero-waste system by converting MBG leftovers into Black Soldier Fly larvae (maggots), liquid fertilizer, and compost for fish farming and school gardens.	Food waste was substantially reduced, protein-rich fish feed was produced, soil fertility improved, and students gained experiential learning in ecological cycles and sustainable resource management.

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The empirical findings show that leftover food from the Free Nutritious Meal (MBG) Program has been widely and creatively utilized across various regions in Indonesia through school- and community-based initiatives. Most practices focus on converting uneaten food into livestock feed, such as for chickens, ducks, fish, and maggots, as well as into organic compost, liquid fertilizer, and processed food products. These initiatives significantly reduced organic food waste, lowered livestock feed and disposal costs, supported small-scale food production, and demonstrated the potential for circular economy implementation within educational settings. In addition to environmental benefits, the findings highlight strong educational and social impacts, including student involvement in hands-on sustainability practices, character and environmental education, creativity, teamwork, and entrepreneurial skills development. At the institutional level, pilot programs coordinated by local governments further indicate the scalability and policy relevance of MBG leftover food utilization, suggesting that such practices can be expanded nationally and adapted to broader contexts of sustainable food management.

1. Empirical Evidence of Leftover Food Utilization in the MBG Program

   Findings from various media reports and institutional publications indicate that the Free Nutritious Meal (MBG) program has generated significant amounts of leftover food in schools, but these leftovers are increasingly being managed through innovative and productive utilization practices rather than disposal. Across multiple regions in Indonesia, schools, educators, local communities, and local governments have implemented practical strategies to repurpose uneaten portions of MBG meals—primarily rice, vegetables, side dishes, and fruit—into alternative resources such as livestock feed, aquaculture feed, compost, maggot cultivation inputs, eco-enzyme, and even reprocessed edible products. These practices demonstrate that students' leftover food is not inevitably waste but can be transformed into valuable secondary resources within educational and community ecosystems (Kompasiana, 2025; Radar Jogja, 2025; Kompas Surabaya, 2025).

2. Utilization of MBG Leftovers as Livestock and Aquaculture Feed

   A dominant pattern identified in the findings is the utilization of MBG leftovers as feed for livestock and fish. At MTsN 1 Bantul, uneaten MBG food was systematically collected and processed into feed for free-range chickens maintained on school grounds, resulting in successful chicken reproduction, evidenced by the hatching of chicks (kuthuk), which indicates sufficient nutritional value of the repurposed food (Kompasiana, 2025). Similar practices were observed at SMA Banyumanik Semarang, SMAN 1 Kebumen, and several schools in Tangerang Selatan, where leftover rice and vegetables were dried, mixed, or directly reused as feed for chickens, ducks, mentok, and catfish, reducing organic waste accumulation while lowering livestock feed costs (Radar Jogja, 2025; Regional Espos, 2025; TangerangNews, 2025). These findings confirm that MBG leftovers can effectively support animal nutrition when handled appropriately, contributing to waste reduction and resource efficiency.

3. Circular Economy Practices through Maggot Cultivation and Composting

   Another significant finding is the emergence of circular economy practices through maggot cultivation and composting. At MAN 2 Bantul and SMPN 1 Banjarmasin, MBG leftovers were separated and processed into organic compost, liquid fertilizer, and Black Soldier Fly larvae (maggots), which were then used as high-protein feed for fish and livestock (MAN 2 Bantul, 2025; Duta TV, 2025). Similarly, youth initiatives in Lumajang processed MBG food waste into eco-enzyme, liquid fertilizer, and maggot feed, demonstrating community-based innovation in organic waste transformation (Pantura7, 2025). These initiatives not only reduced the volume of food waste entering disposal

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systems but also produced value-added outputs that support agriculture, aquaculture, and environmental sustainability.

4. Community and Government-Led Reuse of MBG Leftovers

   The findings further reveal that MBG leftover utilization is not limited to schools but often involves broader community and government participation. In Kuningan, residents collected uneaten MBG food from SDN 2 Babakanreuma to feed household livestock, reducing waste while generating economic benefits through reduced feed purchases (Kuningan Mass, 2025). At the municipal level, the Government of Madiun implemented a pilot circular economy initiative by aggregating MBG leftovers from multiple schools and redirecting them as livestock feed in designated areas, with plans for expansion based on positive trial outcomes (Sinergia Mediatama, 2025). These cases demonstrate institutional recognition of leftover food as a recoverable resource rather than a disposal burden.

5. Creative Reprocessing of MBG Leftovers into Edible Products

   Beyond feed and compost, the findings also document creative reprocessing of MBG leftovers into new edible products. In Lampung Tengah, students collected uneaten bananas from MBG meals and transformed them into banana cake (kue bolu), which was shared with classmates, illustrating a student-led initiative that combines food waste reduction with creativity, collaboration, and practical food processing skills (Dewiku, 2025). This case highlights the educational potential of MBG leftovers when integrated into experiential learning activities that promote responsibility and sustainability.

6. Behavioral and Educational Outcomes of MBG Implementation

   In addition to material reuse, the findings indicate positive behavioral and educational outcomes associated with the MBG program. Reports from SMAN 1 Bringin emphasize improved student awareness of balanced nutrition, responsible eating habits, and positive attitudes toward government-provided meals, even when leftover utilization was not the primary focus (SMAN 1 Bringin, 2025). When combined with reuse practices, MBG implementation becomes a platform for character education, environmental awareness, and practical understanding of sustainability, reinforcing values of moderation and responsibility.

7. Synthesis of Findings

   Overall, the findings demonstrate that students' leftover food from the MBG program has been empirically utilized in diverse and context-specific ways across Indonesia, including animal feed, aquaculture support, composting, maggot cultivation, eco-enzyme production, and creative food reprocessing. These practices collectively reduce food waste, lower economic costs, support circular economy models, and enhance educational outcomes. The evidence confirms that effective management and utilization of MBG leftovers can transform a potential waste problem into an opportunity for sustainability, ethical resource use, and integrative learning.

Thematic Categorization of MBG Leftover Utilization

Based on the analysis of various news reports, the utilization of leftovers from the Free Nutritious Meal (MBG) program demonstrates consistent patterns that reflect how schools, communities, and local governments respond to food surplus. These practices can be grouped into four dominant forms of utilization, each with distinct mechanisms and observable impacts.

1. Utilization of MBG Leftovers as Livestock and Fish Feed

   One prominent pattern is the reuse of uneaten MBG food as feed for livestock and fish. Leftover items such as rice, vegetables, and side dishes that remain after meal distribution are collected, sorted, and in some cases dried or mixed with additional feed

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ingredients before being given to chickens, ducks, catfish, or other animals. This practice reflects a practical response to the accumulation of organic food waste generated by the MBG program, especially in schools where meal portions are prepared based on total enrollment rather than daily attendance.

The impacts of this utilization are tangible and measurable. Schools and individuals involved report a significant reduction in organic waste volume, as food that would otherwise be discarded is redirected into productive use. Economically, this approach reduces dependence on commercial animal feed, leading to lower operational costs for small-scale livestock or aquaculture activities. Biologically, the effectiveness of MBG leftovers as feed is evidenced by healthy animal growth and, in several instances, successful reproduction, indicating that the nutritional content of the reused food remains adequate. Beyond material outcomes, this practice also reinforces environmental responsibility among students and educators by demonstrating how waste can be transformed into valuable resources.

2. Utilization of MBG Leftovers for Maggot Cultivation

   Another significant pattern involves the use of MBG food waste as a substrate for cultivating Black Soldier Fly larvae, commonly known as maggots. In this model, leftover food is collected and processed as feed for larvae, which grow rapidly due to the high organic content of the MBG leftovers. The larvae are later harvested and used as high-protein feed for fish or poultry, or integrated into broader waste management systems.

   The evidence of impact from maggot cultivation is particularly strong in terms of efficiency and sustainability. The rapid growth cycle of maggots demonstrates the suitability of MBG leftovers as a nutrient source, while the resulting larvae provide an affordable and locally produced alternative to commercial feed. This approach also contributes to substantial waste reduction, as organic leftovers are decomposed biologically rather than disposed of in landfills. Socially and economically, maggot cultivation has opened opportunities for youth groups and community initiatives to develop skills, generate income, and participate in environmentally oriented entrepreneurship, positioning MBG leftovers as inputs within a circular and regenerative economic system.

3. Processing MBG Leftovers into Compost and Eco-Enzyme

   A further form of utilization focuses on converting MBG leftovers into compost, organic fertilizer, or eco-enzyme through controlled decomposition or fermentation processes. In this approach, uneaten food is separated from non-organic waste and processed into soil-enhancing products that can be applied in school gardens, green spaces, or local agricultural activities. Eco-enzyme production, in particular, involves fermenting food waste with water and sugar to create multipurpose liquid solutions used for fertilization, cleaning, or pest control.

   The impacts of this utilization are evident in environmental, educational, and institutional dimensions. Environmentally, composting and eco-enzyme production reduce the volume of waste transported to disposal sites, helping to alleviate pressure on local waste management systems. Agriculturally, the resulting compost and fertilizers improve soil fertility and plant growth, creating visible benefits within school environments. Educationally, the involvement of students in composting and fermentation activities strengthens experiential learning related to sustainability, biology, and environmental ethics, transforming MBG waste management into a practical learning platform rather than a purely technical process.

4. Reprocessing MBG Leftovers for Human Consumption and Nutrition Awareness

   In addition to waste-based utilization, some initiatives emphasize the creative reprocessing of edible MBG leftovers for human consumption and the cultivation of

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nutritional awareness. Instead of discarding leftover fruits or food items that remain safe to consume, students and teachers creatively transform them into new food products, such as processed snacks or cakes, which are then shared within the school community. This approach shifts the focus from waste treatment to responsible consumption and food appreciation.

The impact of this form of utilization lies primarily in behavioral and educational change. By actively reusing edible leftovers, students develop a stronger awareness of food value and learn to avoid unnecessary waste. The process fosters creativity, cooperation, and practical life skills, while reinforcing the message that nutritious food should be respected and fully utilized. In the broader context of the MBG program, such practices help cultivate a culture of mindful consumption, supporting the program's nutritional objectives while reducing food wastage at the source.

Table 2. Linkage of MBG Leftover Utilization Findings with Islamic Economics Principles

No	Source (Year)	Isrāf (Avoidance of Waste)	Khilāfah (Stewardship)	Maqāṣid al-Sharīʿah (Objectives of Sharia)
1	Kompasiana (2025)	The reuse of leftover MBG food as chicken feed directly prevents food from becoming waste, embodying the Qur'anic prohibition of isrāf in consumption.	Students and teachers act as responsible stewards by managing food resources entrusted to them.	Supports ḥifẓ al-māl (protection of resources) and ḥifẓ al-bi'ah (environmental preservation) through productive reuse and education.
2	Radar Jogja (2025)	Transforming uneaten rice and vegetables into livestock feed avoids excessive disposal of edible resources.	The teacher demonstrates individual stewardship by managing surplus food responsibly beyond school boundaries.	Advances ḥifẓ al-māl through cost efficiency and ḥifẓ al-nafs indirectly by sustaining food systems.
3	Kompas Surabaya (2025)	Processing leftovers into fish feed and compost minimizes waste generation.	The school community fulfills its role as khalīfah by integrating ecological cycles into daily practices.	Promotes ḥifẓ al-bi'ah and ḥifẓ al-'aql through experiential environmental learning.
4	Kuningan Mass (2025)	Community collection of leftovers prevents food from being discarded unnecessarily.	Residents collectively assume stewardship over shared resources.	Strengthens ḥifẓ al-māl and ḥifẓ al-ijtimā' (social welfare) by reducing costs and waste.
5	Duta TV / Radar Banjarmasin (2025)	Composting food remnants avoids waste accumulation.	Students learn stewardship by participating in waste separation and composting.	Supports ḥifẓ al-bi'ah and ḥifẓ al-'aql through environmental education.
6	Sinergia Mediatama (2025)	Government-led reuse of MBG leftovers prevents systemic food waste.	The state exercises institutional khilāfah by managing public resources ethically.	Advances ḥifẓ al-māl, ḥifẓ al-bi'ah, and ḥifẓ al-nafs via sustainable public policy.
7	Dewiku (2025)	Reprocessing leftover bananas into edible	Students act as stewards by	Supports ḥifẓ al-nafs (nutrition), ḥifẓ al-'aql

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		cake prevents food loss.	creatively managing surplus food.	(skills), and ḥifẓ al-māl.
8	Pantura7 (2025)	Fermentation of food waste into eco-enzyme and fertilizer avoids disposal.	Youth initiatives reflect collective stewardship and innovation.	Enhances ḥifẓ al-bi'ah, ḥifẓ al-māl, and ḥifẓ al-nasl through sustainable community empowerment.
9	SMAN 1 Bringin (2025)	Responsible food consumption reduces the tendency toward waste.	Students are guided to appreciate food as a trust from Allah.	Supports ḥifẓ al-nafs and ḥifẓ al-'aql through nutrition awareness.
10	Regional Espos (2025)	Redirecting leftovers to poultry feed reduces organic waste buildup.	Schools demonstrate stewardship by closing the food–waste loop.	Promotes ḥifẓ al-māl and ḥifẓ al-bi'ah via efficient resource use.
11	TangerangNews (2025)	Livestock feeding and maggot cultivation prevent food waste accumulation.	Local authorities and residents jointly perform khilāfah.	Advances ḥifẓ al-māl, ḥifẓ al-bi'ah, and ḥifẓ al-ijtimā' through circular economy practices.

The findings demonstrate that the utilization of leftover food from the MBG program is strongly aligned with core principles of Islamic economics, particularly the avoidance of isrāf, the exercise of khilāfah, and the realization of maqāṣid al-sharīʿah. Across various school, community, and government initiatives, the repurposing of food leftovers into livestock feed, compost, processed food, and value-added products effectively prevents waste and reflects obedience to the Qur'anic prohibition against excess. These practices illustrate stewardship at multiple levels—individual, institutional, and state—where students, educators, communities, and authorities manage food resources responsibly as a trust from Allah. Moreover, the initiatives contribute to key objectives of maqāṣid al-sharīʿah, including the protection of wealth (ḥifẓ al-māl), life and nutrition (ḥifẓ al-nafs), intellect (ḥifẓ al-'aql), environment (ḥifẓ al-bi'ah), and social welfare (ḥifẓ al-ijtimā'). Collectively, these findings indicate that MBG leftover food management not only supports sustainable food systems but also operationalizes Islamic economic values in practical, educational, and socially impactful ways.

Linking Empirical Findings with Previous Studies

The empirical findings presented in Table 1 extend and complement previous studies on the Makan Bergizi Gratis (MBG) program by shifting the analytical focus from macro-level policy legitimacy and legal frameworks to micro-level implementation practices, particularly the management and utilization of students' leftover food. While earlier studies primarily evaluate MBG in terms of welfare outcomes, governance, and Islamic legal compliance, this research demonstrates how MBG is operationalized at the school and community level as a practical instrument of sustainability, resource efficiency, and value-based education.

Pradita et al. (2025) emphasize that the success of the MBG program depends heavily on amānah (integrity), accountability, and just governance, noting persistent challenges such as distribution delays and budget limitations. The empirical cases documented in this study—such as leftover food reuse for livestock feed, compost, and circular economy initiatives—illustrate how grassroots innovations by schools and communities can partially mitigate these structural limitations. By reducing waste and generating secondary benefits (e.g., livestock nutrition, compost, and food production), these practices enhance the overall efficiency of MBG implementation, thereby strengthening its contribution to maṣlaḥah despite institutional constraints identified in previous research.

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In contrast to Ansori and Sukendar (2025), who critically assess the juridical inappropriateness of zakat fund allocation for MBG due to asnaf restrictions, the findings of this study reveal an alternative pathway for achieving Islamic economic objectives without violating zakat jurisprudence. The reuse of leftover MBG food through community-based, non-monetary redistribution mechanisms—such as livestock feed, composting, and shared food processing—reflects principles of resource optimization, mutual assistance, and avoidance of isrāf, rather than financial redistribution through zakat. This suggests that sustainability-oriented food management practices can serve as a Sharia-compliant complement to state-funded welfare programs.

Furthermore, the findings strongly reinforce the conclusions of Nuraini et al. (2025), who argue that integrating maqāṣid al-sharīʻah into free meal programs enhances their sustainability and social impact. The documented practices—such as composting, maggot cultivation, eco-enzyme production, and student-led food processing—demonstrate concrete alignment with ḥifẓ al-nafs (by maintaining food security and nutrition), ḥifẓ al-māl (by reducing waste and lowering feed costs), and ḥifẓ al-bīʾah (through environmental preservation). Unlike prior conceptual analyses, this study provides empirical evidence that maqāṣid-oriented implementation is not merely theoretical but actively practiced at the school and community level.

Additionally, Alifah (2026) frames MBG as a legitimate public policy under the principle of tasarruf al-imām ʻala al-raʻiyyah manūṭun bi al-maṣlaḥah, provided it prioritizes justice and marginalized groups. The findings of this research deepen that argument by showing that schools function as critical agents of policy realization, where public welfare objectives are translated into daily practices. Initiatives involving students in waste sorting, composting, and food reuse transform MBG from a top-down policy into a participatory and educational process, thereby strengthening its legitimacy and ethical grounding in Islamic governance.

Overall, this study bridges a crucial gap in the literature by demonstrating that the effectiveness of the MBG program cannot be assessed solely through policy design, legal compliance, or funding mechanisms. Instead, food waste management and leftover food utilization emerge as key determinants of sustainability, ethical compliance, and educational value. By empirically linking MBG implementation to Islamic economic principles—particularly the prohibition of isrāf, the responsibility of khilāfah, and the realization of maqāṣid al-sharīʻah—this research extends existing scholarship and positions MBG as not only a nutrition policy but also a platform for environmental ethics and character education within Islamic economics.

Qur’anic Anchors in the Ethical Interpretation of MBG Leftover Food Utilization

The empirical practices of managing and utilizing students’ leftover food within the Free Nutritious Meal (MBG) program strongly resonate with the Qur’anic prohibition of isrāf (wastefulness). The Qur’an explicitly condemns wasteful behavior, stating, “Indeed, the wasteful are brothers of the devils” (Q. 17:27). This verse establishes waste not merely as an inefficient act but as an ethical violation that contradicts Islamic moral conduct. In this context, the transformation of uneaten MBG food into livestock feed, compost, maggot cultivation inputs, eco-enzyme, and reprocessed edible products reflects a conscious effort to avoid isrāf at the institutional, community, and individual levels. Rather than allowing surplus food to enter waste streams, schools and communities actively reframe leftovers as resources, thereby aligning daily food management practices with Qur’anic ethical injunctions against excess and neglect of blessings (niʻmah).

The principle of khilāfah (human stewardship) further provides a theological foundation for interpreting these practices. The Qur’an states, “Indeed, I will place a vicegerent upon the earth” (Q. 2:30), affirming humanity’s role as a trustee responsible for managing natural and

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material resources in a balanced and accountable manner. The findings demonstrate that students, teachers, school administrators, communities, and local governments act as khalīfah by exercising stewardship over food resources entrusted through the MBG program. By closing the food–waste loop and integrating leftover utilization into livestock systems, school gardens, and community initiatives, these actors operationalize khilāfah in concrete ways. The MBG program thus becomes not only a nutritional intervention but also a platform for cultivating stewardship ethics, where educational spaces function as microcosms of responsible environmental governance.

Moreover, the practices observed in the MBG program strongly align with the objectives of maqāṣid al-sharīʿah, particularly the preservation of life (ḥifẓ al-nafs), wealth (ḥifẓ al-māl), intellect (ḥifẓ al-ʻaql), and the environment (ḥifẓ al-bi'ah). The Qur'anic guidance, "Eat and drink, but do not waste" (Q. 7:31), encapsulates the balance between consumption and restraint that underpins these objectives. By redistributing surplus food into productive uses, the MBG program safeguards public resources, reduces disposal costs, supports food production cycles, and enhances environmental sustainability. Simultaneously, the involvement of students in composting, food reprocessing, and circular economy practices fosters experiential learning, reinforcing intellectual development and ethical awareness. These outcomes indicate that leftover food utilization within MBG is not merely a technical waste management solution but a practical realization of maqāṣid al-sharīʿah in contemporary educational and public policy contexts.

Taken together, the Qur'anic principles of avoiding isrāf, fulfilling khilāfah, and advancing maqāṣid al-sharīʿah provide a coherent ethical framework for understanding the management and utilization of students' leftover food in the MBG program. The findings suggest that when nutrition programs are integrated with Islamic economic ethics and educational values, they can simultaneously address food waste, environmental sustainability, character education, and social welfare. This integrative approach positions the MBG program as a model of ethically grounded public policy that transforms surplus food from a potential problem into a source of ecological, educational, and moral value.

Interpretation of MBG Leftover Utilization from an Islamic Economic Perspective

The utilization of leftovers from the Free Nutritious Meal (MBG) program, as reflected in various practices across schools and communities, aligns closely with fundamental principles in Islamic economics. These practices demonstrate how food surplus management can embody ethical values that discourage waste, promote collective benefit, and uphold responsibility over resources entrusted to humans. Based on the news analysis, the utilization of MBG leftovers demonstrates not only technical waste management practices but also broader social, educational, and governance-related patterns. In addition to the four dominant themes previously identified, several complementary themes emerge.

1. Avoidance of Isrāf (Wastefulness)

   In Islamic teachings, isrāf refers to excessive consumption and waste, which is explicitly discouraged in the Qur'an. The practices observed in MBG leftover utilization—such as repurposing uneaten food into animal feed, maggot cultivation, compost, or even reprocessed food—represent concrete efforts to prevent food from being wasted. Rather than allowing surplus meals to become organic waste, schools and communities intervene to redirect leftovers into productive uses.

   From an Islamic economic perspective, these actions reflect obedience to the ethical command to avoid wastefulness in the management of resources. Food provided through the MBG program is intended as a form of social welfare; therefore, allowing it to be discarded unused would contradict its moral purpose. By minimizing food waste, these initiatives demonstrate that public resources, even when partially unused, can still

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be managed responsibly and ethically, reinforcing the value of moderation (wasatiyyah) in consumption.

2. Realization of Maslahah (Public Benefit)
   The transformation of MBG leftovers into livestock feed, maggot protein, fertilizer, or reusable food products illustrates the principle of maslahah, or public benefit. In Islamic economics, resources are considered valuable not merely by ownership, but by the extent to which they generate benefit for individuals and society. The observed practices show that MBG leftovers generate multiple layers of benefit: environmental, economic, educational, and social. Alifah (2026) indicates that MBG embodies the essence of maṣlaḥah and can be classified as a legitimate policy in Islamic governance, provided it is implemented justly, proportionally, and prioritizes marginalized groups. Manalu et al. (2025) explain that the advantages of the MBG program primarily lie in its broad range of benefits, ranging from improving children's health and supporting academic achievement to equalizing opportunities for low-income families. Regarding perceived benefits, the majority of students assessed that MBG has a positive impact, particularly in easing families' economic burdens, helping meet nutritional needs, and improving students' concentration in learning. With adequate nutrition, children are expected to be more focused, productive, and achieve higher levels of achievement in school. This perception also emphasizes MBG's function as a social equity program that enables all students, regardless of economic status, to receive equal nutritional rights.
   Environmentally, waste reduction contributes to cleaner school surroundings and reduced landfill burden. Economically, schools, households, and community groups experience lower costs for animal feed and fertilizer, while some initiatives open opportunities for income generation. Educationally, students gain experiential learning in sustainability and resource management. These multidimensional benefits indicate that MBG leftovers are no longer treated as valueless waste, but as inputs capable of generating continuous utility, which is a core objective of maslahah-oriented economic behavior.
3. Fulfillment of Amanah (Trust and Responsibility)
   In Islamic thought, humans are regarded as khalifah (stewards) on earth, entrusted with managing resources responsibly. Food distributed through the MBG program represents a public trust (amanah), funded and organized for the welfare of students. The conscious efforts by schools, teachers, students, and communities to manage leftovers responsibly indicate an awareness of this trust.
   The act of collecting, processing, and repurposing MBG leftovers reflects accountability toward both public resources and the environment. Rather than viewing leftover food as someone else’s problem, stakeholders assume responsibility for its management. This aligns with the Islamic economic view that accountability extends beyond consumption to post-consumption behavior, including waste handling and environmental impact. In this sense, MBG leftover utilization practices demonstrate ethical governance at the micro level, where responsibility is enacted through everyday actions.
4. Toward a Sharia-Compliant Circular Economy
   Taken together, these practices illustrate an emerging form of a Sharia-compliant circular economy, where resources circulate through productive cycles instead of ending as waste. Leftover food becomes animal feed, larvae protein, fertilizer, or reprocessed food, creating closed-loop systems that reflect efficiency, sustainability, and ethical stewardship. This model resonates strongly with Islamic economic principles that emphasize balance between consumption and conservation, individual benefit and collective welfare.

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Thus, the utilization of MBG leftovers is not merely a technical response to food waste but represents an ethical-economic practice rooted in Islamic values. By avoiding isrāf, maximizing maslahah, and fulfilling amanah, these initiatives demonstrate how public nutrition programs can be aligned with Islamic economic ethics while simultaneously addressing contemporary challenges of sustainability and waste management.

5. Strengthening Ukhuwwah and Collective Economic Responsibility (Ta'āwun)
   The utilization of MBG leftovers frequently involves collaboration among schools, teachers, students, residents, youth groups, and local governments. From an Islamic economic perspective, this collective action reflects the principle of ta'āwun (cooperation), which emphasizes shared responsibility in addressing social and economic challenges. Rather than handling food waste individually or institutionally, stakeholders cooperate to ensure that surplus food continues to generate value.
   This cooperative approach strengthens ukhuwwah ijtimā'iyyah (social solidarity), as resources are redistributed and managed for collective benefit. In Islamic economics, economic activity is not solely driven by individual profit but by communal welfare. The sharing of MBG leftovers for livestock feed, composting, or maggot cultivation demonstrates how surplus from a public welfare program can reinforce social cohesion and collective accountability, transforming food management into an act of social cooperation grounded in ethical values.
6. Promotion of Economic Efficiency without Exploitation (Iqtisād and 'Adl)
   Islamic economics emphasizes iqtisād (balanced efficiency) and 'adl (justice), rejecting both wastefulness and exploitation. The observed MBG leftover utilization practices illustrate efficiency achieved through ethical means: reducing input costs for animal feed, fertilizer, or food processing without harming others or engaging in speculative behavior. The value generated from leftovers does not come from excessive extraction but from optimizing what already exists.
   Importantly, these practices avoid unjust enrichment. MBG leftovers are not commodified in a way that deprives students of their nutritional rights; instead, they are reused only after their primary purpose has been fulfilled. This reflects distributive justice in Islamic economics, where efficiency must not compromise equity. The practices demonstrate that cost reduction and productivity can be achieved while maintaining fairness, transparency, and respect for the original social purpose of public resources.
7. Internalization of Ethical Consumption and Production (Akhlaq Iqtisadiyyah)
   Beyond technical reuse, MBG leftover utilization contributes to the internalization of akhlaq iqtisadiyyah (economic ethics), particularly among students. Islamic economics places strong emphasis on moral conduct in both consumption (istihlāk) and production (intāj). By engaging students in responsible food use, waste reduction, and reuse processes, these initiatives cultivate ethical awareness from an early age.
   Students learn that food is not merely a consumable commodity but a blessing (ni'mah) that must be respected. This ethical framing encourages moderation, gratitude, and responsibility, which are central values in Islamic teachings. Over time, such ethical socialization supports the development of future economic actors who prioritize sustainability, fairness, and stewardship over excessive consumption, aligning personal behavior with broader Islamic economic objectives.
8. Integrated Islamic Economic Interpretation
   Collectively, the utilization of MBG leftovers reflects a holistic Islamic economic framework that integrates ethical consumption, social cooperation, justice, efficiency, and stewardship. These practices demonstrate that public nutrition programs can function not only as welfare mechanisms but also as platforms for embedding Islamic economic values in everyday life.

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From avoiding isrāf, realizing maslahah, fulfilling amanah, fostering ta'āwun, ensuring 'adl, and nurturing akhlaq, MBG leftover management exemplifies how Islamic economics can be operationalized at the grassroots level. Rather than remaining normative or theoretical, Islamic economic principles are translated into practical actions that address contemporary challenges of food waste, sustainability, and social responsibility.

MBG Leftover Utilization in Perspective of Maqāṣid al-Sharī'ah

The utilization of leftovers from the Free Nutritious Meal (MBG) program can be systematically interpreted through the framework of Maqāṣid al-Sharī'ah, which represents the overarching objectives of Islamic law in safeguarding human welfare. Rather than being viewed merely as technical waste management practices, these initiatives directly contribute to the protection and enhancement of essential human and societal interests.

1. Ḥifẓ al-Māl (Protection of Wealth and Resources)
   The repurposing of MBG leftovers into animal feed, maggot cultivation, compost, and eco-enzyme reflects a clear effort to preserve economic value. In Islamic economics, māl (wealth/resources) is not limited to monetary assets but includes all usable resources that can generate benefit. Allowing edible food to become waste constitutes a loss of potential value and contradicts the principle of resource preservation.
   By converting leftovers into productive inputs, schools and communities prevent economic leakage and enhance efficiency in resource utilization. Reduced spending on commercial feed and fertilizer, along with the potential generation of new income streams, demonstrates that MBG leftovers are transformed from cost burdens into economic assets. This practice aligns with ḥifẓ al-māl by ensuring that public resources continue to circulate productively rather than being dissipated through waste.
2. Ḥifẓ al-Nafs (Protection of Life and Well-being)
   The MBG program is fundamentally designed to support nutrition and student health. Responsible management of its leftovers extends this objective beyond direct consumption. When leftovers are safely repurposed into animal feed, fertilizer, or reprocessed food products, they indirectly support food security and environmental health, both of which are essential components of human well-being.
   From an Islamic perspective, protecting life (ḥifẓ al-nafs) includes maintaining a healthy environment and sustainable food systems. Reducing organic waste prevents pollution, disease vectors, and environmental degradation, thereby contributing to a safer and healthier living space. Thus, MBG leftover utilization reinforces the original life-protecting purpose of the program while minimizing negative externalities.
3. Ḥifẓ al-'Aql (Protection of Intellect through Education and Awareness)
   Many MBG leftover initiatives actively involve students in processing, composting, maggot cultivation, or food reuse. These activities function as informal but powerful educational tools that enhance critical thinking, environmental literacy, and ethical reasoning. In Islamic economics, ḥifẓ al-'aql is not limited to avoiding harm to the intellect but includes nurturing knowledge and awareness that enable responsible decision-making.
   Through hands-on engagement, students learn about food cycles, sustainability, and ethical consumption. This experiential learning internalizes values of moderation, responsibility, and stewardship, strengthening intellectual development aligned with Islamic ethical reasoning. Consequently, MBG leftover utilization contributes to cognitive and moral education simultaneously.
4. Ḥifẓ al-Bī'ah (Environmental Protection as an Extended Maqāṣid)
   Although environmental protection is not explicitly listed among the classical five Maqāṣid, contemporary Islamic economic scholarship increasingly recognizes ḥifẓ al-

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bī'ah as an essential extension. The reduction of food waste, composting, and circular reuse of organic matter directly support ecological balance.

By minimizing landfill waste and promoting nutrient recycling, MBG's leftover utilization practices embody Islamic environmental ethics rooted in stewardship (khilāfah). These actions affirm that environmental care is not optional but integral to fulfilling human responsibility toward creation.

Integrative Educational Insight of the Free Nutritious Meal (MBG) Program

The utilization of leftovers from the Free Nutritious Meal (MBG) Program contributes not only to environmental sustainability and economic efficiency but also plays a significant role in student character formation. Through direct involvement in managing food leftovers—such as converting them into animal feed, compost, maggot cultivation, or reprocessed food—students internalize ethical values through daily practice. These activities transform abstract moral principles into experiential learning, embedding responsibility, moderation, and social awareness within the school environment.

1. Responsibility and Amanah-Oriented Character
   Student participation in collecting, sorting, and repurposing MBG leftovers cultivates a sense of responsibility toward food consumption and public resources. Food is no longer perceived as disposable but as an amanah (trust) that must be managed carefully. This practice fosters accountability and awareness of the consequences of wasteful behavior. From an Islamic ethical perspective, such responsibility reflects the principles of amanah and khilāfah, reinforcing the understanding that humans are stewards of resources rather than mere consumers.
2. Discipline, Self-Control, and Wasatiyyah
   MBG leftover utilization initiatives implicitly teach discipline and self-control. Students become more mindful of portion sizes, consumption habits, and waste reduction through routine practices such as waste separation and food management. These activities encourage consistency and adherence to shared rules, strengthening self-discipline. In Islamic character education, this aligns with the principle of wasatiyyah (moderation) and the avoidance of isrāf (excessiveness), helping students internalize balanced consumption as an ethical choice rather than external enforcement.
3. Empathy, Social Awareness, and Ta'āwun
   When students observe leftover food being transformed into resources that benefit others—such as livestock feed, school gardens, or community-based initiatives—they develop empathy and social awareness. These practices nurture values of ta'āwun (cooperation) and collective care, enabling students to understand that individual behavior contributes to broader social welfare. Food waste reduction thus becomes a social and moral concern, particularly relevant in contexts of inequality and food insecurity.
4. Environmental Ethics and Khilāfah Values
   Active involvement in composting, maggot cultivation, and eco-enzyme production embeds environmental ethics into students' daily routines. Students experience ecological cycles—decomposition, regeneration, and reuse—through hands-on activities rather than abstract instruction. This experiential learning fosters environmental consciousness and stewardship-oriented character. Within Islamic thought, this reflects khilāfah and the responsibility to maintain ecological balance (mīzān), encouraging a moral relationship with nature based on care and sustainability.
5. Creativity, Initiative, and Problem-Solving
   Several MBG leftover initiatives stimulate creativity and innovation, such as reprocessing leftover food into value-added products or developing organic fertilizers. These activities promote collaboration, initiative, and problem-solving skills. From an Islamic economic

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perspective, such practices represent productive effort (kasb) guided by ethical considerations, where challenges like food waste are transformed into opportunities through responsible innovation.

6. Integrity and Ethical Consumption
   By linking food consumption with its broader environmental and social impacts, MBG leftover utilization reinforces integrity in everyday behavior. Students learn to respect food, consume responsibly, and avoid careless waste. This integrity-based character formation aligns with Islamic moral education, where ethical values are consistently reflected in daily actions. Habituation to responsible consumption during schooling is likely to influence students' future economic behavior and ethical decision-making.

Relevance of MBG Leftover Utilization in the Educational and School Context

The utilization of MBG leftovers holds strong relevance within the educational context, as it extends the role of schools beyond academic instruction into spaces of ethical, environmental, and social learning. Schools function as environments where values, habits, and character are shaped through daily practices, making MBG leftover management an integral component of holistic education.

1. MBG as Experiential and Contextual Learning
   MBG leftover management provides experiential learning opportunities that connect theory with practice. Activities such as composting, feeding livestock, and waste sorting align with constructivist learning approaches and can be integrated across disciplines, including science, economics, civic education, and religious studies. In this sense, MBG serves as a living laboratory for interdisciplinary education.
2. Strengthening School-Based Character Education
   Character education is reinforced through routine and participation rather than abstract instruction. Practices of responsible eating and collective waste management embed values such as discipline, cooperation, and responsibility into school culture. In Islamic pedagogy, this reflects tarbiyah bil ḥāl—education through lived experience—where values like amanah and moderation are practiced rather than merely taught.
3. Schools as Centers of Environmental Education
   Through sustainable leftover management, schools act as agents of environmental education. Students gain environmental literacy and awareness of sustainability issues, supporting broader educational goals related to sustainable development. From an Islamic perspective, this reinforces the role of humans as guardians of ecological balance.
4. Development of Life Skills and Student Agency
   Participation in MBG leftover initiatives fosters life skills such as teamwork, leadership, creativity, and initiative. Students become active contributors to their school environment, enhancing motivation, self-efficacy, and a sense of ownership. This student agency is educationally significant, as learners perceive themselves as actors in social change rather than passive policy recipients.
5. Institutional Learning and Ethical School Governance
   At the institutional level, MBG leftover management encourages coordination, accountability, and transparency among school stakeholders. Clear routines and shared responsibilities improve school governance and introduce students to ethical public program management, reflecting principles of ḥusn al-idārah (good governance) within Islamic education.
6. Schools as Role Models for the Community
   Schools that successfully manage MBG leftovers often influence families and surrounding communities. Sustainable practices adopted at school are replicated at

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home, extending the educational impact beyond the classroom. This positions schools as centers of social transformation, aligning with the Islamic educational goal of producing individuals who benefit both themselves and society.

In conclusion, the utilization of MBG leftovers transforms the program from a nutrition initiative into a comprehensive educational instrument. It supports experiential learning, strengthens character education, promotes environmental stewardship, develops life skills, and enhances institutional responsibility. From both educational and Islamic economic perspectives, MBG leftover utilization demonstrates that ethical resource management and character formation are inseparable. Sustainable public welfare programs, therefore, depend not only on policy design but also on educational environments that cultivate moderation, responsibility, and social consciousness.

CONCLUSION AND SUGGESTION

A. Conclusion

The empirical findings in this study complement previous research on the Makan Bergizi Gratis (MBG) program by extending the analysis from macro-level policy, legal, and governance perspectives to micro-level implementation, particularly the management and utilization of students' leftover food. While earlier studies emphasize MBG's role in welfare enhancement, justice, accountability, and maqāṣid al-sharī'ah alignment, this study demonstrates how grassroots practices—such as reusing leftovers for livestock feed, compost, and circular economy initiatives—enhance program efficiency, reduce food waste, and generate additional social, economic, and environmental benefits. These findings support prior conclusions that MBG promotes maṣlaḥah but also respond to identified challenges, such as budget constraints and governance limitations, by showing that community-based innovations can mitigate inefficiencies without relying on controversial funding sources like zakat. Moreover, the results provide concrete empirical evidence that integrating Islamic economic principles, including the avoidance of isrāf, the practice of khilāfah, and the realization of maqāṣid al-sharī'ah, is feasible at the school and community levels. Overall, this study positions leftover food management as a critical yet underexplored dimension of MBG sustainability, transforming the program from a food assistance policy into a platform for ethical consumption, environmental stewardship, and integrative education.

The utilization of leftovers from the Free Nutritious Meal (MBG) program reflects core principles of Islamic economics by transforming food surplus into ethically productive resources rather than waste. Practices such as converting leftovers into animal feed, compost, maggot protein, or reprocessed food demonstrate the avoidance of isrāf (wastefulness) and promote moderation (wasatiyyah) in consumption. These efforts ensure that public resources intended for social welfare continue to generate value beyond their primary use. From an Islamic economic perspective, MBG leftover utilization realizes maṣlaḥah (public benefit) by producing multidimensional outcomes, including environmental cleanliness, cost efficiency, educational enrichment, and social welfare. The responsible management of leftovers reflects amanah (trust and accountability), as schools and communities actively assume stewardship over public resources. Collectively, these practices form an emerging Sharia-compliant circular economy, where resources circulate through productive cycles in line with ethical and sustainability principles. Moreover, collaborative management of MBG leftovers strengthens ta'āwun (cooperation) and social solidarity, while achieving iqtiṣād (balanced efficiency) and 'adl (justice) without exploitation. By engaging students and communities in ethical consumption and production, these initiatives foster akhlaq iqtisadiyyah, embedding Islamic economic values into everyday behavior. Overall, MBG leftover

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utilization illustrates how public nutrition programs can operationalize Islamic economic ethics at the grassroots level, addressing food waste, sustainability, and social responsibility in an integrated and practical manner.

The utilization of leftovers from the Free Nutritious Meal (MBG) program aligns closely with the framework of maqāṣid al-sharī'ah by safeguarding key dimensions of human and societal welfare. Repurposing leftovers into animal feed, compost, maggot cultivation, and eco-enzyme supports ḥifẓ al-māl by preserving economic value and preventing resource loss, while reducing costs and creating productive assets. These practices also reinforce ḥifẓ al-nafs, as waste reduction and sustainable food systems contribute to environmental health and overall well-being. Through student involvement in leftover management, MBG initiatives promote ḥifẓ al-'aql by enhancing environmental awareness, ethical reasoning, and experiential learning. Furthermore, the emphasis on waste reduction and ecological balance reflects ḥifẓ al-bī'ah as an extended maqāṣid, embedding environmental stewardship within Islamic ethical responsibility. Collectively, MBG leftover utilization demonstrates that food waste management can function as a holistic instrument for achieving the objectives of Islamic law in an integrated, practical, and sustainable manner.

The utilization of leftovers from the Free Nutritious Meal (MBG) Program serves as an integrative educational practice that simultaneously strengthens student character, promotes environmental sustainability, and enhances economic efficiency. Through hands-on activities such as composting, waste sorting, animal feed production, and food reuse, students internalize ethical values—responsibility (amanah), moderation (wasatiyyah), cooperation (ta'āwun), and environmental stewardship (khilāfah)—through daily experience rather than abstract instruction. These practices foster creativity, problem-solving, leadership, and integrity in consumption behavior, while positioning schools as experiential and interdisciplinary learning spaces that integrate scientific, economic, civic, and religious perspectives. At both institutional and social levels, MBG leftover management encourages accountability, ethical governance, and community influence, transforming schools into role models of sustainable practice. Overall, MBG leftover utilization elevates the program into a comprehensive educational instrument where character formation, ethical resource management, and sustainable public welfare are deeply interconnected.

B. Suggestion

Based on the findings and conclusions of this study, several strategic suggestions are proposed to strengthen the sustainability, effectiveness, and ethical impact of the Makan Bergizi Gratis (MBG) program, particularly in relation to leftover food management:

1. Policy and Institutional Strengthening
   The government and relevant ministries should formally integrate leftover food management into MBG operational guidelines. Clear technical standards, monitoring mechanisms, and incentives for schools that implement sustainable leftover utilization (e.g., composting, animal feed, circular economy initiatives) are needed to ensure consistency, accountability, and scalability. This integration would help address budget constraints and inefficiencies without relying on controversial or non-compliant funding sources.
2. Capacity Building for Schools and Communities
   Training programs should be provided for school administrators, teachers, and community partners on safe, hygienic, and productive leftover management techniques. Capacity building will ensure that practices such as composting, maggot

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cultivation, and food reuse are conducted responsibly, in line with health standards and Islamic ethical principles (amanah, avoidance of isrāf, and khilāfah).

3. Integration into Curriculum and Character Education
   Leftover food utilization should be embedded into school curricula as part of integrative and experiential learning across subjects such as science, economics, civic education, and Islamic studies. This approach will strengthen character education by operationalizing values of wasatiyyah, ta'āwun, responsibility, and environmental stewardship through daily practice rather than abstract moral instruction.
4. Strengthening Participatory and Transparent Governance
   To enhance public trust and program effectiveness, participatory mechanisms involving parents, community leaders, and local stakeholders should be encouraged in managing and supervising MBG implementation. Transparent reporting of food distribution, leftover utilization, and cost efficiency aligns with the principles of amānah, 'adl, and good governance emphasized in fiqh siyasah.
5. Community-Based Circular Economy Development
   Local governments and schools should collaborate with farmers, small enterprises, and community groups to develop Sharia-compliant circular economy models based on MBG leftovers. Such collaboration can generate additional economic value, reduce environmental burdens, and strengthen social solidarity while remaining aligned with maqāṣid al-sharī'ah.
6. Future Research Directions
   Further studies are recommended to quantitatively measure the economic, environmental, and educational impacts of MBG leftover utilization, as well as comparative studies across regions. Future research may also explore policy design models that integrate Islamic economics, sustainable development goals, and public nutrition programs more comprehensively.

Overall, these suggestions emphasize that the long-term success of the MBG program depends not only on food provision but also on ethical resource management, educational integration, and participatory governance. By institutionalizing leftover utilization, MBG can evolve into a sustainable, Sharia-aligned public welfare program that delivers multidimensional benefits for society.

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