



Public-Private-People collaborative model on food waste management in metropolitan area of Thailand

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Abstract

Food waste has emerged as a critical issue in metropolitan cities globally, including Bangkok, where it constitutes 47 percent of the total annual waste generation. This multifaceted problem involves various stakeholders, including the public sector, private sector, and the general public. The research aimed to examine collaboration models among these sectors for effective food waste management in Bangkok, Thailand. Employing a Grounded Theory approach, data were gathered from four key informant groups: the public sector, private sector, people sector, and academics, totaling 25 participants. The interview process and observational surveys were carried out iteratively and continuously in tandem with data analysis until achieving theoretical saturation. The research findings indicated the existence of three collaborative models for managing food waste in Bangkok: 1) Structured collaboration, 2) Loose form of collaboration, and 3) Occasional collaboration. These collaborations are driven by various levels of developmental direction, benefits for involved parties, active participation of large private companies, as well as non-profit organizations. However, challenges persist, including unclear regulations and bureaucratic complexities, and a lack of awareness among the majority of the population regarding reducing and separating food waste.

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Introduction

Metropolitans, cities, and various places worldwide are facing the issue of food waste (Rochester Institute of Technology, 2019), which originates from wholesale and retail, service, and consumption (United Nations

Environment Programme [UNEP], 2021) encompasses markets, shops, supermarkets, hotels, restaurants, and accommodation (Food and Agriculture Organization of the United Nations [FAO], 2011, UNEP, 2021). Concrete data on this food waste have been available since 2011, revealing that approximately 1.3 billion tons of food

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are discarded globally each year, equivalent to about one-third of the food produced for human consumption (FAO, 2011). Later, in the year 2015, the United Nations set a goal to reduce global food waste as part of the 12th Sustainable Development Goals (SDG 12), which aims to ensure sustainable consumption and production patterns. The third target under this goal calls for halving per capita global food waste at the retail and consumer levels, as well as reducing food losses along production and supply chains by 2030. This goal resulted in the development of a roadmap and action plan for food waste management in Thailand for the period 2023–2030. There is uncertainty about how to translate and apply these global and national targets to local practices.

This research area is Bangkok, the capital city of Thailand, which faces a similar problem of food waste. This is due to the lack of systematic management for discarded or spoiled food (Office of Natural Resources and Environment Policy and Plan [ONEP], 2019). Furthermore, Bangkok is a rapidly expanding metropolis with a registered population of approximately 5.49 million people at the end of 2022, and with a significant number of temporary residents and tourists visiting, this has led to a significant increase in solid waste. The amount of waste has risen from 8,943 million tons in 2011 to 9,519 million tons in 2020 although there was a reduction in waste during the COVID-19 pandemic in 2021–2022. (Bangkok Metropolitan Administration [BMA], 2023). The food waste in Bangkok still accounted for an average of around 47 percent of the total waste generated, which is approximately 4,500 tons per day. However, the food waste separation program initiated by the Bangkok Metropolitan Administration or BMA in 2023 only manages to handle approximately 85 tons per day (BMA, 2023).

Managing food waste is not a task that can be accomplished by any particular sector (UNEP, 2021). Thus, this research aims to examine the collaborative model among related stakeholders: the public sector, private sector, and the general public involved in managing food waste in Bangkok, and to provide recommendations for developing cooperation that reduces limitations and enhances the efficiency of Bangkok's food waste management, as well as its potential adaptation to other metropolitan areas.

Literature Review

The concept of collaborative management is applied to situations with complex or unclear boundaries,

increased stakeholder involvement, lack of direct responsibility, or past management failures. In such cases, individuals turn towards each other to undertake various actions (Linden, 2003). This includes both vertical collaboration, involving collaboration within different levels of government organizations, both central and local, and horizontal collaboration, which involves collaboration among organizations in different sectors, both formal and informal (Agranoff & McGuire, 2003). It is crucial to establish relationships and define the roles of each relevant party (Thomson & Perry, 2006; Bryer, 2009).

A study by Agranoff and McGuire (2003) on the collaborative models of local governments in the United States identified several distinct models. These encompass models that create opportunities for organizations from all sectors to collaborate in achieving mutually beneficial objectives. Some models involve organizations with divergent goals collaborating due to resource deficiencies. The collaborative model varies, with organizations of higher potential collaborating with those of lower potential. Temporary collaborative models among organizations are also taken into account.

The Public-Private-People Partnership (4Ps) concept extends the Public-Private Partnership (PPP) model to address government budget constraints in large-scale projects (Asian Development Bank, 2008) and to tackle challenges related to public trust (Hui & Hayllar, 2010). According to Junqi (2012), the 4Ps concept significantly enhances the role of the public. In Thailand, the collaborative model known as “Pracharath” or Trilateral Collaboration, described by Kotsing (2017), focuses on mutual assistance to overcome constraints and improve opportunities for all involved parties. Similarly, Aramthiantamrong and Payomratanasin (2020) studied Trilateral Collaboration between public sector, non-government organization, and the general public, emphasizing the importance of the government taking the lead in initiating coordination and building partnerships with other sectors in environmental management in Bangkok.

Regarding the issue of food waste, there have been proposals to develop systematic public policies for managing food waste throughout the supply chain (Chunhachotianan & Onintha, 2017; Lipinski et al., 2013; Saiphet & Kantha, 2023). Consequently, involving various sectors is crucial. However, Bunjongsiri (2018) found that many people in Thailand perceive food waste as a distant issue unrelated to their daily lives, while the Thailand Environment Institute (2021) reported a general lack of awareness about waste reduction and sorting, despite some positive examples.

Previous research on food waste management has primarily focused on specific aspects and stakeholder groups, such as household consumers (Bunditsakulchai & Chen, 2021; Schanes et al., 2018; Srijuntrapun, 2016), event industry (Ungsumeth, 2021), hotel and restaurant business (Turasakun & Rugmai, 2021; Chaiyasain, 2023). Various research works consistently refer to the Food & Drink material hierarchy proposed by UNEP (2014), which emphasizes waste prevention, optimization, recycling, recovery, and disposal, in that order.

Methodology

This research employed the Grounded Theory qualitative research strategy, which is well-suited for describing phenomena and complex situations. It also aims to generate theoretical insights that have not been extensively explored before, following the framework of Strauss and Corbin (1998) and Hamid et al. (2012). The study emphasized the trustworthiness or rigor of qualitative research, incorporating methods such as member check and audit trail, as outlined by Shenton (2004).

Participants

Key informants were selectively chosen through purposive sampling based on their at least 5 years of experience in waste management or food waste management at the national level, or their experience working in the Bangkok area, along with their willingness to provide information for this research. They were from four sectors (1) public sector in both the Bangkok Metropolitan Administration (BMA) and related government organizations, (2) private sector, encompassing hotels, supermarkets, and markets, (3) the general public, including community leaders and representatives of non-profit organizations, and (4) academics. The sample size adhered to the guidelines of Grounded Theory research and the basic principles suggested by qualitative researchers (Joungrakul, 2018). Subsequently, a snowball sampling method was used, resulting in a total of 25 participants.

Data Collection

This research employed in-depth interviews with a semi-structured interview format to collect data from key informants. Emphasis was placed on safeguarding

privacy and confidentiality to protect the data providers. The interview process followed a continuous, cyclical pattern of data collection and analysis over approximately one year in 2022. Additionally, the researchers utilized observational methods to gather data by participating in meeting and seminar activities and observing various events in the area. This was complemented by a study of additional documents to support and augment the information obtained from interviews.

Data Analysis

This data analysis employed Conventional Content Analysis method based on Creswell (2013), proceeding through various steps of coding in a study aimed at theory generation using a Straussian approach, as guided by Hamid et al. (2021). The process began with open coding, extracting meaning from speech and assigning codes, followed by categorization. Axial coding involved linking or specifying relationships between categories. Selective coding then integrated data from axial coding to select the core category. Throughout this process, the researchers continuously recorded and analyzed data concurrently. Iterative movement back and forth occurred until achieving theoretical saturation, following the approach of Tie et al. (2019).

Results

From the study of stakeholders involved in food waste management in Bangkok, including the public sector, private sector, and the general public, various roles and collaboration patterns were identified as follows:

Roles of Stakeholders in Food Waste Management in Bangkok

The public sector, primarily represented by the government, is responsible for policy formulation and planning, while the Bangkok Metropolitan Administration (BMA), which is a local government agency, holds the authority for waste management in the Bangkok metropolitan area. Plans and projects fall under the development plan for Bangkok over a 5-year period, aligning with the national policy to promote green communities and green organizations as well as the SDGs target. A committee has been appointed to drive policies regarding the initial stages of waste management in Bangkok, involving various sectors. In this regard, the BMA set indicators to evaluate

the performance of district offices regarding the collection of organic waste for composting. There has been a campaign encouraging citizens to separate waste at the source. However, stakeholders observe that the emphasis has been on waste collection without adequate focus on prevention and reduction at the source. Despite subsequent efforts, the BMA declared a non-inclusion policy, urging citizens to separate food waste from general waste for composting, distributing the compost to farmers as animal feed. Nevertheless, Bangkok still lacks a comprehensive system to manage food waste systematically from its source to the final destination.

“...The system of the Bangkok Metropolitan Administration (BMA) still does not support food waste, and the emphasis has been excessively on end-of-pipe solutions. The focus is on collection to prevent accumulation, with practices such as landfilling and incineration, but opportunities at the source are not adequately addressed.”

(Academic, researcher in food waste management)

The private sector is starting to become more aware of food waste management, as evident from interviews with representatives of major companies engaged in wholesale and retail of food and beverages. These companies reflect existing policies to prevent and reduce food waste, which not only helps cut costs but also involves segregating food waste for collection by BMA. Some companies utilize a portion of the separated food waste to produce their own organic compost, distributing it to customers.

Additionally, other private companies have begun to declare clear policies and goals for significant food waste reduction. They collect surplus food for donation to non-profit organizations, providing it to those in need. There are a few private enterprise support communities engaged in waste management initiatives, and several hotels have implemented food waste separation, utilizing it for animal feed and composting to contribute to environmental conservation and enhance their image. In some fresh markets, waste management aligns with criteria for preferred fresh markets, where vegetable and fruit scraps are separated. A portion of these scraps are used to produce organic compost for floor cleaning, significantly reducing the need to purchase cleaning products. The remaining waste is collected by district offices, resulting in minimal residual waste and helping reduce the fees associated with waste management significantly.

“...Developing new menus to utilize ingredients efficiently, ensuring that the materials sent to the kitchen do not end up as waste in landfills.”

(Hotel Manager)

“...Setting a goal for zero food waste to landfill by 2030 is being pursued through various means, including having each branch handle it themselves and teaching customers how to do it.”

(Sustainability manager, large scale supermarket business – 1)

“Dried food items that are not sold or are close to expiration are carefully selected for quality and donated to those in need...”

(Quality assurance manager, large scale supermarket business – 2)

However, the majority of the population still buys and consumes food without much caution, leading to a significant amount of food waste in households, particularly in the expanding condominium communities in Bangkok, which are major contributors to the substantial food waste generation. The primary issue identified consistently across various sources is that people do not separate waste at the source due to a lack of awareness about the problem. There is also a lack of confidence in Bangkok’s waste management system, with the perception that waste management is the responsibility of the city, and a general lack of knowledge about appropriate food waste management practices. Only a few pilot communities have received continuous support from Bangkok’s administration in waste management, resulting in effective food waste management in those specific communities.

“The inadequate management of food waste is due to the fact that people dispose of food waste together with general waste, making it challenging to handle.”

(Academic who promotes food waste reduction in educational institutions)

“...Villagers believe it is the responsibility of BMA and wonder why they don’t increase the number of waste bins and improve the collection system.”

(Community leader advocating for waste reduction and segregation in the community)

Regarding the roles in managing food waste for the aforementioned sectors, collaboration between the

public and private sectors is primarily observed in the collection and disposal activities of generated food waste. There is limited collaboration in activities focused on the prevention and reduction of food waste. These activities are mostly in the early stages, with some pioneering initiatives in specific areas or branches of major private companies.

In addition to the roles of the three sectors defined in the research objectives-public, private, and people, this study also found that non-profit organizations play various roles in food waste management in Bangkok metropolitan area. Their important role involves receiving surplus food donations from the private sector and distributing them to low-income communities, shelters, and those in need. They also coordinate with businesses in a central part of Bangkok, to collect and manage the generated food waste by composting it to create fertilizer for growing organic vegetables.

Collaboration Models among the Public Sector, Private Sector, and General Public in Food Waste Management in Bangkok

Based on data collection and analysis, the researchers have identified collaboration models among the public sector, private sector, and the general public, including non-government organizations, in the management of food waste in Bangkok. The collaboration models can be categorized into three types, considering the relationships between stakeholders, resource sharing, and activities: 1) Structured collaboration, 2) Loose form of collaboration, and 3) Occasional collaboration, as shown in Table 1.

Structured collaboration

This is a form of engagement among stakeholders with specified involvement, assigned roles and responsibilities, and jointly conducted activities. It involves clear and explicit conditions or agreements, such as appointment announcements, collaboration records, joint funding agreements, and service contracts. This contributes to the development of a continuous and consistent plan of action or joint activities.

Structured collaboration is mostly observed in the cooperation between the BMA and private companies for waste collection and disposal services, as well as joint funding for waste-to-energy projects. Resources are shared according to legally binding contracts. Additionally, there is collaboration between the BMA and large-scale retail and wholesale private companies for the separation of food waste from supermarkets, utilizing it for composting and biogas production. Collaboration extends to hotels and restaurants working with public organizations, as well as cooperation between the government and non-profit organizations in receiving and distributing excess food to shelters and low-income individuals which are voluntary and have clear action plans in place.

“...Executed an MOU between the BMA and the main office; thereafter, each branch worked collaboratively to tailor their efforts to the specific needs of their respective areas...”

(Sustainability manager, large scale supermarket business - 1)

“...Collaborated with the private sector; the process was not overly complicated. Signed an MOU, scheduled a date, and smoothly received donated goods...”

(Project leader, non-profit organization receiving and redistributing surplus food)

With regard to a committee driving the waste management policy at its source in Bangkok, this collaboration involves the public sector, private sector, and the general public. The committee has clear appointments and defined roles, but practical implementation still encounters unclear and inconsistent activities.

Loose form of collaboration

This is a form of stakeholders working together with a common goal, characterized by flexibility and a lack of emphasis on rigid structures, clear relationships, or well-defined roles. It relies on closeness and trust, with each party benefiting from the collaborative activities, allowing the activities to progress continuously.

Table 1 Collaboration models among stakeholders in food waste management in Bangkok metropolitan area

Component	Structured collaboration	Loose form of collaboration	Occasional collaboration
Relationships	- Clearly define roles and responsibilities - Establish plans/activities - Formalize agreements in writing	- Flexible - Rely on closeness and trust	- Depending on the situation - Not clear
Resource sharing	- According to the agreement	- Reciprocal support	- One-sided giving and receiving, or - Not clear
Activities	- Continuous and consistent	- Continuous	- Short periods, or - End as needed

This loose form of collaboration is evident in collaborations between the BMA and other sectors, where district offices often play a role in engaging specific target groups, particularly communities, fresh markets, and familiar restaurants, in the separation and beneficial use of food waste. Non-profit organizations and private businesses also collaborate with restaurants to implement food waste separation for composting. This collaborative model is further observed between the private sector and the public, with instances like hotels and restaurants donating food scraps to agricultural partners for animal feed or compost creation. In some fresh markets, cooperation is established with merchants involved in waste separation through the distribution of bio-fermentation liquid.

“...Doing it informally, it’s more flexible and easier—no need to spend a lot of time on extensive documentation or numerous meetings...”

(Co-founder, non-profit organization collecting food waste for composting)

“...Farmers receive food scraps from us, and we get safe raw materials to use. Collaborating in this way is less complicated, similar to regular waste collection, but it’s farmers who do the collecting instead of the city.”

(Administrator, environmentally certified hotel)

Occasional collaboration

This is a form of engaging in activities together based on specific situations or for a particular purpose. It occurs within a short period with a defined starting and ending point. It typically involves providing knowledge and advice on food waste management, supplying items or equipment for waste management, or making temporary donations of surplus food.

“...As we earnestly turn food scraps into compost, private companies have taken notice. They provided biogas fermentation tanks, and the generated gas is then used in the kitchens of nearby households...”

(Community leader, zero waste community)

Collaboration in various forms is driven by significant forces, including the mutual benefits for stakeholders, fostering a willingness to collaborate. This can manifest in cost reduction, contributing to a positive image, and providing emotional well-being benefits through shared responsibilities. Additionally, there is momentum from

SDGs leading to the development of the country’s food waste management plans. State officials responsible for national environmental policy state: “...previously, nobody acknowledged food waste, but with the SDGs target, discussing food waste has become easier.” Policies on food waste separation from the BMA and targets for food waste from large retailers and certain hotel businesses have been announced. However, some stakeholders argue that district offices are working merely to meet targets, while most private sector entities are primarily driven by image-building without addressing the underlying complexities seriously.

However, there are still unclear and complicated regulatory and bureaucratic impediments of collaboration between the government and other sectors. Sanitation officers from district offices note: “...the work is limited by legal constraints and regulations that prohibit certain actions or involve potential risks. This makes district offices hesitant to proceed, fearing audits or disciplinary action...” Furthermore, most informants agree that the lack of appreciation for food leads to a significant amount of food waste being discarded from households. The failure to separate waste is also a crucial issue that complicates food waste management efforts.

Discussion

This research highlights the role of the BMA as a public agency at the local level that promotes food waste separation and responses for ensuring timely waste collection. As for the private sector, including supermarkets, markets, hotels, and restaurants, as indicated by FAO (2011), and UNEP (2021), recognized as significant contributors to food waste, some entities are found to be proactive and play a clear role in managing food waste. This aligns with findings from Aramthiantamrong and Payomratanasin (2020), emphasizing the importance of the private sector in environmental management. On the other hand, although consumers are substantial contributors to food waste generation, as highlighted by Srijuntrapun (2016), ONEP (2019), this research found that consumers play a minimal role in food waste management, aligned with findings from TEI (2021) and Bunjongsiri (2018).

The roles of stakeholders that emphasize the collection of food waste for beneficial use do not align with the Food & Drink material hierarchy proposed by UNEP (2014), except in cases where the private sector donates surplus food to non-profit organizations for distribution to those in need, contributing to a reduction in potential food waste.

The collaborative model among the public sector, private sector, and the general public in food waste management in Bangkok all follow the concept of horizontal collaboration, as proposed by Agranoff and McGuire (2003) and presented by Aramthiantamrong and Payomratanasin (2020). This approach aims to reduce the limitations of the government in managing food waste and to ensure that each sector benefits. It involves mutual cooperation where each sector turns towards each other to carry out operations, aligning with Linden's (2003) perspective and some local government collaboration models in the United States, as synthesized by Agranoff and McGuire (2003).

However, the research points out the lack of clarity in regulations and the complexity of the bureaucratic system, identified as obstacles in developing collaboration between the public sector and other sectors. These challenges, not found in previous research, lead to a more informal or occasional collaboration rather than structured cooperation. Despite suggestions by Bryer (2009),

Carlssona and Berkesb (2005), Thomson and Perry (2006), that developing collaboration with the public organization requires clear relationship establishment and role definition for each party involved.

Conclusion and Recommendation

This research examines the collaborative model among stakeholders, including the public sector, private sector, and the general public in managing food waste in Bangkok Metropolitan area. The researchers developed a conceptual framework based on data obtained from interviews with various stakeholders and observations of related activities. The key findings were summarized and categorized into different data sets, as illustrated in Figure 1, providing an overview of the theoretical conclusions regarding collaboration among those stakeholders in food waste management in Bangkok metropolitan area.

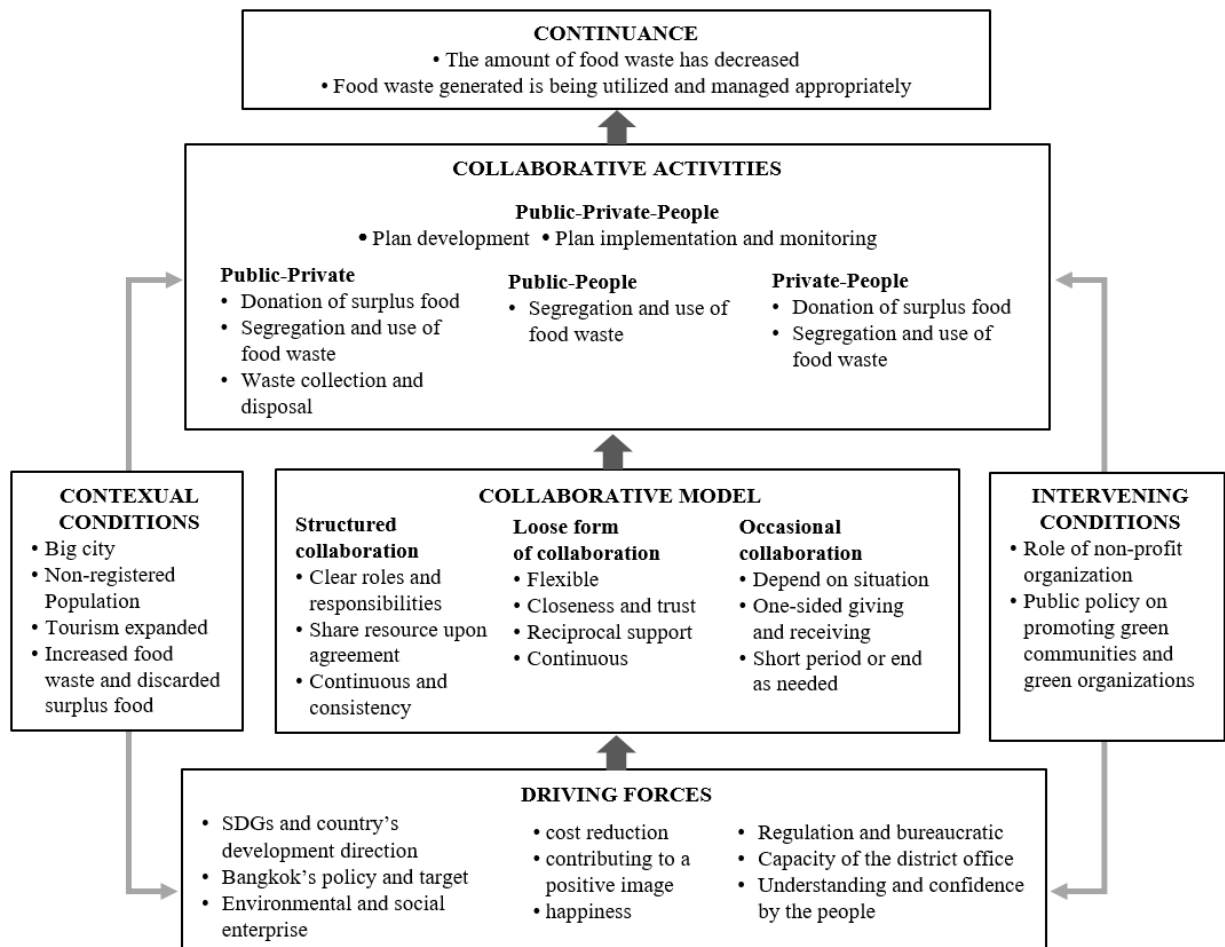


Figure 1 Theoretical conclusions of Public-Private-People collaboration in food waste management in the Bangkok metropolitan area

The collaborative model that has emerged is contextually influenced by local conditions stemming from economic expansion, tourism, and the complexity of urban society. This has led to an increasing trend in the volume of food waste. Significant intervention issues include a crucial role that non-profit organizations and public policy play in promoting green communities and green organizations. On the other hand, significant driving forces that negatively affect this issue include understanding and confidentiality, leading to poor waste separation behaviors. The other driving forces behind this collaboration stem from the benefits realized, guiding the development direction globally, nationally, and locally. Consequently, collaboration and various activities continue to evolve, characterized by creative processes, flexibility, adaptability, and mutual benefits for all parties involved. However, this collaboration and these activities are still within limitations, with many initiatives being in the initial stages of development and some operations in pilot communities requiring further expansion and community engagement for effective waste reduction and separation.

Policy recommendations for the development of collaboration in food waste management in Bangkok are as follows:

- 1) BMA should declare clear goals and guidelines for achieving food waste reduction targets for each sector, emphasizing increased responsibility at the source of food waste management.

- 2) The BMA should collaborate with public or private organizations specializing in communication to expedite efforts in preventing and reducing food waste, and to boost public awareness and participation in the proper management of segregated food waste.

- 3) Enhance structured collaboration between BMA and the private sector by implementing incentive measures and simplifying the process to better accommodate entities generating food waste.

- 4) Fostering a loose form of collaboration by decentralizing responsibilities to district offices and developing their coordination skills across various sectors and implementing activities tailored to each area.

- 5) Organize occasional collaborative activities and CSR initiatives related to food waste management that are appropriate for the situation or ensure continuity and achieve tangible results.

- 6) Review and improve regulations and processes within government agencies that hinder collaboration with the private sector, the public, and other sectors.

For future research proposals, it is recommended to investigate the collaborative model in food waste

management at the sub-sector level, such as service, retail and wholesale trade, and consumer sectors. Additionally, conducting quantitative research would be valuable to identify and confirm factors influencing collaboration within these specific sectors more clearly.

Conflict of Interest

The author declares that there is no conflict of interest.

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