

Sustainable organic waste value chains
Scoping Studies Synthesis

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Glossary

CEA	Central Environmental Authority
DFAT	Department of Foreign Affairs and Trade, Australia
DoA	Department of Agriculture
HH	Household
IWMI	International Water Management Institute
KMC	Kaduwela Municipal Council
MC	Municipal Council
SUSL	Sabaragamuwa University of Sri Lanka
WPWMA	Western Province Waste Management Authority
UTS-ISF	Institute for Sustainable Futures, University of Technology Sydney

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1. Introduction

This report documents a synthesis of scoping studies carried out between June - August 2023, relevant to strengthening organic waste value chains for Kaduwela Municipal Council (KMC).

The scoping studies seek to support KMC to be a model for sustainable organic waste value chain management at the local authority level.

The scoping studies were carried out by the International Water Management Institute (IWMI), Janathakshan (GTE) Ltd, Sabaragamuwa University of Sri Lanka (SUSL) with support from the Institute for Sustainable Futures at the University of Technology Sydney (ISF-UTS) as part of a project 'Sustainable Organic Waste Value chains'. The project is funded through the Knowledge and Linkages for an Inclusive Economy Grants Program by the Australian Government Department of Foreign Affairs and Trade.

This report documents findings and recommendations from three scoping studies:

1. Training on composting and marketing
2. Community awareness on waste management and organic waste products
3. Liquid fertiliser marketing

Each of the three scoping studies was led by a research partner, though all research partners were engaged in planning the scopes of work and final reporting.

Table 1: Scoping study lead researchers

Training on composting and marketing	IWMI
Community awareness on waste management and organic waste products	Janathakshan
Liquid fertiliser marketing	SUSL

Individual detailed reports for each of these studies is also available on request from the research partnership.

Key content areas of this synthesis report related to the scoping studies are:

- Background and purpose of the studies
- Approach and study participants
- Key findings
- Key recommendations within organic waste value chain development
- Future options

2. Background to scoping studies

2.1 Prioritised by Kaduwela Municipal Council

KMC identified priority areas to strengthen organic waste value chains. KMC expressed interest for the scoping studies to be completed within a relatively short timeframe (3-4 months) as part of its ongoing efforts to strengthen waste management practices.

The research partnership prepared brief activity plans to scope the areas of inquiry. These activity plans were confirmed with KMC before study activities commenced. Importantly KMC staff were involved in all of the scoping studies, taking part in training initiatives; community-level activities to learn about community awareness; and also being key stakeholders consulted as part of the study on liquid fertiliser marketing.

2.2 To guide longer-term initiatives

The scoping studies also provide an important ingredient to inform strategic, short, medium and longer-term initiatives to strengthen organic waste value chains within KMC and also Sri Lanka more broadly. This is in line with the research partnership goal to inform '*Evidenced-based options for (organic waste) value chains to enhance sustainable waste management, food production and livelihoods*'.

The scoping studies seek to inform the development of a road map for KMC to guide organic value chains in KMC while ensuring it is in line with the Western Province Waste Management Master Plan and provide insights for other stakeholders interested to enhance organic waste value chains in Sri Lanka.

2.3 Scoping studies purpose

Each of the three scoping studies was guided by clear objectives as set out in Table 2 below.

Table 2: Scoping study objectives

Scoping Study	Objective
Training on composting and marketing	To scope and identify training needs of the composting and waste management staff of KMC covering the waste management service chain. Based on current knowledge, for improving organic waste value chains including composting process, value addition and marketing. Design an appropriate training programme to cater the specific training needs
Community awareness on waste management and organic waste products	To understand the level of awareness among community leaders on the waste management activities including the "Waste App" and waste derived products done by KMC (composting, biogas, material recovery) and the factors contribute to better awareness.
Liquid fertiliser marketing	To gain a better understanding of the target customers, competition, demand for liquid fertilizer and market trends in the liquid fertilizer industry in the KMC area. The findings from this activity will enable KMC to develop an effective marketing strategy for liquid fertilizer.

2.4 Scoping studies approach and study participants

An approach unique to each scoping study focus was planned and carried out including inclusion of different stakeholders relevant to the scoping studies.

Table 3: Scoping study approach and study participants

Scoping Study	Study approach and participants
Training on composting and marketing	<p><u>Approach:</u> The project team conducted two training sessions: Training session 1 was co-designed with Sustainable Agriculture Research and Development Centre (an institution under the Department of Agriculture, Sri Lanka). Training session 2 was co-designed with Waste Management Authority of Western Province (WMA).</p> <p><u>Study participants:</u> Training 1: Deputy Commissioner; Officer in charge of compost plant; Supervisors; Public Health Inspector (PHI); Sanitary workers at compost plant (35 participants (one female and 34 male participants)). Training 2: Officer in charge of compost plant; supervisors; Public Health Inspector (PHI); Sanitary workers at compost plant (30 participants (all male participants))</p>
Community awareness on waste management and organic waste products	<p><u>Approach:</u> Focus group discussions and field visits to the KMC waste management facility. Pre and post FGD and field visit questionnaire.</p> <p><u>Study participants:</u> 106 attendees / respondents to questionnaires (44 males and 61 females (no response from 1 person))</p>
Liquid fertiliser marketing	<p><u>Approach:</u> Review of existing literature related to the liquid fertilizer industry, market trends, and competition relevant to the KMC; surveys with farmers, especially farmers who received liquid fertilizer samples from KMC; in-depth interviews with KMC staff, industry experts and key stakeholders in the liquid fertilizer industry.</p> <p><u>Study participants:</u> Deputy commissioner, KMC; Officer in Charge of liquid fertilizer; Managers of KMC outlets; Other KMC staff (2); Farmers/end users (31); purposive (4); Compost and/or liquid fertilizer producers (6); Retailers/wholesalers (10); Agricultural extension officers (4).</p>

3. Key scoping study findings

This section provides key highlights, specific to each of the scoping studies and also synthesise findings across the three scoping studies.

3.1 Study on training on composting and marketing

Training in waste treatment practices needs to improve, to strengthen organic waste value chains (composting process, quality and marketing).

During open discussion in the two training sessions **areas for improvement in KMC organic waste treatment** were identified:

- source segregation
- household level waste management practices
- monitoring and evaluation of composting process
- compost quality through best practices and value addition process.

During open discussion in the two training sessions **formats and processes for ongoing training** were identified as a priority for the sustainable operation of the compost plant:

- conduct more regular training
- extend similar training programmes to the other local authorities in the Western Province
- target different groups such as waste collectors, recyclable handlers, and public health inspectors (PHIs) who are actively engaged with the waste management activities in a local authority.
- link with the different groups, for example linking with the PHI training school to provide collaborative training on waste management
- enable exchange of experiences on waste management activities and continue to be engaged in collaborative work between waste management authority at the provincial level and Kaduwela Municipal Council at the local authority level.

Best practice example: private sector engagement in compost production

A private company buys compost produced by the Dambulla Municipal Council and sells the product at a higher price after value addition.

Dambulla Urban council compost plant currently operates as a PPP model where compost is produced by urban council and value addition through granulation is done by private sector.

Recommended actions for sustainable organic waste management informed by training scoping study:

1. Develop a capacity training plan including content, target audience and the frequency of training required on improving organic waste value chains.
2. Improve the level of waste management at the household level including practicing home composting.
3. Improve source segregation of organic waste.
4. Develop a waste collection plan for improved source segregation - collecting different types of waste on separate days such that the organic waste will be collected more frequently than the recyclable and other non-degradable waste.¹
5. Explore the value addition mechanisms practicable to KMC.
6. Engage with the private sector to improve the marketability of the product- marketability of the compost can be improved through value addition processes such as pelletization and granulation.²



¹ An assumption is that this will reduce hidden mixed waste collection, will improve source segregation at household level given the clear instructions for households to only hand over organic waste on such a day and other types on another day.

² The study identified examples of this practice already under way in other MC with private sector.

3.2 Study on Community awareness

Community engagement needs to be increased to strengthen awareness and action of households in waste segregation and to value and purchase of KMC produced organic waste products.

Participation in this study was through four focus groups and a pre and post questionnaire.

Who participated:

106 individuals	<ul style="list-style-type: none"> ● 82% (n=87) over 60 years of age ● No youth (under 40 years of age) included 	<ul style="list-style-type: none"> ● 58% females (n=61) ● 42% males (n=44) 	<ul style="list-style-type: none"> ● Majority have education level of secondary school or higher
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A questionnaire was provided in the local language. It consisted of sections:

- personal information
- household waste segregation practices
- waste collection process of KMC
- waste management practices of KMC
- the “Clean up” waste information App
- use of KMC organic waste products.

Following the completion of the questionnaire, the chief Public Health Inspector (PHI) and Development officer of KMC provided information to community leaders using PowerPoint presentations and demonstration models. Topics included:

- waste generation facts of the KMC area
- principles of waste management
- efforts taken by KMC to manage waste and current issues
- support expected from the community.

After this awareness raising session, the community leaders were taken onsite to view the entire waste transition and treatment process at the KMC waste management and transition center (“*Ran Palassa*”). They observed:

- weighing of vehicles
- unloading at the composting facility
- various steps of the composting process
- unloading at non-degradable waste treatment facility
- manual separation of recyclables
- bailing of materials to be sent to the waste to energy plant
- glass collection center and cleaning of vehicles.

Relevant officers of the KMC site explained the key steps, important considerations, and other relevant factors in the entire process and community leaders were given opportunities to ask questions/clarifications.

After visiting the facility, community leaders returned to the FGD classroom setting for an open discussion. Community leaders were able to share ideas/suggestions/inputs on how the community, KMC, and other stakeholders could further improve the waste management process in the area in a more healthy and sustainable manner. Ways to improve the communication and awareness creation processes between KMC and the community were also identified.

Key questionnaire survey findings:

1. High satisfaction levels of KMC waste treatment services
2. High rates of awareness and practice of segregation of waste at home³
3. High rates of home composting
4. Low awareness and use of Clean Up Waste App in the community
5. Mixed to low awareness of KMC produced organic products
6. High perception of quality of KMC produced compost⁴
7. Low awareness of KMC produced liquid organic fertiliser
8. Low use of liquid fertiliser (most commonly for home gardens - though not KMC produced liquid organic fertilizer)

Detailed questionnaire findings are available in Annex 1.

Recommended actions for sustainable organic waste management informed by the community awareness study:

1. Raise community awareness about KMC waste management and production of organic waste products (compost / liquid fertilizer) effectively by providing opportunities for community to see what is being done by KMC to manage the waste.
2. Utilise community leaders and CBOSs as a facilitators/animators to conduct awareness creation sessions.
3. Ensure presence of a KMC official with authority for the awareness sessions to gain better attention from community.
4. Make "Clean Up" App functional and promote among the community (especially through youth groups) as it has very useful applications for the community.
5. Make community aware of the quality and benefits of compost and liquid fertilizer produced by the KMC, different from other products.⁵

³ Further investigation on actual contamination levels is required

⁴ It is to note that awareness is low, but quality perception is high

⁵ There are many substandard products in the market which hinder the promotion of KMC's waste-derived products



Awareness Programme for Community Leaders

3.3 Study on liquid fertiliser marketing

A marketing strategy for Kaduwela Municipal Council's liquid fertilizer is needed to raise awareness and demand from farmers (especially home gardeners), which can be enabled through collaborative practice with Department of Agrarian Development, compost producers and retailers.

Key insights from the marketing study of Liquid organic fertiliser (LOF) are provided below:

Liquid organic fertiliser use:

- A significant majority of farmers interviewed have had prior experience with liquid fertilizer.
- Home gardeners are the most prominent category that use liquid fertilizer.⁶
- Paddy and vegetables are the major crop types for which liquid fertilizer is applied.

Marketing options:

- Liquid organic fertiliser is best suited as a supplementary fertilizer for other organic fertilizers. For example, liquid organic fertiliser can be packaged with KMC produced compost and offered as a complete home garden organic fertilizer package.
- The plantation sector is another viable market for bulk sales of LOF provided that the nutritive composition is tailored to suit the requirements of plantation crops.

Collaborative practices for marketing:

- There are currently numerous collaborative practices to market liquid fertiliser.
- Retailers can provide insights on the market landscape. They describe the availability of many brands of liquid fertilizer which they perceive as organic.

Best practice example: collaborative marketing activities

Western Province Waste Management Authority (WMA) and the Department of Agrarian Development are working together to promote WMA produced liquid fertilizer among the local farming community.

Demand and competitive market for liquid fertiliser:

- None of the retailers interviewed for the study reported selling KMC's LOF.
- Demand for liquid fertilizer is stable despite lifting the chemical ban. The stable demand can also be attributed to the consistent demand from home gardeners as they are not entitled to fertilizer subsidies.
- The retail price of liquid fertilizer in the market ranged between Rs 800 to 2000 per litre, yet the KMC LOF, despite being competitively priced, failed to penetrate the market due to inadequate awareness, promotion, distribution, and quality concerns.
- Improving the nutrient composition of KMC liquid fertiliser could position the product more favourably for competitive pricing and increased demand.
- Interviews with Agricultural Research and Production Assistants (ARPAs) from the Malabe Agrarian Services Centre provided valuable insights into LOF use, benefits, application methods, and wider implications. Although ARPAs were aware of KMC LOF, no initiatives had been undertaken to

⁶ Home gardeners and urban farmers use a significant proportion of their produce for home consumption this compels them to choose organic fertilizers.

leverage their knowledge and influence for its promotion. Leveraging their expertise and reach could greatly enhance KMC LOF's penetration in the area.

- Liquid fertilizer producers cater to crop requirements by offering a range of products. The small-scale producers cater for local requirements while the large-scale producers tailor products to diverse customer requirements. This includes approaches to enhance the nutritive composition of liquid fertilizers and market trends.

Recommended actions for sustainable organic waste management informed by study on liquid organic fertiliser:

Product development:

1. Develop a fertilizer package for home gardeners, combining compost and liquid fertiliser.
2. Consider liquid fertiliser as a potential profit centre, allocate budgets and skilled human resources through KMC budget.
3. Seek technical support from the Department of Agriculture to enhance the quality of liquid fertiliser and also consider collaborating with technology-based institutions/universities in the vicinity to enhance the quality of the organic fertilizer.
4. Seek funding from donor agencies to improve infrastructure facilities and the quality of liquid fertiliser.

Marketing to farmer segments:

5. Market to plantations as another important market segment for bulk sales of nutrient-enhanced liquid fertilizers formulated to meet the crop-specific demands of crops such as tea, rubber, coconut and other cash crops.

Collaborative marketing activities:

6. Build a strategic partnership with the *Department of Agrarian Development* to promote and sell compost and LOF in major agricultural areas. e.g., in Nuwaraeliya for vegetables.
7. Tap into existing *retailer networks* offering special attractive commissions for retailers.
8. Showcase the role of KMC in making local resource systems circular (circular economy in action) through *local media coverage* (Television documentaries and Radio programs). This can include waste to energy and liquid fertiliser, waste to compost and plastic recycling initiatives. It can also feature success stories of farmers who have benefited from using compost and liquid fertiliser.
9. Use *community relations* to promote the home gardening package.
10. Utilise the *Waste App* as an effective channel to promote KMC products, secure orders and deliver compost and LOF to the doorstep at the time of collecting garbage.
11. Partner with the *Agrarian Services Centre* and the *Provincial Department of Agriculture* to organize home garden competitions and offer LOF and compost free for the competitors.
12. Provide compost and LOF free of charge to *schools* offering agriculture and related subjects in their curricula.
13. Develop a strong promotional message (slogan) should be developed to convey that the LOF is a by-product of your own biodegradable waste such as "Your Biodegradable Waste Transformed into organic fertilizer".
14. Collaborate with the *Department of Agriculture, local community and local fertilizer retailers* to establish a few demonstration plots/home gardens in key areas.





4. Summary of key recommendations

This section details recommendations from the three scoping studies.



The recommendations are grouped under change outcomes relevant to the organic waste value chain.

The recommendations highlight the need for an integrated approach to strengthen utilisation of organic waste. There is a need to strengthen early parts of the value chain in order to reap the benefit of changes in later parts of the value chain. To maximise benefit of organic waste, there is a need to act to promote use of organic waste products.

The recommendations highlight the need for sector-wide collaboration. KMC cannot deliver organic waste value chains alone. The scoping studies identified key stakeholders that can work with KMC and accompany them to capitalise on the opportunities and achieve desired change outcomes.


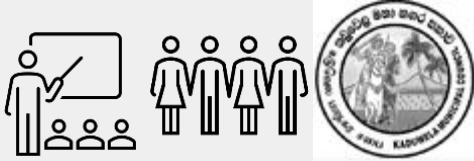

VALUE CHAIN	EXPECTED CHANGE OUTCOMES	PRACTICAL ACTIONS / SCOPING STUDY RECOMMENDATIONS	COLLABORATORS
 Waste management	1. Strengthened waste treatment practices at KMC	Develop a capacity training plan including content, target audience and the frequency of training required on improving organic waste value chains.	Sustainable Agriculture Research and Development Centre (an institution under the Department of Agriculture, Sri Lanka). Waste Management Authority of Western Province (WMA).
		Seek funding from donor agencies to improve infrastructure facilities and the quality of organic products (including liquid fertiliser).	donor agencies / private sector
 Raw materials  Storage and transport	2. Improved household level understanding of waste management and segregation ⁷of organic bio gradable waste	Activate community leaders / community groups / schools to be peer educators.	community groups, community leaders, schools
		Update and promote Waste App - especially for youth engagement.	youth groups
		Lead site visits and open days hosted by KMC officials for community to access waste treatment plant.	community groups, community leaders, schools
		Institute waste collection plan to promote HH segregation of organics, i.e., increased frequency of organic waste compared to recyclable waste	community groups, community leaders, schools
 Treatment	3. Produce value added compost products	Engage with the private sector as option to improve the marketability of the product- marketability of the compost can be improved through value addition processes such as pelletization and granulation.	Private sector
		Seek technical support from the Department of Agriculture to enhance the quality of liquid fertiliser and collaboration with technology-based institutions/universities in the vicinity to enhance the quality of the organic fertilizer.	DoA

⁷ To note this is an issue in Sri Lanka and globally – we can learn from best practice examples from researchers.

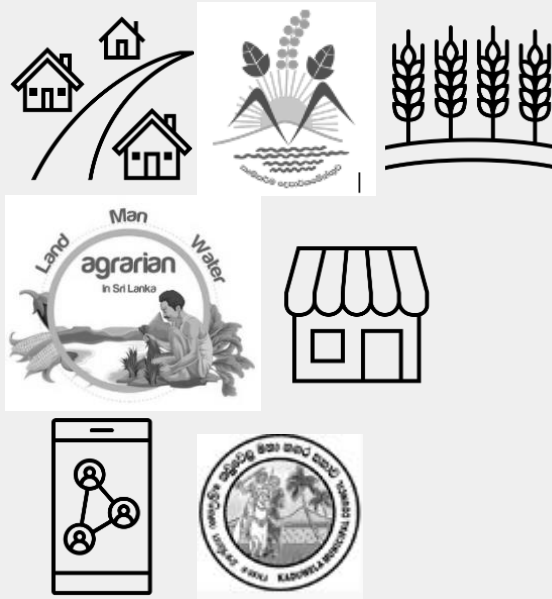
		<p>Create products targeted to market segments. For example</p> <ul style="list-style-type: none"> - Develop a fertilizer package for home gardeners combining compost and liquid organic fertiliser (LOF should be a supplement for compost) - Target plantations (as market segment) for bulk sales of nutrient-enhanced liquid fertilizers formulated to meet the crop-specific demands of crops such as tea, rubber, coconut and other cash crops 	plantations
 <p>Retail</p>  <p>End use</p>	<p>4. Promotion of organic waste products, such as liquid fertiliser</p>	<p>Consider liquid fertilizer operations as a potential profit centre and budgetary allocations and skilled human resources should be made available</p>	KMC
		<p>Improve marketing and communications e.g.:</p> <ul style="list-style-type: none"> - Prepare a strong promotional message (slogan) to convey that the LOF is a by-product of your own biodegradable waste such as "Your Biodegradable Waste Transformed into organic fertilizer" - Utilise the Waste App as a channel to promote KMC products, secure orders and deliver compost and LOF to the doorstep at the time of collecting garbage - Showcasing the role of KMC in making local resource systems circular (circular economy in action) through local media coverage (Television documentaries and Radio programs). 	KMC; media; KMC, local fertilizer retailers
		<p>Demonstrate and increase awareness:</p> <ul style="list-style-type: none"> - Establish demonstration plots/home gardens in key areas - Provide compost and LOF free of charge to schools offering agriculture and related subjects in the curricula - Organize home garden competitions and offer LOF and compost free for the competitors 	Schools; Agrarian Services Centre and the provincial Department of Agriculture
		<p>Increase availability:</p> <ul style="list-style-type: none"> - Build a strategic partnership with the Department of Agrarian Development to promote and sell compost and LOF in major agricultural areas. e.g., in Nuwaraeliya for Vegetable - Tap into existing retailer networks offering special attractive commissions for retailers 	Retailers; Department of Agrarian Development

5. Sector-wide collaboration

The scoping studies identified the value of collaborating with a broad set of stakeholders to maximise opportunities to strengthen organic waste value chains.

EXPECTED CHANGE OUTCOMES	STAKEHOLDER COLLABORATIONS	INITIATIVE ROLES
<p>1. Strengthened waste treatment practices at KMC</p>		<p>KMC develop a training plan for production of organic waste products.</p> <p>Development partners support infrastructure upgrades for organic waste products.</p>
<p>2. Improved household level understanding of waste management and segregation of organic bio gradable waste</p>		<p>Schools act as peer educators of KMC waste management activities and source segregation at HH.</p> <p>Community groups act as peer educators of KMC waste management activities and source segregation at HH.</p> <p>KMC upgrade and promote Waste App and host community access to treatment management for awareness raising</p> <p>KMC institute waste collection plan to promote HH segregation of organics, ie increased frequency of organic waste compared to recyclable waste.</p>
<p>3. Produce value added compost products</p>		<p>Private sector improve the marketability of the product- through value addition processes such as pelletization and granulation.</p> <p>DoA provide technical input to enhances quality of liquid fertiliser.</p> <p>Technical / research institutes provide technical input to enhances quality of liquid fertiliser.</p>

4. Promotion of organic waste products, such as liquid fertiliser



Community establish demonstration plots/home gardens in key areas / organize home garden competitions and offer liquid organic fertiliser and compost free for the competitors.

Schools to receive compost and liquid fertiliser free of charge to schools offering agriculture and related subjects in the curricula.

DoA strategic partnership to promote and sell compost and LOF in major agricultural areas.

Plantations viewed as market segment for bulk sales of nutrient-enhanced liquid fertilizers formulated to meet the crop-specific demands of crops such as tea, rubber, coconut and other cash crops.

Department of Agrarian Development strategic partnership to promote and sell compost products in major agricultural areas.

Fertiliser retailers receive special attractive commissions.

Media showcasing the role of KMC in making local resource systems circular (circular economy in action).

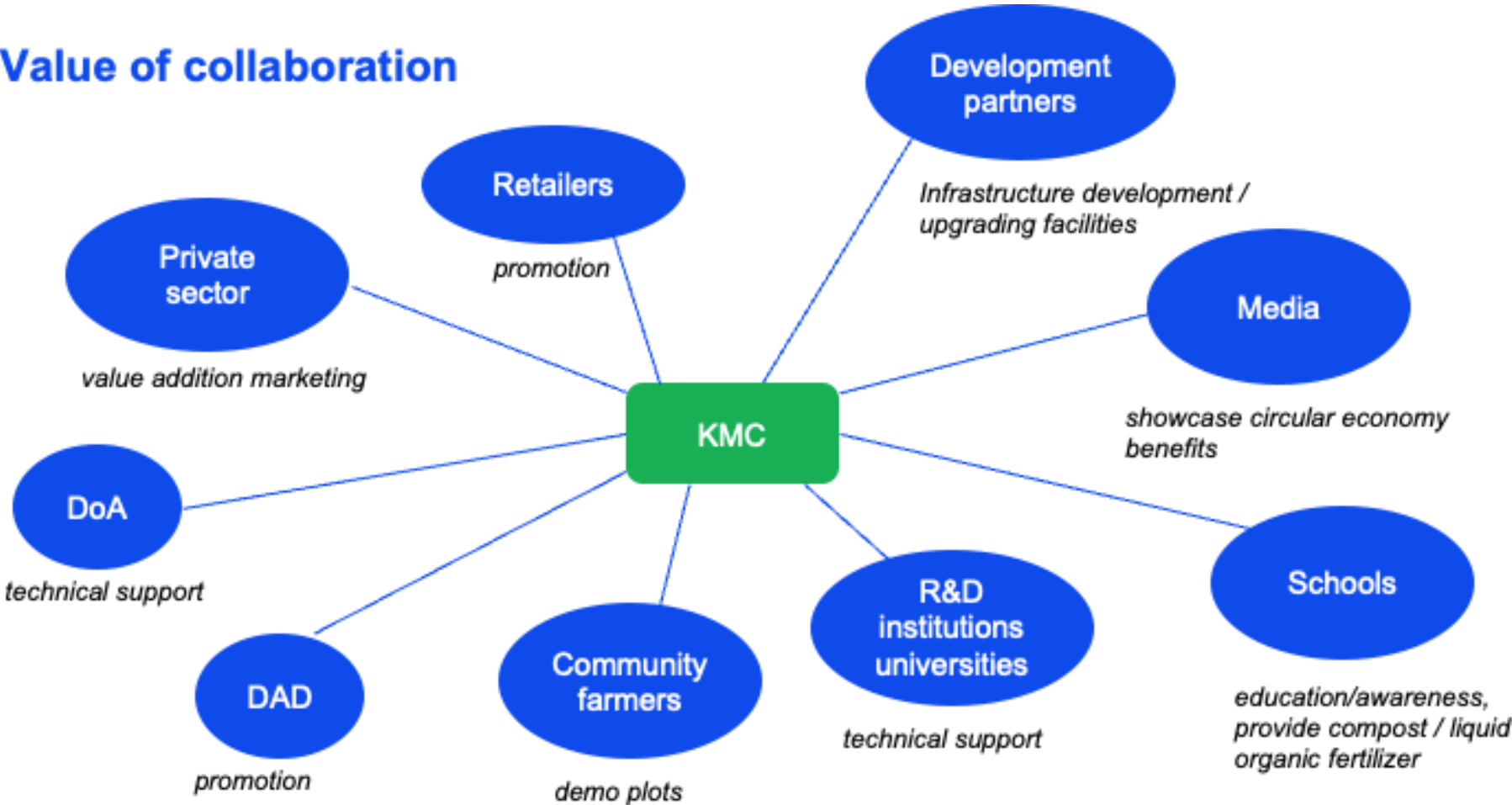
KMC view liquid fertilizer operations as a potential profit centre and budgetary allocations and skilled human resources should be made available.

KMC prepare a strong promotional message (slogan) to market organic products (such as liquid fertiliser)

KMC utilise the Waste App as a channel to promote KMC products, secure orders and deliver compost and LOF to the doorstep at the time of collecting garbage

KMC develop a fertilizer package for home gardeners combining compost and liquid organic fertiliser

Value of collaboration



6. Informed by current practice

The scoping studies revealed numerous examples of current practice which could inform KMC to strengthen its own organic waste value chains. It may be worthwhile to investigate these examples in more detail to guide future KMC practice. Examples related to the production, promotion and marketing of liquid fertiliser includes:

- **Local fabricators (private sector) produce pelletizing and granulation machines.** For example, Dambulla Urban council compost plant currently operates as a Public-Private-Partnership model where compost is produced by urban council and value addition through granulation is done by private sector.
- **Fertiliser promotion through extension services.** The most common brand of liquid fertilizer used by farmer respondents was “Mihilak” produced by Western Province Waste Management Authority which is a well-known brand especially among paddy farmers.

The reason for its popularity is due to distribution of the liquid fertilizer through the Agrarian Services Department and application of this liquid fertilizer using drones free of charge. The Malabe Agrarian Services Centre has promoted this product through their extension network.

6.1 Appetite for action

The scoping studies highlighted appetite for action, not just within KMC but also other key stakeholders who are interested to maximise the value of organic waste products.

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The need for continuous improvement of the composting process with more regular training was identified as a priority for the sustainable operation of the compost plant. It was suggested that similar training programmes should be extended to the other local authorities in the Western Province and beyond targeting different groups such as waste collectors, recyclable handlers, and public health inspectors (PHIs) who are actively engaged with the waste management activities in a local authority. Possible means to link with the different groups, for example linking with the PHI training school to provide collaborative training on waste management was also suggested to be further explored.

(Training scoping study report)

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Interviews with Agricultural Research and Production Assistants (ARPAs) from the Malabe Agrarian Services Centre provided valuable insights into LOF use, benefits, application methods, and wider implications. Although ARPAs were aware of KMC LOF, no initiatives had been undertaken to leverage their knowledge and influence for its promotion. Leveraging their expertise and reach could greatly enhance KMC LOF's penetration in the area.

(Liquid fertiliser marketing study)



The participants actively engaged and provided suggestions during the presentation, field visit and during the open discussion. The majority of community leaders who participated stated that it was a very good decision to have the awareness program at the waste management and transition center. This has given them an opportunity to see how the waste is managed by KMC. Initially they were not very positive about having a session at the waste management center, as the session progressed, they realized the importance of it.

The community leaders mentioned that awareness creation will be more effective if community members get to know about what is exactly done to the waste they generate at the KMC and invite community members to the place in the future to make them aware of the efforts taken by KMC.

In the open discussion participants had various questions to be clarified such as the impact of degradable plastic; how to use compost and liquid fertilizer; the difference between open burning of plastic and controlled incineration. These questions were responded to by KMC staff.

Community members also mentioned that many people are getting into home gardening and are looking for good-quality compost. But most of the products in the market are of low quality, mixed with sand. They are not aware of where they can purchase the compost produced by KMC.

Almost all of the community leaders showed their willingness to further enhance their knowledge of the waste management practices of KMC and facilitate awareness creation sessions for their respective communities.

(Community awareness scoping report)

7. Insights into urban waste to sustainable value chains

A visual summary of a circular economy system that links source materials and end-users through organic waste value chains is presented in Figure 1. The figure draws linkages and connections between different parts of the value chain which are often siloed and fragmented.

The value chain is inclusive of supply of waste streams, treatment of organic waste for compost production, storage and transport of compost to retailers and customers (farmers).

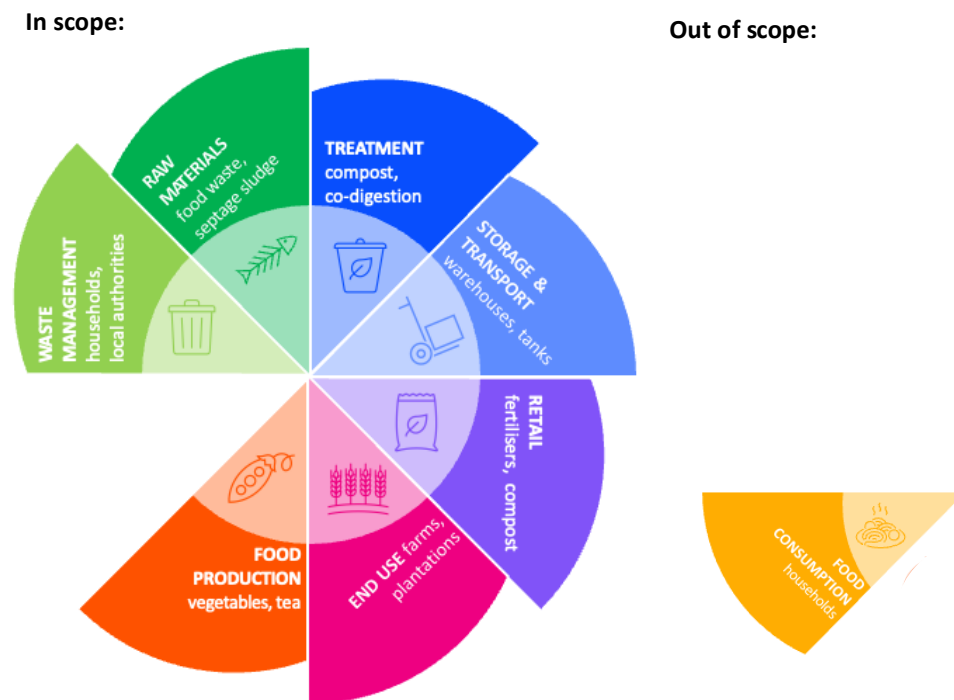
Seeing change across the whole system is necessary. Ultimately this provides a benefit to food security by increasing soil health and reducing dependence on chemical fertilizers.

Figure 1: Urban waste to sustainable value chains



It's important to recognise that the scoping studies explored different parts of the value chain to different extents. As illustrated in *Figure 3* the value chain was mostly represented in the study focus, with only food consumption not included.

Figure 2: Scoping studies focus



Actions to strengthen multiple elements of the value chain

The study on marketing liquid fertiliser highlighted the importance of linking initiatives across multiple aspects of the value chain. Initiatives to strengthen technical production need to be coupled with efforts to equip and motivate retailers for sales and promote confidence for end user sales.

For example - Detailed findings of the study

To convert the digestate into liquid fertilizer, the KMC further processes and refines the digestate to create a nutrient-rich solution that can be applied to agricultural fields to enhance plant growth and productivity. This liquid fertilizer provides an environmentally friendly alternative to synthetic fertilizers and helps to recycle nutrients from organic waste back into the agricultural ecosystem.

However, producing and marketing liquid fertilizer developed using municipal solid waste seem to present several challenges for the Kaduwela Municipal Council (KMC):

Technical production:

- Quality Assurance
- Regulatory Compliance
- Technical Expertise
- Research and Development
- Environmental Considerations
- Scaling Up

Consumer marketing:

- Perception and Acceptance
- Market Awareness
- Changing Consumer Preferences
- Storage and Shelf Life
- Distribution and Logistics
- Competitive Pricing

To address these challenges, KMC should invest in research, education, quality control, marketing, and collaboration with experts to ensure the successful production and adoption of their liquid fertilizer developed from municipal solid waste.

The study highlighted in other parts of the value chain:

Very few farmers and growers in the Kaduwela area are found to use KMC liquid fertilizer to nourish their crops and improve soil health. The limited adoption of KMC's liquid fertilizer, which is developed using municipal solid waste, among farmers and growers in the Kaduwela area could be influenced by several factors:

<p>Perceived Contamination: <i>Health and Safety Concerns</i> <i>Lack of Information</i> <i>Quality and Nutrient Content</i></p>	<p>Traditional Practices: <i>Stigma</i> <i>Regulatory Concerns</i> <i>Demonstration and Proof</i></p>
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To overcome these barriers and increase the adoption of KMC's liquid fertilizer, which is developed using municipal solid waste, among farmers and growers in the Kaduwela area, the KMC could implement the following strategies:

<p>Scientific Validation: <i>Quality Assurance</i> <i>Local Testimonials</i> <i>Farmer Participation</i> <i>Collaborations with Agricultural Extension Services</i></p>	<p>Education and Awareness Campaigns: <i>Demonstration Farms</i> <i>Technical Support</i> <i>Pilot Projects</i></p>
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Annex 1 – Community awareness questionnaire results

KMC WASTE TREATMENT SERVICES

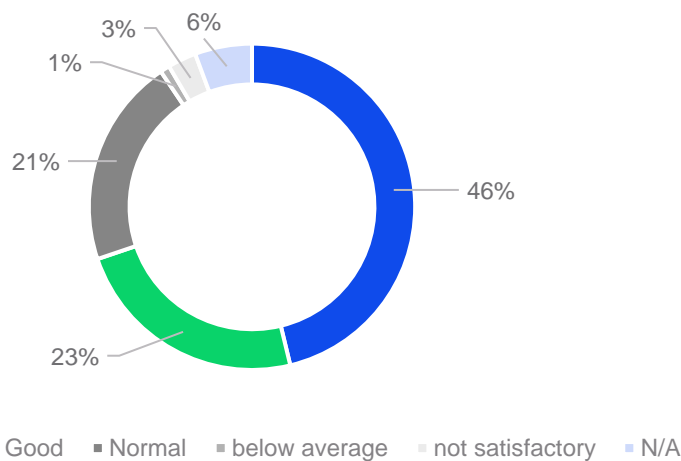
Satisfaction of KMC services

69% (n=74) of those surveyed stated that the service of KMC is very good or good.

3% (n=3) stated they were not satisfied with the service given by KMC.

See Figure 1.

1. Quality of the waste management services provided by KMC



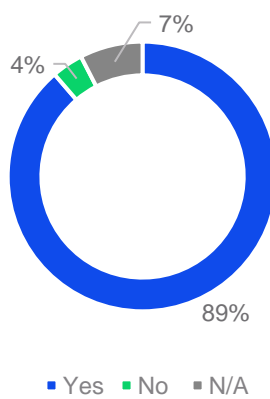
Knowledge of waste disposal and waste segregation:

89% (n=94) of respondents answered 'yes' to knowing about waste segregation.

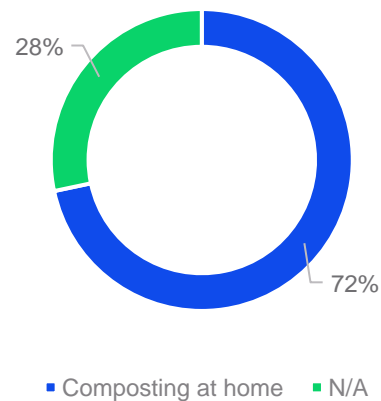
72% (n=76) of those surveyed compost food and/or other degradable waste at home.

See Figures 2 and 3.

2. Awareness/knowledge on waste segregation



3. Composting at home

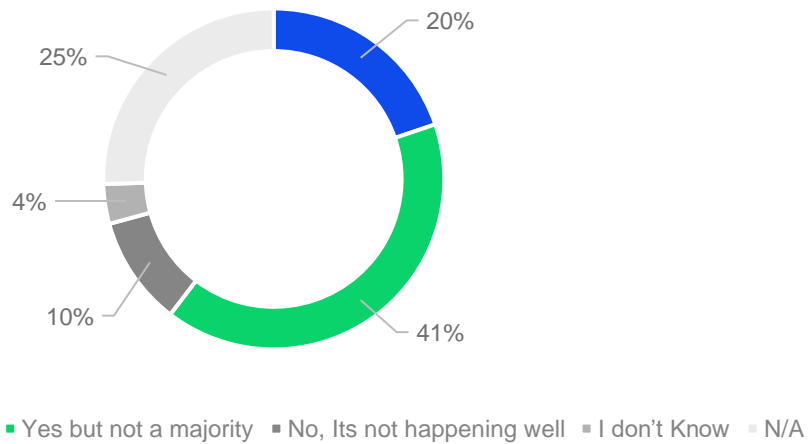


61% (n=65) of those surveyed are confident that others in the community (not community leaders like themselves) are knowledgeable about waste segregation.

39% (n=42) of those surveyed consider knowledge / practice of waste segregation 'not well - don't know - not - not answered'.

See Figure 4.

4. Perception on practice of waste segregation by the community



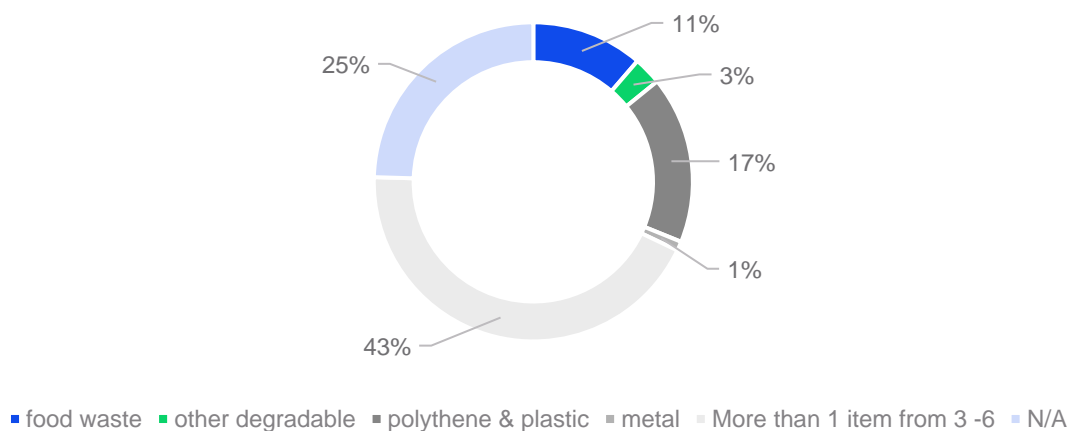
Practice of waste segregation:

75% (n=80) of those surveyed hand over at least one type of waste to the KMC

25% (n=26) did not respond to this question

See Figure 5.

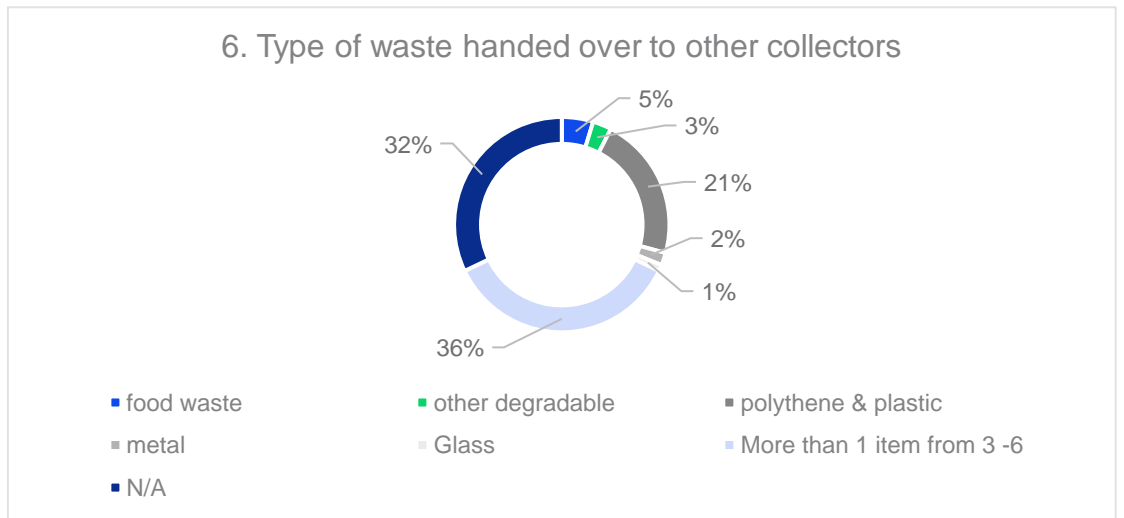
5. Types of waste handed over to KMC



68% (n=72) of those surveyed noted that they hand over waste to other collectors.

5% (n=5) of those surveyed hand over food waste. Plastic waste is most handed over to others (21%)

See Figure 6.



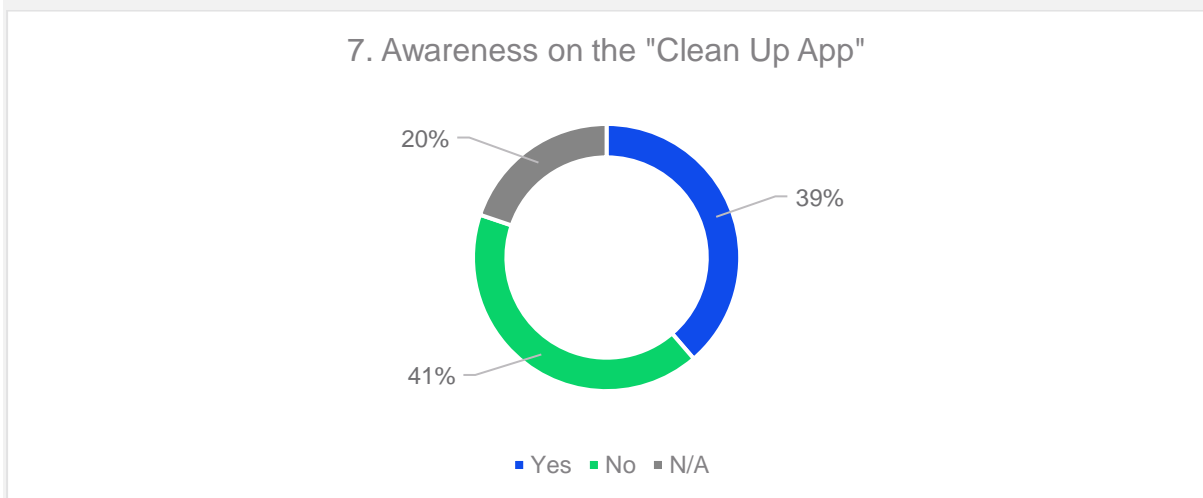
CLEAN UP WASTE App

Knowledge about and use of the 'Clean up Waste' App:

41% (n=44) of those surveyed don't know about the App

39% (n=41) of those surveyed know about the App

See Figure 7.



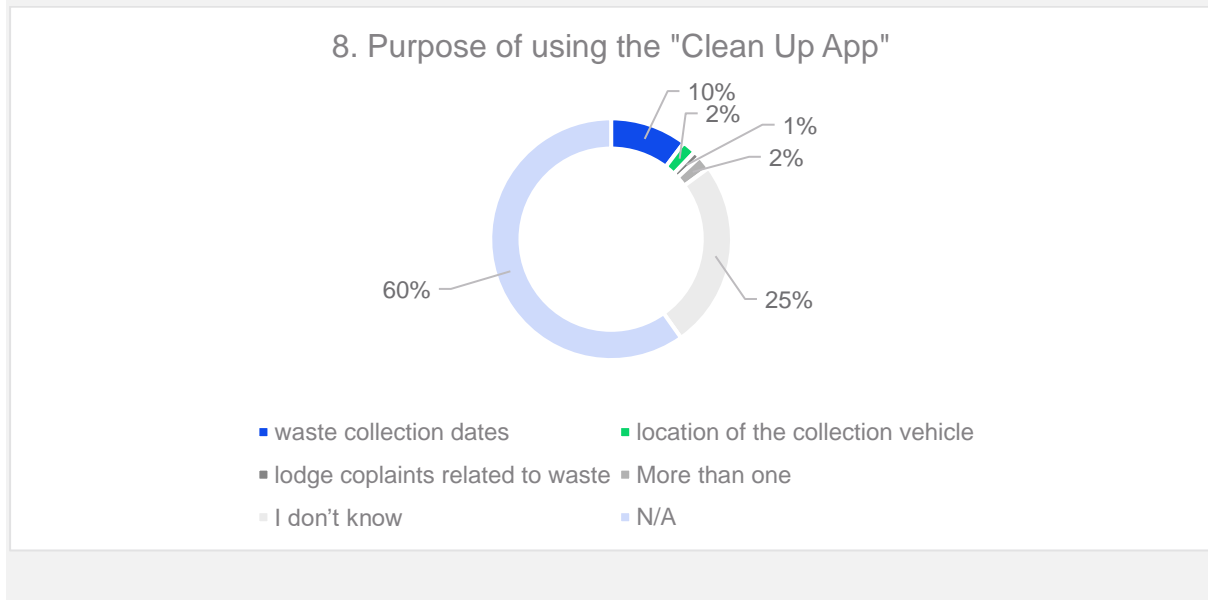
Knowledge about purpose of the App:

60% (n=64) of those surveyed did not answer the question

25% (n=26) answered I don't know

10% (n=11) of those surveyed described the purpose as 'waste collection dates'

See Figure 8.



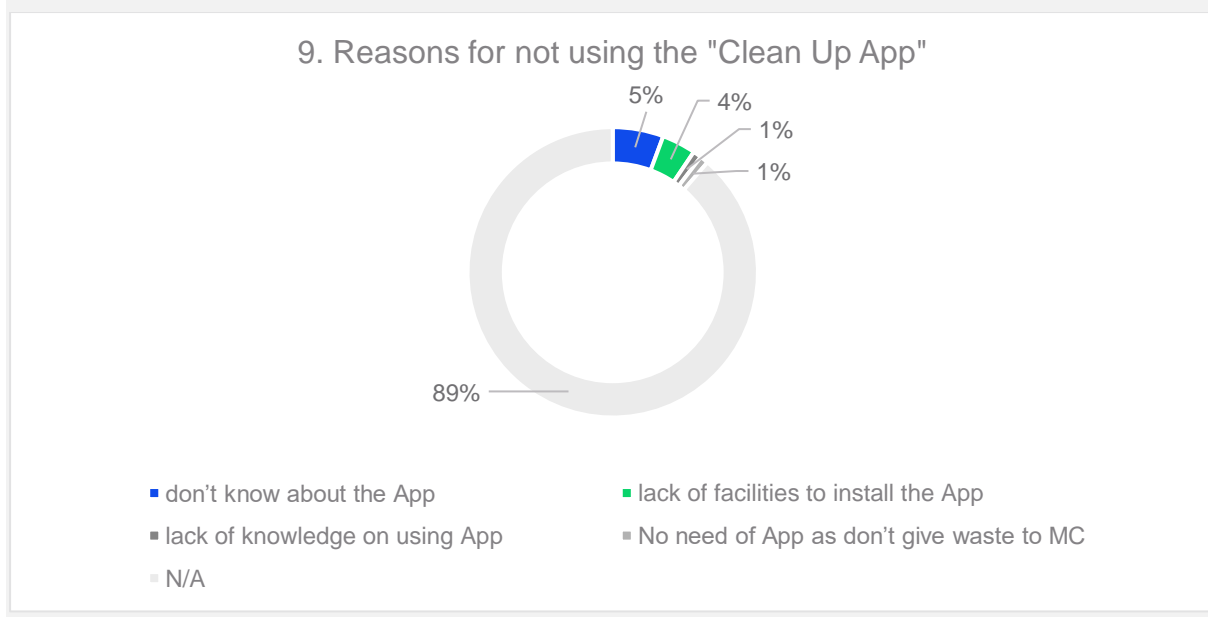
Reasons not using the App:

89% (n=94) of those surveyed did not answer the question

5% (n=5) noted that they are not familiar with the App

4% (n=4) lack facilities to install the App

See Figure 9.



Ideas to promote the App in the future:

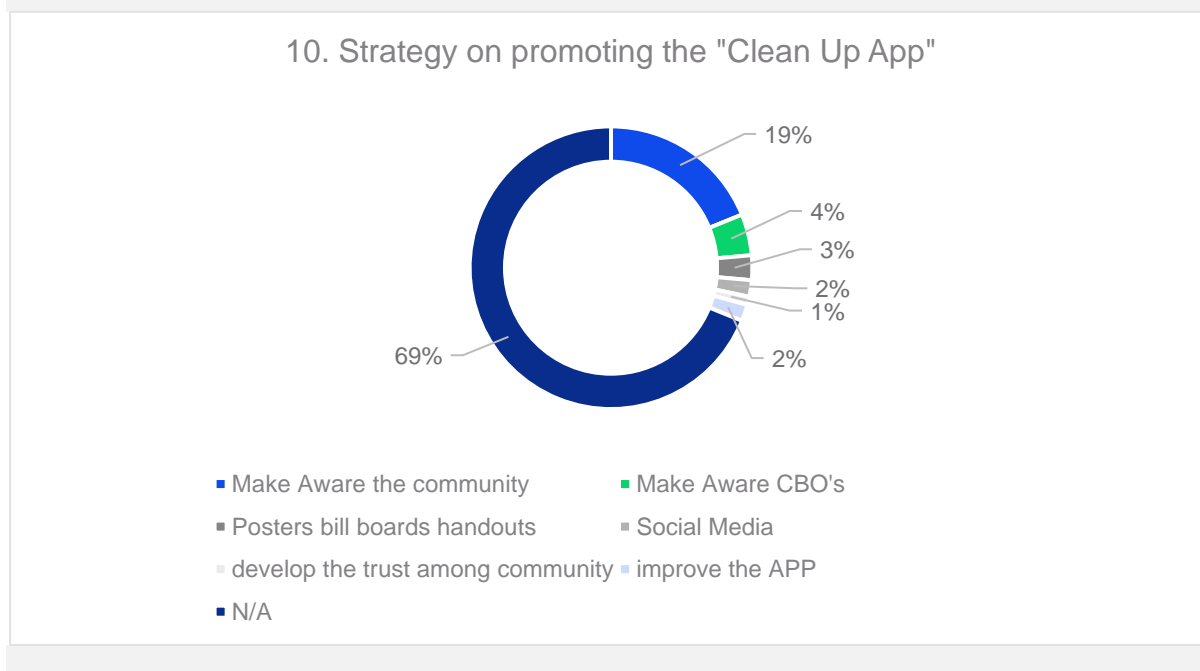
69% (n=73) of those surveyed had no ideas on a strategy to promote this App.

19% (n=20) stated that community awareness programmes can be used to promote the App.

12% (n=13) had ideas of promoting the App through strategies like awareness in CBOs, posters, billboards, handouts, social media, improving the trust among the community on the App, and improving the App.

This App needs to be promoted more within the community in addition to improving its functionality.

See Figure 10.



USE OF COMPOST AND LIQUID FERTILIZER PRODUCED BY KMC

Awareness of organic waste derived products from KMC

67% (n=71) of those surveyed are aware that there are waste-derived products produced at KMC.

33% (n=33) of those surveyed are not aware of any waste-derived products at KMC.

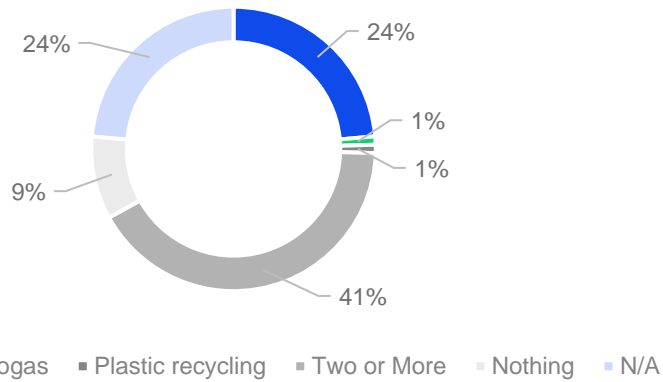
24% (n=26) are aware of compost production

2% (n=2) respondents are aware of biogas production and plastic recycling done at KMC

0% (n=0) of those surveyed were aware of the liquid fertilizer production at KMC.

See Figure 11.

11. Awareness on waste derived products of KMC



Perception of use of compost produced by KMC

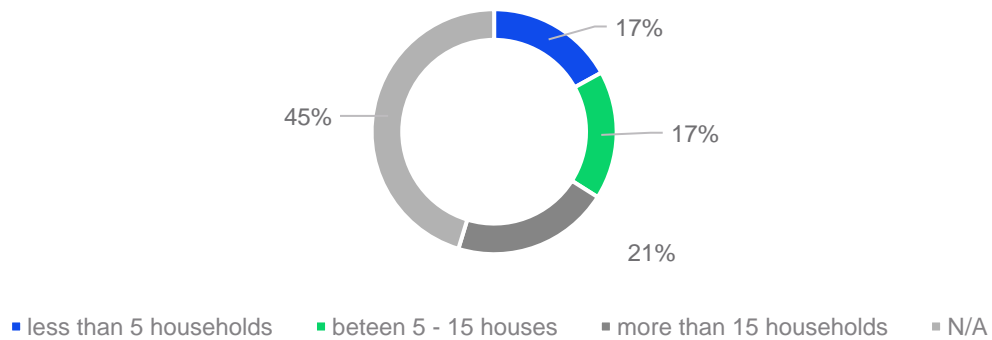
45% (n=48) of those surveyed had no idea if the community is using compost produced at KMC.

55% (n=58) responded that they know the community is using compost from KMC.

21% (n=20) stated that the compost is being used by more than 15 households they know.

See Figure 12.

12. Perception on use of compost by the community



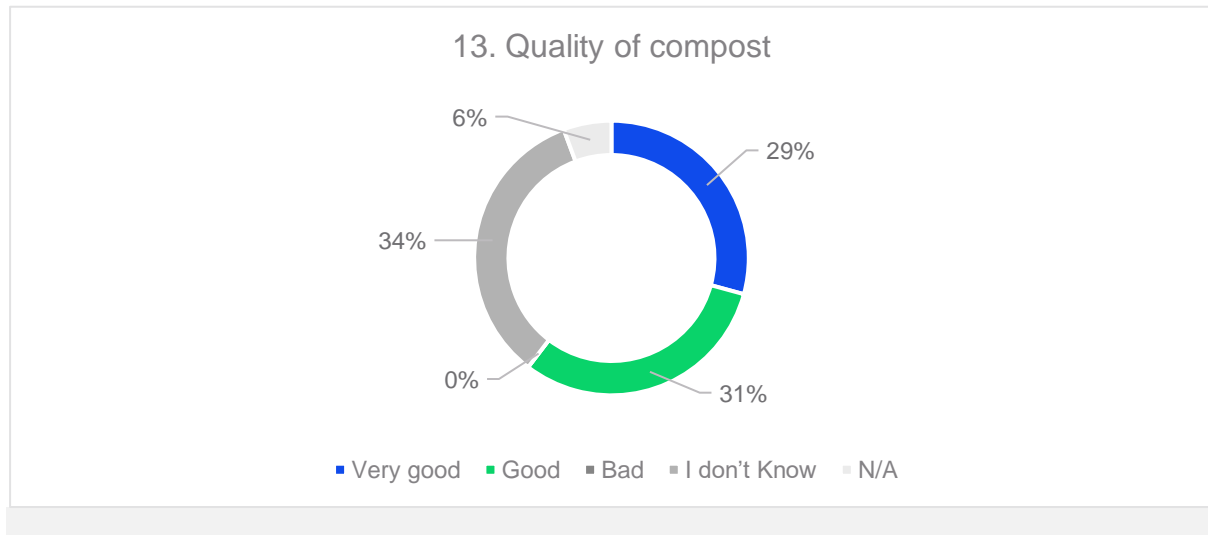
Perception of quality of compost

60% (n=64) of those surveyed stated that the quality of the compost is 'very good' (31%) or 'good' (29%).

40% (n=42) of those surveyed had no idea about the quality of the product which implies that the community require more information about product quality.

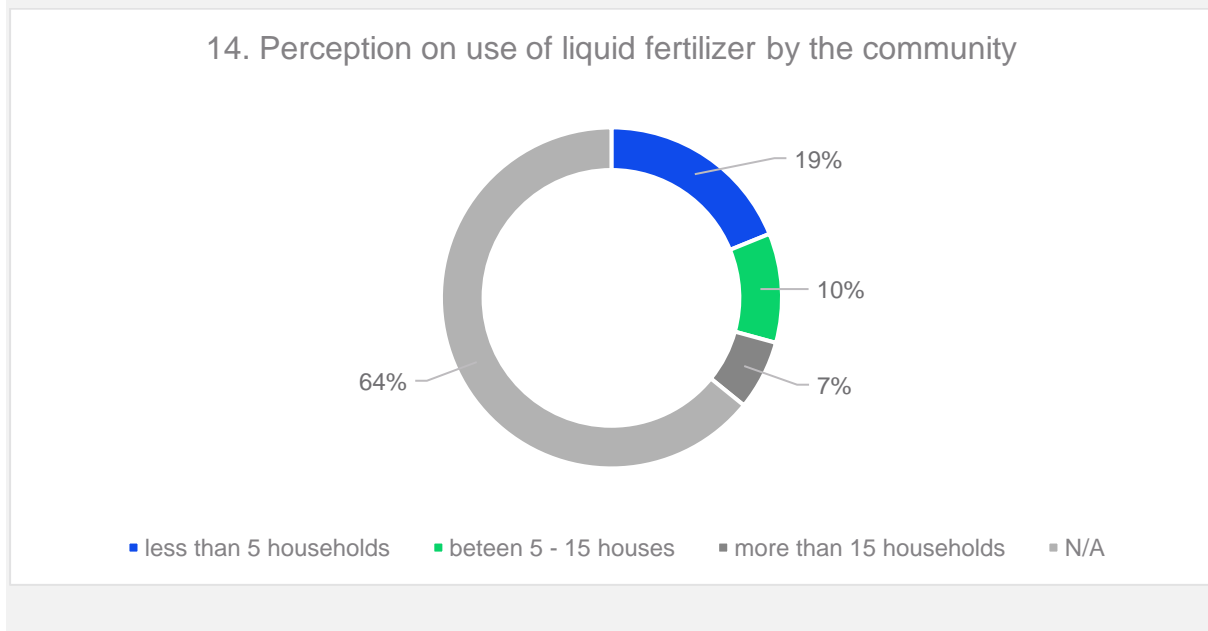
None surveyed say that the compost product is bad which is a good indication.

See Figure 13.

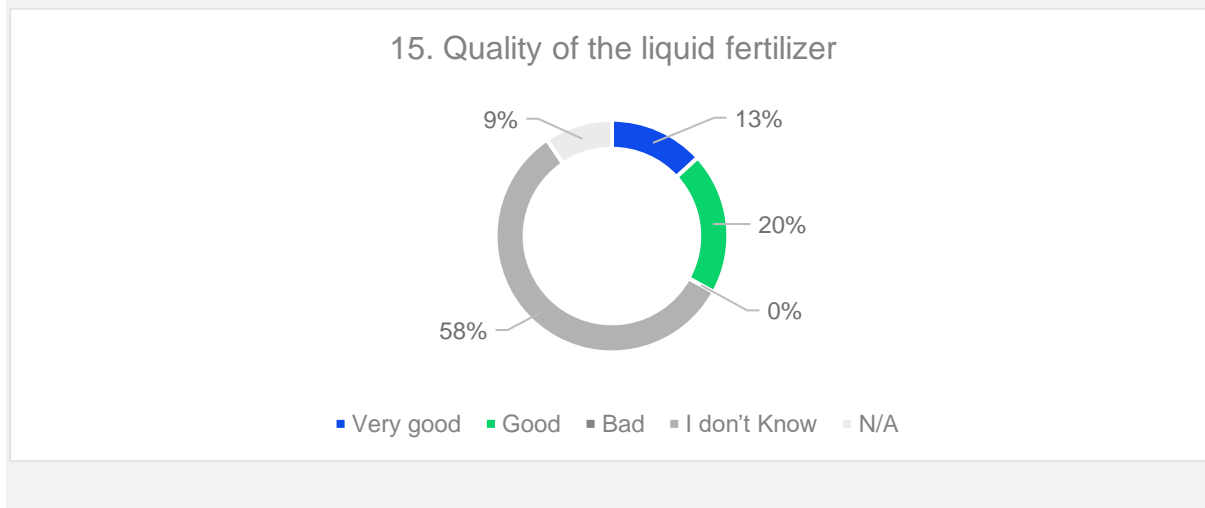


68 respondents (64%) had no idea whether the community is using the liquid fertilizer produced at KMC. 38 (36%) responded that they know the community is using the liquid fertilizer produced by KMC. 19% stated that this is being used by only less than 5 households they know.

See Figure 14.



(67%) (n= 72) had no idea on the quality of the liquid fertilizer
 (33%) (n=35) stated that the liquid fertilizer is very good (13%) or good (20%).
 None of those surveyed respondents stated that the liquid fertilizer is bad.
 See Figure 15.



83% (n=88) of those surveyed are using compost and liquid fertilizer for home gardening purposes.
 17% (n=18) of those surveyed stated that the compost and liquid fertilizer is being used for the commercial agriculture.
 See Figure 16.

