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COMMUNITY-CENTRIC APPROACHES TO KITCHEN WASTE MANAGEMENT IN URBAN AREAS FOR SUSTAINABLE PLANNING: A SYSTEMATIC REVIEW

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Abstract

Kitchen waste is a major contributor to municipal solid waste in urban areas, posing significant environmental and management challenges. This study systematically reviews 29 peer-reviewed articles to assess how community-centric approaches support sustainable kitchen waste management. A mixed-method Systematic Literature Review (SLR), guided by the ROSES protocol, applied deductive thematic coding across five themes: Community Participation and Social Capital (CPS), Governance, Policy and Institutional Frameworks (GPI), Knowledge, Attitudes, and Practices (KAP), Socio-Economic Dimensions (SED), and Cost-Benefit Analysis (CBA). Results show that community participation and trust networks enhance waste separation and recycling, but weak enforcement and fragmented governance undermine sustainability. Awareness of proper practices is widespread, yet an attitude-behavior gap persists, often constrained by convenience, infrastructure, and cultural habits. Socio-economic conditions strongly influence outcomes: low-income and high-density communities face barriers to affordability and space limitations. Cost-benefit perspectives reveal that households are more likely to engage when immediate rewards are provided or visible improvements complement long-term environmental benefits. Kitchen waste management is an integral component of urban planning policy towards sustainability, which requires community engagement, supportive policies, and equitable services to strengthen resilience and inclusivity.

Keywords: systematic literature review, deductive thematic analysis, community participation, kitchen waste management, urban sustainability

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INTRODUCTION

By 2050, global municipal solid waste production is projected to reach 3.4 billion tons (Kaza et al., 2018). Daily activities are said to be among the contributing factors to generating municipal solid waste, showcasing a significant challenge to waste reduction efforts (Mor and Ravindra, 2023). As urbanisation is rapidly occurring, municipal solid waste must be appropriately managed. Organic waste refers to biodegradable materials that decompose naturally (Kadir et al., 2016) and is a part of the municipal solid waste. Rapid urbanisation and consumption trends have intensified the generation of household organic waste. Organic waste now constitutes a substantial portion of municipal solid waste in many cities. Any mismanagement of this biodegradable waste shall contribute significantly to environmental degradation, including methane emissions, groundwater contamination, and overburdened landfill sites. As cities pursue more sustainable development pathways, household organic waste management has become a critical intervention.

Community-centric approaches to urban kitchen waste management involve innovative strategies promoting sustainability and community engagement. Waste banks in Indonesia offer economic incentives for recycling, though challenges in participation and financial sustainability persist (Al Zahra and Shohibuddin, 2025). Smart city initiatives integrate technological solutions with community-centred approaches, emphasising the need for digitisation, community engagement, and policy development in waste management (Szpilko et al., 2023). Decentralised valorisation of organic waste through composting and anaerobic digestion presents cost-effective alternatives to traditional waste management systems, as demonstrated in Santiago, Chile (de Kraker et al., 2019). In Thailand, community learning centres have successfully transformed waste management challenges into educational opportunities, promoting the co-production of public services and working towards zero waste goals (Amornsiriphong et al., 2024). These approaches highlight the importance of community involvement, technological innovation, and localised solutions in addressing urban kitchen waste management.

Studies on household organic waste management highlight the importance of source segregation and community participation in sustainable urban development. For instance, in Hanoi, Vietnam, a source separation program revealed low participation rates and contamination issues, emphasising the need for improved education and policy measures (Kawai and Hu'o'ng, 2017). While a study in Dschang, Cameroon, highlighted the complex socio-political factors influencing organic waste segregation, including the importance of multiple waste bins, monetary compensation, and informal sector involvement (Kongnso et al, 2024). These studies underscore the multifaceted nature of organic waste management in urban settings.

This study critically evaluates academic research on kitchen waste management techniques using a Systematic Literature Review (SLR) methodology. Through a social science lens, it tries to increase knowledge of community-centric kitchen waste management and find recurring trends. It looks at how social capital and community involvement affect group activities, how institutional frameworks, governance structures, and policy tools support or impede these initiatives, and how waste behaviours are influenced by practices, attitudes, and knowledge. It assesses the social and environmental effects of these programs and delves deeper into the socioeconomic aspects of local waste management techniques. The research attempts to produce insights that guide inclusive, egalitarian, and sustainable urban trash management solutions by including these viewpoints. The results are meant to guide future empirical research and scholarly discussions in urbanisation sustainability policy.

RESEARCH GAP

Studies have been carried out regarding solid waste from multiple management angles such as smart system which covers from the approaches, technologies and services (Sosunova and Porras, 2022), the use of kitchen waste as an organic fertilizer in sustainable agriculture (Kuligowski et al., 2023), to autonomous composting units as a sustainable solution for urban biowaste management leading to high quality compost product that is aligned with the EU environmental targets (Maragkaki et al., 2022) – to name a few. Although there is a spectrum of studies on municipal solid waste, there are insufficient scholars who have systematically reviewed the existing studies with a focus on community-centric kitchen waste management in urban areas. In doing so systematically, according to Robinson and Lowe (2015), traditional literature reviews face several issues, including being rarely comprehensive, highly susceptible to reviewer bias, and seldom taking into account differences in the quality of studies. This article attempts to contribute to the existing body of knowledge by developing a systematic literature review (SLR) on community-centric kitchen waste management in urban areas. A systematic literature review is a structured process used to identify, select, and critically evaluate existing studies to address a specific research question (Dewey and Drahota, 2016). The review procedure is preceded by the protocol. As a result, SLR is a systematic and open procedure in which the search is carried out across multiple databases, and others can duplicate the same procedure. It discusses a thorough search approach that helps researchers find the answer to a specific query (Xiao and Watson, 2019).

The review is guided by the central research question: How are community participation approaches applied in kitchen waste management within urban areas? This study aimed to identify the gap by reviewing existing related studies systematically to gain a depth understanding of community-centric

kitchen waste management in urban areas. Urban areas were selected due to several reasons. Because of their dense populations, high household consumption, changing consumption patterns (Abdul Halim et al., 2025; Parfitt et al., 2010), and the substantial amount of organic waste produced every day, urban regions offer an extremely important backdrop for research on community-centric kitchen waste management. A significant and ongoing stream of kitchen trash is produced by the concentration of residential buildings, food-related companies, and marketplaces, which presents difficult management issues. However, a variety of socioeconomic strata with differing degrees of awareness (Kolawole and Owoigbe, 2025) and involvement in environmental projects frequently make up metropolitan communities. This variability offers a useful chance to investigate the ways in which various social dynamics, local norms, and community structures affect waste management practices.

RESEARCH METHODOLOGY

Some studies have addressed household organic waste management in relation to sustainable urban development. Key contributions in the literature have examined a range of themes, including waste segregation at source Kawai and Hu'o'ng, 2017), composting technologies and practices (Manea et al., 2024, Zhou et al., 2022), community-based waste initiatives (Meidiana, 2022, Joleha et al., 2024), and supportive policy frameworks for circular economy models (Saqib and Sadef, 2025). However, despite the growing body of research, there is a need to identify gaps in community-centric kitchen waste management in urban areas within the scope of community participation, governance & policy, knowledge & attitudes, socio-economic factors, and social & environmental outcomes. These are the predetermined themes that form the framework of the research, which is deductive in approach.

This study, therefore, adopts a Systematic Literature Review (SLR) approach to analyse and synthesise existing research on household organic waste management. Mixed-method approach is applied. The study aims to identify the research gaps that persist across different thematic areas and contextual settings, thereby informing future research directions and contributing to more holistic and sustainable urban waste management solutions.

The Review Protocol - ROSES

In conducting this study, the Reporting Standards for Systematic Evidence or known as ROSES is used as a guide. ROSES is designed specifically for systematic reviews and maps for the conservation and environmental management field (Haddaway et al., 2018). It offers a detailed template and flow diagram that makes reporting clearer. ROSES accelerates the review process by

providing a detailed and structured framework that ensures transparency and completeness in reporting.

Based on the ROSES protocol, the authors started the SLR by formulating the research question for the review. This is followed by the explanation of the systematic searching strategy, which comprises three main sub-processes: identification, screening (inclusion and exclusion criteria), and eligibility. The next step is the quality appraisal of the selected articles. During this process, a strategy is applied to ensure the quality of the articles to be reviewed. Finally, the method of data abstraction, analysis, and validation is explained.

Formulation of Research Question

A research question provides direction for any scientific study. For this study, the PICo mnemonic is applied as the research question development tool. PICo is based on three main concepts (Table 1), which are: Population or Problem; Interest, and Context (Hosseini et al., 2024), which then guides the formulation of the main research question: How are community participation approaches applied in kitchen waste management within urban areas?

Table 1: Three main aspects of the study according to the PICo mnemonic.

Element	Definition	Application to Study
P	Population or Problem	Residential communities generating kitchen/food waste
I	Interest (phenomenon of interest)	Kitchen waste management practices involving community participation
Co	Context	Urban areas with a focus on sustainability/environmental management

Systematic Searching Strategies

The systematic searching strategies involved three stages: identification, screening, and eligibility. The explanations are outlined in the following sections accordingly.

i. Identification

For the study on community participation in kitchen waste management in urban areas, the identification stage is the process where any synonyms, related terms, and variations related to the main keywords are searched. This is to enrich the existing keywords for a more comprehensive search of articles to be reviewed. The keywords are developed accordingly to the research question (Okoli, 2015).

The identification process relied on keywords suggested by the online thesaurus, and ChatGPT. Using the enriched keywords, a full search string/query was developed accordingly to the databases. However, Table 2 shows examples of search strings for Science Direct and Google Scholar only.

Table 2: The search strings.

Database	Search string/ search advanced query
ScienceDirect	"residential kitchen waste" OR "household food waste") AND ("community participation" OR "community involvement" OR "citizen engagement" OR "public participation") AND ("organic waste recycling" OR "waste disposal" OR "garbage management")
Google Scholar	("residential kitchen waste" OR "household food waste" OR "domestic food waste" OR "kitchen organic waste" OR "residential organic waste") AND ("community participation" OR "community involvement" OR "citizen engagement" OR "public participation" OR "community-based approach*" OR "resident involvement" OR "community action") AND ("waste management" OR "waste treatment" OR "organic waste recycling" OR "waste disposal" OR "garbage management") AND ("urban sustainability" OR "sustainable urban development" OR "urban environmental sustainability" OR "sustainable city" OR "urban ecology" OR "sustainable urban planning")

The full search string is based on Boolean operators (AND, OR, NOT), truncation, wildcards (*), phrase searching, and field code functions, on several databases, which are Scopus, Web of Science, and ScienceDirect. These comprehensive (thousands of publishers) databases have several advantages, such as advanced search functions, multidisciplinary in nature, including environment-related, and good quality control of their articles (Martin-Martin et al., 2018). The searching process resulted in a total of 3273 articles identified.

ii. Screening

Several criteria are set to screen the initial number of articles obtained, which were: full articles published between 2015 to 2025 (books, reports, proceedings, and review articles are not included), within the field of social sciences, written in English (to avoid confusion in reading), and open access. The sorting functions that are available in the databases help the process. The literature search was limited to the past ten years to ensure the review captures the most up-to-date findings, reflecting recent advancements, evolving methodologies, and current trends, while avoiding reliance on outdated information. However, looking at the overwhelming quantity of articles obtained, the publication year is further reduced to the recent five years (2020 to 2025) except for Google Scholar, which is two years* (2024 to 2025). Google Scholar does not have the field selection by field. Thus, screening by Social Science is not possible. Articles have to be screened manually, hence a longer time is required, which leads to the decision of keeping to the recent two years. Table 3 shows the final number of articles after the exclusion due to the screening process.

Table 3: Comparison of the number of articles obtained before and after the screening process.

Database	Initial Number of Articles	Number of Articles Screened - 2015-2025	Number of Articles Screened - 2023-2025
Scopus	8	1	0
Web of Science	776	12	6
ScienceDirect	1529	76	7
Google Scholar*	960	864	43

Note: *2024-2025

For Google Scholar, the initial search, with no time restrictions, yielded 960 records. This pool was sequentially refined to 864 records using a 10-year publication window (2015-2025) and then to 305 records by focusing on the most recent two years (2024-2025). After manual screening of titles and abstracts, 44 records were selected for full-text retrieval. Following the removal of 1 duplicate, 43 full-text articles were assessed for eligibility. Of these, 16 met the inclusion criteria and were selected for the final review. The only article obtained from Scopus is found redundant in Web of Science and Google Scholar. The one in Web of Science is kept. The process had excluded 3217 articles following the unmatched criteria, leaving 43 articles for the eligibility stage.

iii. Eligibility

In this third process, retrieved articles are manually monitored by looking at the titles and abstracts to ensure they match the inclusion criteria. The finalised articles must focus on **community participation in kitchen waste management in urban areas**. Therefore, 27 articles were excluded during the title and abstract screening. In total, there were only 29 selected articles left, and they are called Primary Studies (PSs) (Abouzahra et al., 2020).

QUALITY APPRAISAL

The six quality assessments (QAs) developed by Abouzahra et al. (2020) are adopted for this study, and they are as follows:

- QA1: Is the purpose of the study clearly stated?
- QA2: Is the interest and the usefulness of the work clearly presented?
- QA3: Is the study methodology clearly established?
- QA4: Are the concepts of the approach clearly defined?
- QA5: Is the work compared and measured with other similar work?
- QA6: Are the limitations of the work clearly mentioned?

The use of AI is applied to examine these 29 articles based on the six defined QAs. To evaluate each QA, the scoring procedure used is as follows: Yes

(Y) = 1; Partially (P) = 0.5; or No (N) = 0. An article will be considered of sufficient quality and included in the systematic literature review (SLR) if its total score exceeds 3.0 (50%). The result is shown in the following Table 5.

Table 5: Quality assessment of primary studies (PSs)

ID	QA1	QA2	QA3	QA4	QA5	QA6	Total Score	% by max PS
PS1	1	1	1	1	1	0	5	83.3
PS2	1	1	1	1	1	1	6	100
PS3	1	1	1	1	1	1	6	100
PS4	1	1	1	1	1	1	6	100
PS5	1	1	1	1	0	0	4	66.7
PS6	1	1	1	1	1	1	6	100
PS7	1	1	1	1	1	0	5	83.3
PS8	1	1	1	1	1	0	5	83.3
PS9	1	1	1	1	1	1	6	100
PS10	1	1	1	1	1	1	6	100
PS11	1	1	1	1	1	0	5	83.3
PS12	1	1	1	1	0	0	4	66.7
PS13	1	1	1	1	1	0.5	5.5	91.7
PS14	1	1	1	1	1	0.5	5.5	91.7
PS15	1	1	1	1	0.5	0	4.5	75
PS16	1	1	1	1	1	1	6	100
PS17	1	1	1	1	1	1	6	100
PS18	1	1	1	1	1	1	6	100
PS19	1	1	1	1	1	1	6	100
PS20	1	1	1	1	1	0.5	5.5	91.7
PS21	1	1	1	1	1	0.5	5.5	91.7
PS22	1	1	1	1	1	1	6	100
PS23	1	1	1	1	1	1	6	100
PS24	1	1	1	1	1	1	6	100
PS25	1	1	1	1	1	1	6	100
PS26	1	1	1	1	1	1	6	100
PS27	1	1	1	1	1	1	6	100
PS28	1	1	1	1	1	1	6	100
PS29	1	1	1	1	1	1	6	100

The overall process of the systematic searching strategies (identification, screening, and eligibility) as well as the quality appraisal is shown in a flow chart in the following Figure 1.

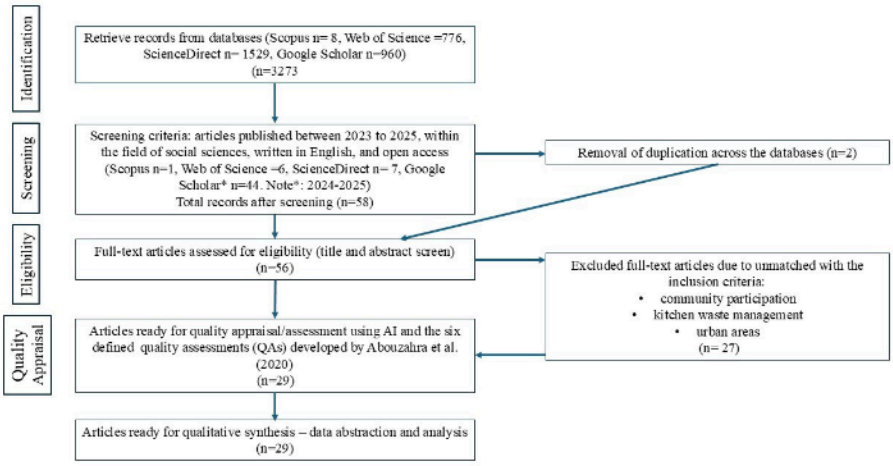

Figure 1: Flow chart of the systematic searching strategies and quality appraisal *(adapted from Sulaiman et al., 2023)*

DATA ABSTRACTION AND ANALYSIS

The qualitative method was used in this study, and the chosen articles were carefully reviewed, especially in the abstract, results, and discussion parts. The data abstraction process was directed by the study question, and the results are tabulated. This is followed by thematic analysis, a technique for finding, examining, and summarizing patterns (themes) in data. Thematic analysis is claimed as effective in summarising large datasets and praised for its flexibility, which allows adaptation to various research questions, epistemological positions, and data types (Braun and Clarke, 2006).

A deductive approach is applied for this research, where the themes are predetermined to address the scope of the research and align with the social science field. The sub-themes are then developed, which match the criteria for the themes. Thus, five themes and 25 sub-themes guided the analysis of the selected articles.

There are six steps involved in thematic analysis, and they are as follows: i) getting to know the data; ii) creating preliminary codes; iii) looking for themes; iv) reviewing themes; v) defining and labelling themes; and vi) creating the report, according to Braun and Clarke (2006). Writing, analysis, and reflection are all entwined during this process, directing the creation and improvement of themes to create a compelling narrative from the data.

Steps i and ii are covered in the data abstraction stage. Steps iii through v are where the authors developed the themes and sub-themes. The accuracy of themes is reviewed for usefulness and accurate representations of the data. This is followed by the report writing (step vi).

RESULTS

Themes and Sub-Themes

The themes, sub-themes, and their brief descriptions are elaborated before discussing the findings (Table 6). The nature of methods is also stated: mixed–method (MM), quantitative (QN), and qualitative (QL).

Community Participation and Social Capital

This theme reflects the community members' active engagement in waste management initiatives. It comprises the strength of social networks and trust (ST), collective action (CA), and the local leadership's role in driving participation. Volunteerism (VO) plays an important role, with individuals contributing time and effort to support program activities. Community ownership (CO) ensures that the community feels responsible for the success of the initiatives, and this will foster long-term commitment. These elements build strong social capital that underpins sustainable waste practices.

Governance, Policy, and Institutional Framework

Governance and policy determine how waste management systems are structured and implemented. Policy instruments (PI) provide the regulatory and strategic framework for action, while decentralised governance (DG) allows local adaptation and responsiveness. Stakeholder collaboration (SC) ensures multi-sectoral input, transparency (TR) strengthens accountability, and institutional capacity (IC) supports effective delivery. Together, these sub-themes create an enabling environment for waste initiatives to succeed.

Knowledge, Attitudes, and Practices (KAP) in Waste Management

This theme addresses how awareness and values influence waste behaviours. Environmental literacy (EL) and waste attitudes (WA) shape public understanding, while cultural beliefs (CB) and intergenerational learning (IL) embed practices in social norms. Behavioral change (BC) results from aligning knowledge and attitudes with sustainable waste habits.

Socio-Economic Dimensions of Community Waste Practices

Socio-economic conditions can drive or hinder participation in waste management. Economic incentives (EI) encourage involvement, while gender roles (GR) influence household waste practices. Participation barriers (PB) and urban poverty (UP) can limit engagement, and cost-benefit analysis (CBA) informs feasibility and policy design.

Table 6: Themes and sub-themes

Country	PS	authors	Main study design	Community Participation					Governance & Policy					Knowledge & Attitudes					Socio-Economic Factors					Social & Environmental Outcomes				
			(QN/QL/MM)	ST	CA	LL	VO	CO	PI	DG	SC	TR	IC	EL	WA	CB	IL	BC	EI	GR	PB	UP	CBA	LE	PH	CI	SI	SD
Malaysia	PS1	Subria et al., 2025 (GS)	MM	1	1	1		1	1	1	1		1	1	1				1						1		1	1	
Thailand	PS2	Srijuntrapun et al., 2025 (GS)	QN						1	1	1		1	1	1	1	1	1	1	1	1	1	1	1			1	1
China	PS3	He et al., 2025 (GS)	MM	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1		1	1		1	1	1
Iran	PS4	Khosravani et al. 2025 (GS)	MM	1	1	1		1	1		1	1	1	1	1			1						1	1	1	1	
Kuwait	PS5	Aljuwaiei & Al-Saber, 2025 (GS)	QN	1	1									1	1	1	1	1			1			1		1	1	
Zimbabwe	PS6	Musasa et al., 2025 (GS)	MM		1	1		1	1	1	1	1	1	1	1		1	1	1	1	1	1		1	1	1	1	1
Indonesia	PS7	Nurfauziah et al., 2025 (GS)	QN						1		1			1	1	1		1			1	1		1	1	1	1	1
Czech Republic	PS8	Veselá et al., 2025 (GS)	MM		1	1			1	1	1	1	1	1	1		1	1	1	1	1		1	1		1	1	1
Japan	PS9	Morais & Ishida, 2025 (GS)	QN	1	1	1								1	1	1		1	1	1	1		1	1	1	1	1	
Indonesia	PS10	Lybawa et al., 2025 (GS)	QN											1	1		1	1		1	1	1		1			1	
Ukraine	PS11	Lyeonov et al., 2025 (GS)	MM						1			1	1	1	1	1	1	1	1	1	1		1					
Indonesia	PS12	Putra et al., 2024 (GS)	QL	1	1	1	1	1		1	1		1	1	1			1	1	1	1		1	1	1	1	1	
Indonesia	PS13	Ummamah et al., 2024 (GS)	MM		1	1		1	1	1	1		1	1	1	1	1	1	1	1	1		1	1		1	1	
Poland	PS14	Rogowska et al., 2024 (GS)	QN	1	1	1	1	1	1	1			1	1	1		1	1	1	1	1		1	1	1	1	1	
Indonesia	PS15	Winarsih et al., 2024 (GS)	QN	1	1	1		1	1	1	1		1	1	1		1	1	1		1		1	1		1	1	
Greece	PS16	Temmerman & Veeckman, 2024 (GS)	MM	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1		1	1		1	1	1
UK	PS17	Watona et al., 2020 (SD)	QL	1	1	1		1	1	1	1		1			1		1		1				1			1	1
Australia	PS18	Jobson et al., 2025 (SD)	QN	1		1			1					1	1			1	1		1			1			1	1
USA	PS19	Wharton et al., 2021 (SD)	MM	1		1			1	1	1			1	1			1	1		1			1	1		1	
Ethiopia	PS20	Hatab et al., 2022 (SD)	QN	1	1	1		1	1	1	1		1	1	1	1		1	1		1	1		1	1		1	1
Australia	PS21	Landells et al., 2024 (SD)	MM	1	1	1		1	1	1	1	1	1	1	1			1	1		1			1		1	1	
Netherlands	PS22	Werkman et al., 2025 (SD)	QN	1					1					1	1	1		1	1		1			1			1	
China	PS23	Wang & Yu, 2025 (SD)	QN						1	1	1		1	1		1		1	1		1	1		1	1		1	1
USA	PS24	Alattar et al 2019 (WS)	QN	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1		1		1	1	1	1	1	
USA	PS25	Campbell et al 2025 (WS)	MM	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1		1			1	1	1	1	1
Ecuador	PS26	Davis et al 2016 (WS)	QN		1	1		1	1	1		1	1	1		1			1			1	1	1	1	1	1	1
Canada	PS27	Everitt et al 2024 (WS)	MM		1	1		1	1	1	1	1	1	1	1	1		1			1			1		1	1	1
Finland	PS28	Lehtokunnas et al 2020 (WS)	QL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1			1	1	1	1	1
Netherlands	PS29	Trevenen-Jones et al 2020 (WS)	QL	1	1	1		1	1	1	1	1	1	1	1	1		1	1		1			1	1	1	1	1

Social and Environmental Outcomes of Community Waste Initiatives

Waste initiatives generate tangible community and environmental benefits. Local environmental improvements (LE) and public health benefits (PH) enhance quality of life, while community identity (CI) strengthens cohesion. Sustainability integration (SI) embeds waste practices into broader environmental strategies, and SDG contribution (SD) aligns them with global development goals.

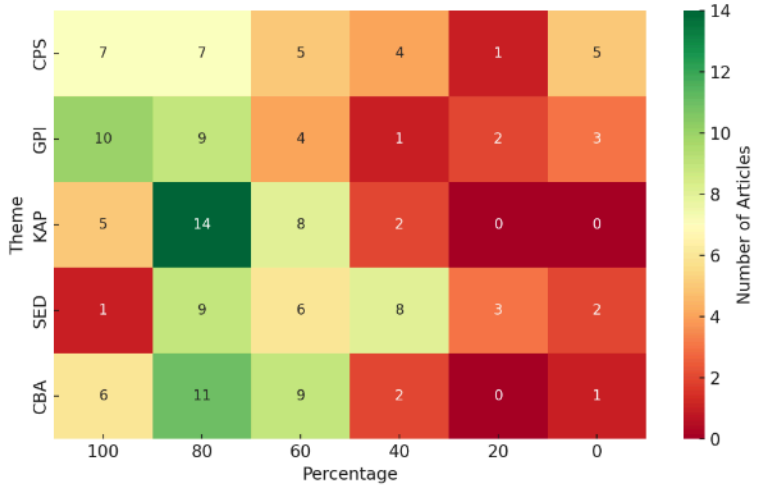

Figure 2: Heatmap of thematic distribution across percentage categories.

Figure 2 shows how the studies are distributed across themes and percentage categories. The Knowledge, Attitudes, and Practices (KAP) theme has the highest frequency of any theme or category, with 14 studies at the 80% level, as shown in the heatmap. This focus indicates that when looking at higher levels of engagement or outcomes, a sizable amount of the literature currently in publication places an emphasis on KAP. The themes of Governance, Policy, and Institutional Frameworks (GPI) and Cost-Benefit Analysis (CBA) are also well-represented at the 80% level (9 and 11 studies, respectively), underscoring the significance of institutional frameworks and economic viewpoints in the waste management discussion. Conversely, lower percentage categories—such as 20% and 0%—are hardly represented, especially in KAP, where no studies are documented. With a moderate but constant emphasis on mid-range values, the Socio-Economic Dimensions (SED) theme exhibits a fairly balanced distribution across categories, peaking at the 40% level (8 studies).

The radar chart (Figure 3) provides a comparative analysis of thematic coverage. The 80% polygon forms the most dominant profile across all themes,

underscoring its consistent prominence in the literature. KAP show has the greatest coverage, which is consistent with the heatmap's findings, while SED peaks at 40%, indicating its unique distributional focus. Furthermore, GPI and CBA continue to hold significant representation at 100% and 80%, respectively, indicating the importance of governance frameworks and cost-benefit analysis in forming successful interventions. On the other hand, the 20% and 0% polygons stay contracted for every theme, suggesting that there is little scholarly interest in situations with little involvement or influence.

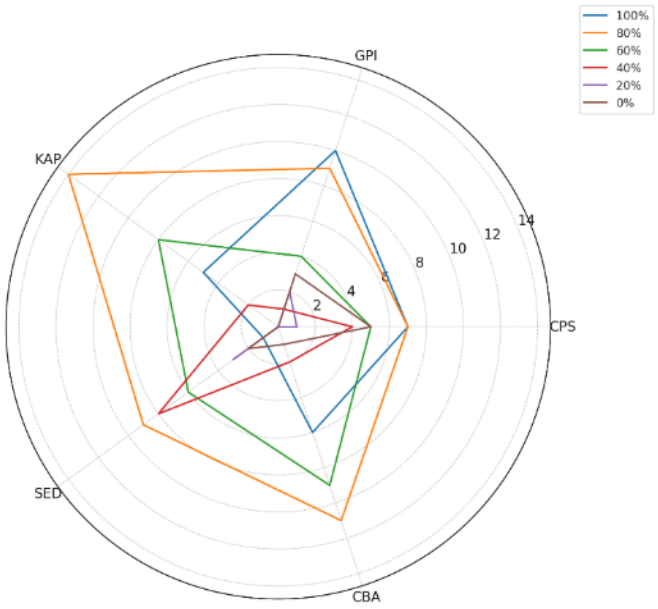

Figure 3: Radar chart of comparative thematic distribution.

The insights from Figures 2 and 3 reveal that research on community-centric approaches to kitchen waste management in urban areas predominantly emphasizes higher levels of community engagement, institutional support, and economic viability. KAP emerges as the central axis of scholarly attention, reflecting its importance in driving behavioral and attitudinal changes necessary for sustainable waste practices in urban households. The substantial coverage of GPI and CBA at higher percentage categories further highlights the pivotal role of governance frameworks and cost–benefit considerations in ensuring the long-term viability and scalability of such initiatives. In contrast, the persistent underrepresentation of studies in the lower categories (20% and 0%) signals a notable gap in understanding the barriers to participation and the challenges faced in contexts of limited community involvement. Collectively, these findings

suggest that academic discourse is strongly oriented towards models of high engagement, positioning KAP, governance, and economic evaluation as cornerstones in advancing community-driven kitchen waste management strategies in urban areas.

Twenty-nine articles are reviewed. Five themes were developed based on the thematic analysis, namely: community participation; governance and policy; knowledge and attitudes; socio-economic factors; and social & environmental outcomes. Five sub-themes for each theme were developed, totalling 25 sub-themes.

The selected articles showcased research from developing (Malaysia, Thailand, China, Iran, Kuwait, Zimbabwe, Indonesia, Ukraine, Ethiopia, Ecuador) and developed countries (Czech Republic, Japan, Poland, Greece, United Kingdom, Australia, United States, Netherlands, Canada, Finland). The research pool for the developing countries reflects challenges in waste management due to rapid urbanization, population growth, and weaker infrastructure systems. In Southeast Asia, research often emphasizes community participation, composting, and informal waste systems as responses to limited municipal capacity. China and Iran contribute studies with strong governance and policy perspectives, reflecting their top-down institutional structures, and also a growing interest in household-level engagement. The global south countries (Zimbabwe, Ethiopia, and Ecuador indicate waste issues that intersect with poverty, informal economies, and limited resources. Research within this region often highlights the role of social capital and local initiatives. Although wealthy, Kuwait still faces the typical challenges of developing systems, particularly in waste minimization and public engagement.

In the developed countries context, research tends to emphasize policy frameworks, technological innovations, and cost-benefit assessment rather than basic infrastructure. Japan, the Netherlands, and Finland highlight advances in recycling systems and urban planning integration, where community-centric approaches complement already well-structured waste systems. The UK, USA, Canada, and Australia focus on the attitude-behavior gap and the role of policy incentives to improve household participation in segregation and recycling. The Eastern European countries contribute perspectives on transitioning waste systems, where EU regulations influence national waste governance, but local communities still face challenges in adoption.

DISCUSSION

The thematic analysis developed five themes and 25 sub-themes. Further discussion of findings stemming from the developed themes is presented in the following Table 7. The focus is on the impact, strength, weakness, and cause of each theme.

Table 7: Comparative thematic table

Theme	Impact	Strength	Weakness	Cause
A. Community Participation & Social Capital (CPS)	Builds trust, ownership, and collective identity; boosts household waste sorting & reduction	Local leadership (e.g., PKK groups, councils), citizen science, and participatory workshops strengthen social capital	Low sustained participation due to time limits, weak volunteerism, and trust deficits	Insufficient awareness, poor reinforcement of collective norms, and limited infrastructure
B. Governance, Policy & Institutional Frameworks (GPI)	Policies (EU Bioeconomy Strategy, Jakstrada Jakarta, SDG 12.3) enable scaling up of community initiatives	Multi-level governance (councils, NGOs, city compost programs) ensures integration of top-down & bottom-up approaches	Implementation gaps: weak enforcement, inadequate facilities (bins, compost sites), poor transparency	Resource constraints, fragmented governance, misalignment between policy & community needs
C. Knowledge, Attitudes & Practices (KAP)	Education & awareness campaigns (nudging, school programs, intergenerational learning) reduce household food waste	High positive attitudes toward waste prevention (e.g., 98% respondents support sorting)	Persistent attitude–behavior gap; knowledge does not always translate into practice	Low environmental literacy, cultural habits undervaluing food, and weak intergenerational transfer
D. Socio-Economic Dimensions (SED)	Generates savings, livelihood opportunities (biofertilizer, compost markets), and women-led empowerment	Economic incentives (cost savings, subsidies) and gender-targeted programs improve participation	Barriers: space limits, financial costs, infrastructure weakness, and poverty are overlooked	Inequalities in income, education, housing, lack of targeted support for the urban poor
E. Cost–Benefit Analysis (CBA)	Communities weigh environmental, financial, and moral benefits against time, odor, and space costs	Visible co-benefits: health improvements, income, reduced pollution, moral satisfaction	Perceived costs (time, inconvenience, disruption) outweigh the long-term benefits	Lack of incentives, poor subsidy schemes, and weak demonstration of household-level benefits

Referring to Table 7, the findings from the reviewed and assessed articles across the three databases consistently underscore the critical role of community participation (CPS) as the foundation of sustainable kitchen waste management. When communities are actively engaged through grassroots initiatives, participatory workshops, and citizen science, trust and social capital are strengthened, leading to more consistent waste sorting and composting practices. However, weak participation due to low awareness, time constraints, and limited infrastructure remains a persistent challenge.

At the institutional level, governance, policy, and institutional frameworks (GPI) provide the enabling structure to scale these community efforts. Initiatives such as Jakarta's Jakstrada policy, the EU circular Economy Strategy, and municipal composting programs demonstrate that supportive

policies can anchor local initiatives into broader sustainability agendas. Yet, implementation gaps and fragmented governance often reduce policy effectiveness, highlighting the need for stronger alignment between institutional capacity and community needs.

The dimension of knowledge, attitudes, and practices (KAP) shows that educational interventions, nudging, and social marketing approaches are effective in shaping household behavior. While positive attitudes towards waste prevention are widely reported, the attitude-behavior gap continues to limit progress, suggesting that awareness campaigns must be paired with practical tools and supportive environments to ensure behavior change.

Socio-economic considerations (SED) reveal that demographic and household characteristics, such as income, education, housing type, and gender roles, shape participation levels in waste management. Economic incentives, subsidies, and women-led initiatives can drive positive outcomes, yet barriers such as poverty, limited space, and weak infrastructure remain significant obstacles. Addressing these inequalities through targeted support is essential for inclusive waste management strategies.

Finally, a cost-benefit perspective (CBA) highlights the tension between perceived short-term costs (time, space, odour, inconvenience) and long-term benefits (environmental protection, health improvements, and economic empowerment). Programs that make benefits visible and immediate at the household level, through subsidies or community incentives, are more likely to sustain participation.

These findings affirm that community-centric kitchen waste management requires a holistic approach – balancing grassroots engagement with supportive governance, bridging knowledge gaps, addressing socio-economic inequalities, and ensuring that cost-benefit outcomes are favorable to households. This integrated perspective positions communities not only as waste generators but also as central actors in co-creating sustainable urban futures.

The synthesis of themes demonstrates that effective kitchen waste management in urban areas relies on fostering strong community participation, supported by enabling governance and policy frameworks. While awareness and positive attitudes exist, translating these into sustained practices requires addressing socio-economic disparities and visible cost–benefit gains for households. A community-centric approach that balances top-down policy support with grassroots ownership, reinforced by education and incentives, provides the most sustainable pathway for reducing kitchen waste and advancing circular economy goals in urban contexts.

RECOMMENDATION

The recommendations are outlined by the themes and the gaps identified based on the findings (Table 6). Under the community participation and social capital (CPS), most existing studies (Subria et al., 2025; Campbell et al., 2025) focus on traditional participation (workshops, waste banks, citizen science). Few examine how technology-enabled participation can strengthen social capital and intergenerational knowledge transfer in an urban context. Thus, for future research direction, innovative participatory models that integrate digital platforms and social media can be explored to sustain long-term community involvement. As for the governance, policy, and institutional frameworks (GPI), studies (Ummamah et al., 2024; Everitt, 2024) highlighted strong policies but weak implementation. There is limited research on how spatial planning regulations (zoning, land use, infrastructure provision) can operationalize waste management policies at neighborhood levels. Hence, future research can be directed to assess the effectiveness of decentralized waste governance systems and their integration into urban master plans. Such research should evaluate cross-sector collaborations (local authorities, private sector, NGOs, and communities). For the knowledge, attitudes, and practices (KAP) theme, many studies (Rogowska et al., 2024; Jobson et al., 2025) confirm positive attitudes but weak actual practice. Few connect these behavioral patterns to urban design and accessibility of facilities. Thus, behavioral interventions within planned urban spaces such as eco-districts and green neighborhoods can be tested to assess how planning design impacts waste-sorting compliance. Examination of the attitude-behaviour gap in greater depth with a focus on how physical urban environments influence household practices. As for the socio-economic dimensions (SED), some studies (Winarsih et al., 2024; Wang & Yu, 2025) recognize the socio-economic constraints but lack of comparative analysis across high-rise apartments, informal settlements, and low-income housing. Comparative studies across different income groups and housing typologies to understand barriers in dense urban environments can be conducted in trying to design equitable access to waste facilities for marginalised groups. In terms of cost-benefit analysis (CBA), the number of studies that measure long-term community-level savings versus short-term household costs is quite few. It is recommended that the true economic and environmental costs of household-level participation, including hidden costs and co-benefits can be evaluated. Such research can apply life-cycle assessments and spatial economic models to integrate the cost-benefit analyses into urban planning decisions.

CONCLUSION

This study has been able to explore the application of community participation approaches in kitchen waste management within urban areas, framed within the

identified themes and sub-themes. It demonstrates that sustainable kitchen waste management in urban areas must be community-centric and firmly integrated into urban physical planning. Effective waste management is not only a matter of behavioral change but also of how cities are spatially organized and the services. Urban planners, policymakers, and local authorities must work together to ensure that physical infrastructure, such as designated sorting facilities, accessible composting spaces, and efficient collection points, aligns with community needs. Community participation and social capital (CPS) can only thrive when supported by physical spaces that encourage collective action. Governance, policy, and institutional frameworks (GPI) require reinforcement through spatial planning that ensures adequate facilities and equitable service delivery. Knowledge, attitudes, and practices (KAP) in waste management depend on visible, well-designed urban systems that make sustainable behavior convenient and practical. Similarly, socio-economic dimensions (SED) demand that planning addresses inequalities in housing, land availability, and service access. Finally, cost-benefit outcomes (CBA) are shaped by how well urban systems reduce inconvenience while maximizing visible benefits for households.

Thus, the future of community-centric kitchen waste management lies in co-created urban systems where spatial planning, governance, and citizen engagement converge. Urban planners must design enabling environments; policymakers must embed waste strategies within broader sustainability frameworks; and local authorities must provide the infrastructure, incentives, and enforcement needed for long-term success. The integrated approach ensures that waste management is not only environmentally sustainable but also socially inclusive, spatially just, and resilient for future urban generations.

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