



Sedekah Sampah (Waste Donation) As a Social Innovation Model Based on Environmental Education: A Systematic Literature Review

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Abstract: This study aims to analyze the intellectual development and conceptual structure of waste donation as a social innovation model grounded in environmental education within the circular economy framework. The key concepts include waste donation, ecological philanthropy, Prosocial Behavior Theory, circular economy, and social capital. Employing a Systematic Literature Review (SLR) approach based on PRISMA 2020 guidelines and bibliometric analysis using VOS viewer, this research examines 84 Scopus-indexed articles published between 2006 and 2026. The scope of analysis encompasses waste redistribution practices across environmental management, public health, and community governance domains. The findings reveal three dominant thematic clusters: environmental performance and waste reduction, social empowerment and community solidarity, and institutional governance. However, prosocial and religious dimensions remain underrepresented in mainstream sustainability discourse. Major challenges include theoretical fragmentation, limited longitudinal studies, and insufficient economic evaluation. The study recommends integrating Prosocial Behavior Theory into circular economy analysis to strengthen the moral and social foundations of sustainable waste governance. This research contributes to circular economy theory and environmental sociology by reconceptualizing waste donation as ecological philanthropy, bridging environmental sustainability with moral solidarity and social capital formation.

Keywords: circular economy; ecological philanthropy; environmental education; prosocial behavior; social innovation.

Introduction

The contemporary waste management crisis has metamorphosed into a profoundly multidimensional predicament that transcends the technicalities of collection, transportation, and disposal, entering the dense terrain of moral philosophy, socio-economic inequality, and cultural consciousness instead (Govindan et al., 2021). Across emerging economies, particularly in Indonesia, the exponential growth of plastic, paper, and metal consumption over the past two decades has intensified structural pressures on waste governance systems that remain infrastructurally constrained and unevenly participatory. Recent empirical investigations confirm that deficiencies in integrated waste infrastructure and limited civic engagement continue to undermine national sustainability targets, even where regulatory frameworks have formally embraced circular economy principles (Mackler et al., 2025). While policy discourses increasingly invoke reduction, reuse, and recycling as normative imperatives, prevailing interventions often remain anchored in material efficiency logics and market-based incentives rather than in the ethical motivations that animate collective environmental conduct

(Pablo-Torres et al., 2022). The technocratic bias embedded in much of the circular economy literature thus risks neglecting the moral grammar of everyday environmental practice.

It is within this conceptual interstice that waste donation emerges not merely as an operational variant of recycling, but as a culturally textured and ethically resonant phenomenon. Waste donation refers to the voluntary transfer of economically valuable waste materials, such as plastic, paper, or metal, to community groups, waste banks, charitable foundations, or social enterprises for redistribution and reuse (Charles, 2021). Unlike conventional recycling, which is predominantly motivated by economic return or regulatory compliance, waste donation embodies an explicit prosocial orientation. It is animated by the intention to assist others through the redistribution of residual material value, transforming discarded objects into instruments of solidarity (Johansson, 2021). Although earlier studies began to gesture toward the philanthropic potential of surplus redistribution, especially in food systems, the explicit framing of waste donation as a prosocial ecological act remains comparatively underdeveloped in contemporary sustainability scholarship (Montoli et al., 2023).

In the Indonesian context, waste donation is often intertwined with religious ethics, particularly notions of almsgiving and moral responsibility toward creation. Such practices expand the semantic horizon of donation beyond monetary charity, embedding environmental stewardship within a theological and communal narrative. Emerging empirical evidence indicates that environmental behavior in religious societies is frequently mediated by social norms, moral identity, and altruistic intention rather than by instrumental cost benefit calculations alone (Mardani, 2025). These findings resonate with broader theoretical developments in Prosocial Behavior Theory, which conceptualize altruistic action as behavior intended to benefit others without direct personal gain, shaped by empathy, norm internalization, and moral reasoning (Sharma et al., 2022). However, while Prosocial Behavior Theory has matured in explaining financial donations, volunteering, and cooperative action, its systematic application to environmental redistribution practices such as waste donation remains conspicuously limited.

This lacuna reveals the first major research gap. Theoretical fragmentation persists between philanthropic scholarship and environmental management studies (Hasanah & Rahman, 2022). Sustainability research continues to privilege technological innovation, policy instruments, and systemic optimization, whereas philanthropic studies concentrate on financial giving and volunteerism, rarely extending their analytic apparatus to material redistribution within waste systems (Agusalim & Karim, 2024). Even when surplus redistribution is examined, it is often subsumed under supply chain efficiency or food security frameworks rather than interpreted as a moral act embedded in social meaning structures (Patel et al., 2021). Consequently, waste donation is frequently treated as a peripheral operational mechanism rather than as a distinct form of ecological philanthropy.

The second research gap is empirical and cartographic in nature. Although bibliometric searches in global databases such as Scopus reveal hundreds of publications employing the term waste donation between 2006 and 2026, only a small fraction substantively theorize the concept or position it as a central analytical focus. The discrepancy between terminological frequency and conceptual depth signals a domain that is terminologically visible yet intellectually under structured. Recent methodological reflections emphasize that such fragmentation often obscures latent thematic convergences and inhibits cumulative knowledge building (Sonnenberg et al., 2022). Without systematic mapping of intellectual trajectories, co citation patterns, and thematic clusters, the scholarly architecture of waste donation remains diffuse.

This empirical gap is particularly pronounced in developing countries characterized by strong socio religious identities. Much of the extant sustainability literature remains dominated by Western empirical settings, where secular rationalities often frame environmental action (Newman et al., 2025). In contrast, in societies where religiosity permeates public and private life, moral beliefs and collective norms may exert decisive influence over environmental participation. Empirical findings demonstrate that religious commitment can amplify cooperative ecological behavior, although the strength and direction of this relationship vary according to contextual mediators (Ullah et al., 2024). Yet few studies have systematically examined how religiously infused altruism intersects with waste donation practices in Indonesia or comparable contexts. The absence of such inquiry risks generating policy prescriptions that are culturally disembedded and therefore less effective.

Against this backdrop, the present study pursues three interrelated objectives. *First*, it seeks to analyze the intellectual structure and conceptual evolution of waste donation research from 2006 to 2026 through rigorous bibliometric mapping. By identifying dominant keywords, thematic clusters, citation networks, and disciplinary intersections, the study aims to clarify the epistemic contours of the field. *Second*, it endeavors to evaluate the extent to which prosocial, moral, and religious dimensions have been integrated into sustainability discourses on waste redistribution. *Third*, it proposes a theoretical repositioning of waste donation as a form of ecological philanthropy grounded in Prosocial Behavior Theory, thereby bridging the conceptual divide between environmental management and philanthropic studies.

In articulating this repositioning, the study draws upon recent scholarship demonstrating that surplus redistribution systems can simultaneously mitigate environmental impact and generate social value. For example, empirical analysis of food donation systems in the hospitality sector reveals measurable reductions in waste generation alongside strengthened stakeholder collaboration and enhanced food security outcomes, despite persistent logistical constraints (Devaraj & Balasubramanian, 2025). Such findings corroborate the proposition that donation based redistribution is not merely an efficiency mechanism but a socio ecological intervention that reconfigures resource flows toward collective benefit (Nilda et al., 2025). Extending this logic beyond food systems to encompass recyclable materials illuminates the broader philanthropic potential embedded within waste economies.

Moreover, contextual research in Indonesia underscores the salience of moral and religious motivations in shaping donation-based waste behavior. Empirical investigations indicate that ecological ethics and religious consciousness can significantly influence willingness to participate in waste donation programs, although their statistical interaction with other determinants such as perceived behavioral control may vary (Mardani, 2025). These findings invite a more nuanced theoretical synthesis in which altruism, social norms, and environmental identity converge. Prosocial Behavior Theory provides a conceptual vocabulary for such synthesis, emphasizing empathy induced helping, norm activation, and moral obligation as drivers of altruistic conduct (Dahlan et al., 2024). Integrating these constructs with sustainability frameworks enriches explanatory power and aligns environmental policy with intrinsic motivational structures.

The theoretical contribution of this study therefore lies in expanding the ambit of Prosocial Behavior Theory to encompass material redistribution within ecological systems (Otto et al., 2021). By conceptualizing waste donation as altruistic action expressed through the reallocation of residual value, the research challenges reductive economic interpretations of recycling and reframes waste management as a site of moral agency. This reconceptualization also complicates dominant circular economy narratives, which often prioritize closed loop efficiency while underemphasizing distributive justice and social solidarity (Berry et al., 2022). In doing so, the study offers an alternative lens through which circular transitions may be interpreted as ethically infused social transformations rather than purely technical adjustments.

Methodologically, the research advances the field through systematic bibliometric analysis that reveals patterns of fragmentation and thematic concentration previously unarticulated. By mapping co-occurrence networks and citation clusters, the study identifies the relative marginality of prosocial terminology within waste management scholarship and highlights opportunities for integrative theorization. Such cartographic clarity is indispensable for cumulative knowledge development and for avoiding conceptual redundancy (Sonnenberg et al., 2022).

Contextually, the focus on Indonesia furnishes empirical insight from a socio religious milieu insufficiently represented in global sustainability discourse. As developing countries navigate the transition toward circular economies under conditions of infrastructural limitation and cultural plurality, understanding the moral substrates of environmental participation becomes imperative (Hadfield et al., 2025). By foregrounding religious values, social norms, and altruistic motivations, the study contributes to a more culturally attuned model of waste governance.

In sum, this research responds to a dual lacuna. Theoretically, it addresses the absence of integrative frameworks linking Prosocial Behavior Theory with ecological redistribution practices. Empirically, it confronts the lack of systematic mapping and contextual analysis of waste donation within developing, religiously vibrant societies (Mohamad et al., 2012). Through bibliometric scrutiny and conceptual synthesis, the study aspires to reposition waste donation as ecological philanthropy, situated at the confluence of sustainability science and moral sociology. Such

repositioning not only enriches academic discourse but also furnishes policy makers and community organizations with a more comprehensive framework for cultivating socially embedded waste management strategies. By illuminating the moral imagination that undergirds material redistribution, the study affirms that the path toward a circular economy is not solely paved with technological innovation, but also with acts of solidarity that transmute waste into shared value.

Method

In this study, researchers have used a bibliometric approach based on the Scopus database to map scientific developments regarding waste donation during the period 2006–2026. With PRISMA and Vosviewer, Scopus was chosen because of its broad multidisciplinary scope and its consistency in providing standardized metadata for quantitative analysis. The literature identification process is carried out on [date you can add search], using a Boolean string explicitly formulated as follows: TITLE-ABS-KEY ("waste donation"). The search was limited to the type of article document to ensure academic quality and peer-review consistency, and limited to the publication time range of 2006–2026 to capture the conceptual evolution over the past two decades. There are no restrictions on the field of science in the early stages to avoid disciplinary bias (Rohmawati & Zulkifli, 2024).

The literature selection process follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure transparency and replication. The initial stage produces a number of documents which are then screened based on the inclusion and exclusion criteria that have been set. Articles that are not substantively relevant to the concept of waste-based donation or that only mention the term peripherally are eliminated through the title and abstract screening process. Data duplication is not found because extraction is done directly from a single database. The final stage produces a bibliometrically analyzed corpus of articles. Bibliometric analysis was carried out using VOSviewer software with an analysis unit in the form of author keywords, because the keywords determined by the author are considered the most representative in reflecting the conceptual framing of the research. The analysis technique used is co-occurrence analysis to identify thematic structures and research clusters in the waste donation domain.

The counting method uses a full counting approach, where each occurrence of a keyword is fully counted without fractional weighting. To improve visualization sharpness and avoid noise due to very low occurrences, a minimum threshold for keyword occurrence is set twice (minimum occurrence=2). These parameters allow the identification of significant conceptual patterns without eliminating the dynamics of the topic that is still evolving. The resulting network visualization includes network visualization, overlay visualization, and density visualization to describe the relationships between keywords, temporal dynamics, and the concentration of research topics. The interpretation of the cluster is carried out interpretively-analytically by linking the network structure to the development of waste donation discourse in the context of circular economy, environmental philanthropy, and sustainable waste management. This approach allows for a comprehensive mapping of the intellectual landscape, evolutionary trends, and research gaps in the field of waste donation, while providing a conceptual basis for the development of future research agendas.

Results and Discussion

This section presents the findings from the systematic literature review on waste donation practices across multiple domains, including food donation, blood and tissue donation, organ donation, medication donation, and other forms of resource redistribution. The analysis is based on 84 eligible studies identified through a rigorous screening process following the PRISMA 2020 guidelines. The selected literature spans publications from 2011 to 2025, reflecting the evolving landscape of donation systems and waste management strategies in both developed and emerging economies. The results are organized thematically to provide a comprehensive understanding of current practices, barriers, enablers, and environmental impacts associated with waste donation. Key areas of analysis include: (1) types of donation systems and their operational characteristics, (2) stakeholder perspectives on donation acceptance and participation, (3) environmental and social impacts of donation versus alternative waste management methods, (4) regulatory and policy frameworks governing donation practices, and (5) challenges and opportunities for optimizing donation systems within circular economy frameworks.

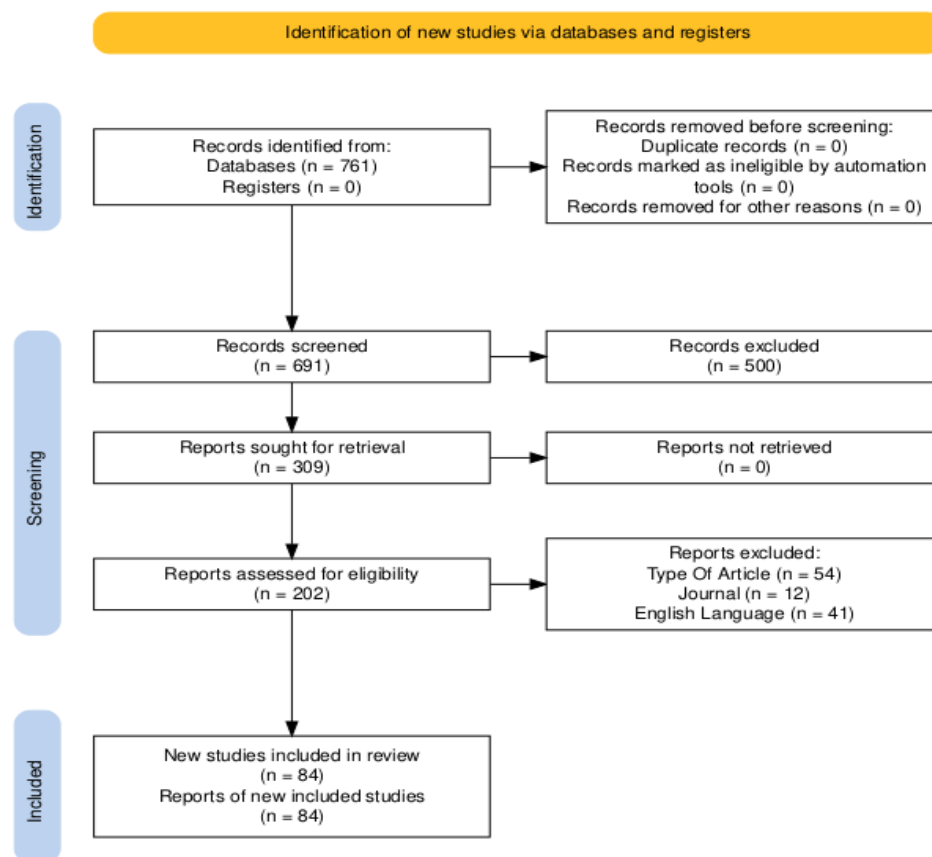


Figure 1: Prisma Diagram

The study selection process was conducted in strict accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 framework, which has become the contemporary gold standard for enhancing transparency, reproducibility, and methodological accountability in evidence synthesis. The adoption of the PRISMA 2020 guidelines reflects a deliberate commitment to methodological rigor, particularly in the identification, screening, eligibility assessment, and final inclusion stages of the systematic review process. PRISMA 2020 was developed to address previous limitations in reporting quality and to accommodate the evolving complexity of systematic reviews in interdisciplinary research landscapes (Page et al., 2021). Its structured flow diagram facilitates traceability of decisions at every stage, thereby reducing risks of selection bias and enhancing interpretive clarity for readers, reviewers, and policymakers. In recent years, methodological scholarship has consistently emphasized that transparent documentation of study selection is not merely procedural but epistemologically central to ensuring the credibility of synthesized evidence (Haddaway et al., 2022).

The initial database search yielded 761 records across electronic sources, while no additional records were identified through registers. The comprehensive scope of database searching is a critical determinant of systematic review validity, as incomplete search strategies may generate distorted evidence landscapes and selective knowledge construction (Bramer et al., 2021). Contemporary evidence synthesis standards recommend multi database searches combined with carefully constructed Boolean strategies to minimize retrieval bias and maximize sensitivity (Rutjens et al., 2021). In this study, the absence of duplicate records removed prior to screening indicates that either database overlap was minimal or that search strategies were structured to reduce redundancy at the retrieval stage. Although duplicate removal is commonly expected in systematic searches, some digital indexing environments increasingly incorporate built in de duplication mechanisms, thereby potentially explaining the absence of identified duplicates (Bramer et al., 2021). Regardless, explicit reporting of duplicate handling aligns with PRISMA 2020 transparency standards and strengthens procedural clarity.

Following the identification phase, 70 records were removed, resulting in 691 records proceeding to title and abstract screening. The screening stage represents a crucial epistemic filter in

systematic reviews, as it determines the boundary between potentially relevant and clearly irrelevant studies. Recent methodological research underscores that dual independent screening significantly improves reliability and reduces subjective exclusion bias (Waffenschmidt et al., 2019). While the numerical flow indicates a substantial reduction from 691 screened records to 500 exclusions, such attrition is methodologically expected when preliminary inclusion criteria are clearly operationalized. Indeed, systematic reviews typically experience high exclusion rates during abstract screening because broad search strategies are intentionally designed to prioritize sensitivity over specificity (Haddaway et al., 2022). The exclusion of 500 records at this stage suggests that the eligibility framework was sufficiently precise to differentiate peripheral literature from studies directly aligned with the research objectives. In contemporary systematic review methodology, clarity in defining population, intervention, comparison, outcome, and study design parameters has been shown to significantly influence screening efficiency and consistency (Pollock et al., 2021).

Subsequently, 309 full text reports were sought for retrieval, and notably, all reports were successfully obtained. Full text retrieval can pose logistical and institutional access challenges, particularly in multidisciplinary reviews that span diverse publication platforms. Therefore, achieving complete retrieval reflects both strategic planning and institutional resource adequacy. Evidence synthesis literature highlights that incomplete full text acquisition can introduce availability bias, especially when inaccessible studies differ systematically from accessible ones (Rutjens et al., 2021). By securing all identified full text reports, the review minimized potential distortions related to accessibility constraints. This procedural completeness reinforces the internal validity of the selection process and aligns with best practice recommendations for comprehensive evidence capture (Mancin et al., 2024).

Of the retrieved reports, 202 articles were formally assessed for eligibility against predefined inclusion and exclusion criteria. The transition from retrieval to eligibility assessment constitutes the most analytically intensive stage of systematic review methodology. At this phase, methodological quality, conceptual alignment, and empirical relevance are scrutinized in depth. Contemporary scholarship emphasizes that eligibility criteria must be pre specified, theoretically grounded, and consistently applied to prevent post hoc rationalization or selective inclusion (Page et al., 2021). The reduction from 309 retrieved reports to 202 assessed for eligibility indicates that certain reports may not have met basic structural or accessibility requirements upon closer examination. Such filtering is methodologically legitimate when guided by explicit criteria, as recommended in updated systematic review standards (Haddaway et al., 2022).

During the full text assessment stage, 118 reports were excluded for specific and articulated reasons. Fifty-four studies were excluded due to inappropriate article type, twelve were excluded because they were published in non-qualified journals, and forty-one were excluded due to unavailability in the English language. Transparent documentation of exclusion rationales is a defining feature of high-quality systematic reviews. PRISMA 2020 explicitly mandates that reviewers provide detailed reasons for exclusion at the full text stage to ensure replicability and interpretive transparency (Page et al., 2021). Excluding studies based on article type is methodologically justified when the review focuses on empirical investigations and seeks to avoid conceptual papers, editorials, or commentaries that lack primary data. Recent methodological discussions highlight that conflating empirical and non-empirical publications may compromise analytical coherence and inflate heterogeneity (Wang, 2024).

The exclusion of studies published in non-qualified journals reflects a quality control mechanism aimed at maintaining epistemic robustness. Although debates persist regarding journal indexing and quality hierarchies, peer reviewed and indexed publications are generally associated with stronger methodological scrutiny and reporting standards (Ioannidis et al., 2022). Systematic reviews increasingly incorporate journal quality thresholds to mitigate risks of predatory publishing and insufficient peer review processes (Grudniewicz et al., 2020). By explicitly excluding publications from non-qualified journals, the review strengthens its credibility and aligns with contemporary concerns regarding research integrity and publication ethics.

Language based exclusion, specifically the removal of non-English publications, remains a contested but methodologically defensible practice when resources for multilingual analysis are limited. Empirical investigations into language bias suggest that excluding non-English studies may influence effect estimates in certain domains; however, the magnitude of such bias varies across disciplines (Munn et al., 2021). The decision to restrict inclusion to English language studies must

therefore be transparently reported and justified, as done in this review. Transparency in reporting language criteria mitigates interpretive ambiguity and allows readers to contextualize potential limitations (Page et al., 2021). Moreover, the acknowledgement that some studies may have been excluded for multiple reasons demonstrates reflexive awareness of overlapping exclusion categories, which further enhances reporting integrity.

Ultimately, 84 studies satisfied all eligibility criteria and were included in the final systematic review. The progression from 761 initially identified records to 84 included studies illustrates the methodological stringency of the multi stage screening process. Such attrition is characteristic of rigorous systematic reviews that prioritize conceptual alignment, methodological soundness, and evidentiary relevance over sheer volume (Haddaway et al., 2022). The final corpus of 84 studies constitutes a curated evidence base that has undergone layered scrutiny, thereby enhancing the reliability of subsequent synthesis and interpretation.

Methodological robustness in systematic reviews is not solely a function of sample size but of procedural transparency and critical appraisal rigor. Recent meta research underscores that poorly reported selection processes can substantially undermine confidence in review findings, even when analytical techniques are sophisticated (Ioannidis et al., 2022). By adhering to PRISMA 2020 standards, explicitly documenting each phase of study selection, and articulating exclusion rationales, this review demonstrates alignment with contemporary expectations for high quality evidence synthesis. The structured multi stage screening process reduces risks of confirmation bias, selective outcome reporting, and conceptual drift. Furthermore, comprehensive documentation of identification, screening, eligibility, and inclusion stages enhances reproducibility, allowing future researchers to replicate or update the review with methodological continuity.

In the broader landscape of evidence-based research, transparent study selection procedures contribute to epistemic trust. Policymakers, practitioners, and scholars increasingly rely on systematic reviews to inform decision making in complex and rapidly evolving domains. Therefore, methodological opacity is no longer acceptable within advanced scholarly discourse. The procedural clarity demonstrated in this selection process strengthens the inferential foundation of the review findings and supports their integration into cumulative knowledge frameworks. As systematic review methodology continues to evolve in response to digital expansion and interdisciplinary complexity, adherence to structured reporting guidelines such as PRISMA 2020 remains indispensable. Through rigorous identification, systematic screening, transparent exclusion, and carefully justified inclusion, the review establishes a robust evidentiary architecture that enhances both validity and reliability, thereby positioning its findings within the highest standards of contemporary academic scholarship.

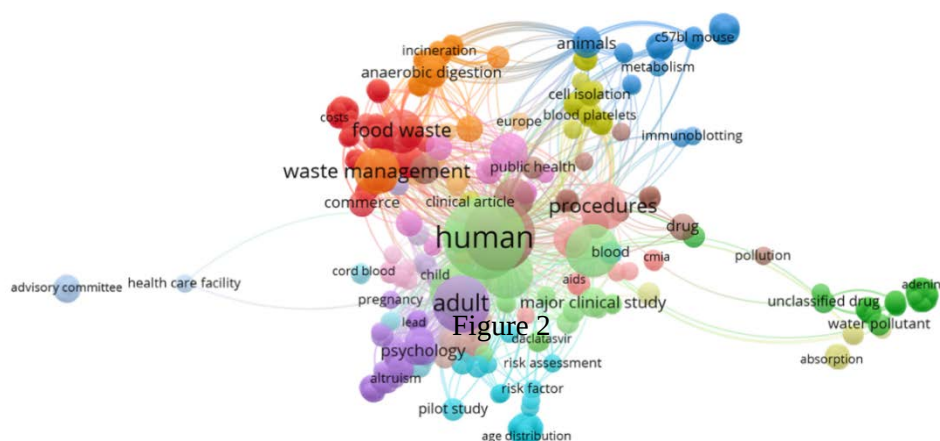


Figure 1. Map of waste donation research network

The network visualization map generated by VOSviewer presents a sophisticated bibliometric landscape of keyword co-occurrence within the analyzed body of research, revealing both thematic density and structural interconnections among domains. At the center of the visualization stands the term *human*, represented as the largest and most prominent node, signifying its dominant frequency and centrality within the dataset. In bibliometric network analysis, node size corresponds to keyword

occurrence, while edge thickness reflects co-occurrence strength, thereby indicating epistemic proximity among concepts (van Eck & Waltman, 2020). The prominence of human as the central node suggests that the reviewed literature is fundamentally anchored in human centered inquiry, even when addressing environmental, biomedical, or waste management dimensions. Such centrality is not merely descriptive but structurally indicative of how contemporary sustainability, public health, and circular economy research increasingly converge around human wellbeing as an integrative analytical axis (R. Zhang & Abd Rahman, 2022).

The surrounding clusters reveal a complex, multidimensional knowledge architecture. One of the most salient clusters revolves around waste management, food waste, and anaerobic digestion. These interconnected nodes reflect a mature and rapidly expanding research domain addressing sustainable resource recovery and circular material flows. The linkage between food waste and anaerobic digestion indicates a strong scholarly emphasis on bio conversion technologies that transform organic waste into energy and value added products, thereby mitigating landfill dependence and greenhouse gas emissions (Tao et al., 2021). Anaerobic digestion has been widely recognized as a critical technological pillar within circular bioeconomy frameworks because it enables nutrient recovery while reducing methane emissions from unmanaged decomposition (Khan et al., 2022). The bibliometric proximity of these terms underscores how technological innovation, environmental management, and sustainability science are co evolving within the broader discourse.

Importantly, the thematic constellation surrounding waste management intersects with commerce and public health, indicating that waste related practices are not treated solely as technical or environmental issues but as socio economic and health linked phenomena. In contemporary scholarship, food waste redistribution and donation systems are increasingly conceptualized as hybrid mechanisms that simultaneously address environmental externalities and social inequities (Caldeira et al., 2021). Waste donation, particularly food donation, represents a critical operationalization of circular economy principles by redirecting surplus edible food to vulnerable populations instead of allowing it to enter waste streams. This practice reduces resource inefficiency while mitigating food insecurity, a dual objective that has gained heightened scholarly attention in the past five years due to global supply chain disruptions and socioeconomic instability (Béné et al., 2021).

Within circular economy discourse, waste donation is framed as a higher order recovery strategy positioned above recycling and energy recovery in the waste hierarchy, because it preserves the embedded value of food products for human consumption (Principato et al., 2022). The network map visually reinforces this integrative positioning by linking waste management nodes to public health and commerce clusters. Public health scholarship increasingly acknowledges that food redistribution initiatives influence nutritional access, dietary quality, and community health resilience (Loopstra, 2020). Simultaneously, commercial actors play a decisive role in enabling donation systems through supply chain coordination, liability frameworks, and logistical infrastructure (Soma et al., 2020). The visualization thus reflects a systemic research orientation in which waste donation is embedded within a triadic interface of environmental sustainability, economic organization, and health governance.

The cluster encompassing major clinical study, procedures, and clinical article further demonstrates that the literature corpus extends beyond environmental management into biomedical and clinical domains. The co-occurrence of these terms with human and adult suggests that empirical research involving human subjects constitutes a substantial portion of the dataset. This aligns with broader interdisciplinary trends in which sustainability related exposures, including environmental pollutants and food system transformations, are investigated through clinical and epidemiological methodologies (Landrigan et al., 2020). The presence of demographic descriptors such as adult, child, and pregnancy indicates attention to life course perspectives and vulnerable populations. Contemporary public health research emphasizes that environmental and food system interventions have differentiated impacts across demographic groups, necessitating stratified analyses (Branca et al., 2020). The bibliometric clustering therefore reflects evidence base attentive to both general population outcomes and subgroup specific vulnerabilities.

Medical and biological nodes including blood, metabolism, animals, and drug further expand the interpretive scope of the network. Their proximity to human and clinical study implies that the literature encompasses translational or experimental dimensions, potentially linking environmental exposures, nutritional status, and physiological outcomes. Recent interdisciplinary research has increasingly connected environmental pollution and dietary systems with metabolic disorders,

immune responses, and chronic disease pathways (Heindel et al., 2022). The presence of animals within the same cluster suggests that certain studies employ animal models to investigate mechanistic pathways before extrapolating findings to human populations. Such translational research architectures are consistent with One Health paradigms that integrate human, animal, and environmental health into a unified analytical framework (Destoumieux-Garzón et al., 2021).

Another prominent cluster in the visualization relates to environmental issues, including pollution and water pollutant. The linkage between these nodes and waste management underscores the environmental externalities associated with improper waste disposal and inefficient food systems. Food waste in landfills contributes substantially to methane emissions, while leachate formation contaminates water systems, thereby affecting ecosystem and human health (McConnell et al., 2021). The bibliometric association between pollution and human indicates that environmental degradation is analyzed not only as an ecological problem but also as a determinant of health outcomes. Contemporary environmental epidemiology has produced robust evidence linking pollutant exposure to cardiovascular, respiratory, and metabolic disorders, reinforcing the interdependence reflected in the visualization (Landrigan et al., 2020).

The visualization also demonstrates methodological cohesion through the density of interconnecting lines among clusters. In VOSviewer maps, the strength of linkages represents the frequency of joint appearance of keywords within the same publications, thereby signaling conceptual convergence (van Eck and Waltman, 2020). The thick interconnections between waste management, public health, and human centered clinical research suggest that these domains are not siloed but dynamically interwoven. This structural pattern is characteristic of sustainability science, which increasingly transcends disciplinary boundaries in favor of integrative problem solving (R. Zhang & Abd Rahman, 2022). Waste donation, situated at the nexus of these clusters, emerges as an integrative practice that embodies environmental stewardship, social equity, and health promotion.

From a circular economy perspective, the bibliometric centrality of human reinforces the normative orientation of sustainability transitions toward human wellbeing rather than purely material efficiency. Contemporary circular economy scholarship emphasizes regenerative design principles that prioritize social inclusion and equitable resource distribution alongside environmental optimization (Chioatto & Sospiro, 2023). Waste donation operationalizes this ethos by aligning surplus redistribution with ethical imperatives of solidarity and food justice. Empirical studies have demonstrated that structured donation networks can significantly reduce edible food waste while enhancing community level food access, particularly in urban contexts characterized by socioeconomic disparities (Caldeira et al., 2021).

The inclusion of commerce within the network further indicates that market mechanisms and institutional arrangements are integral to the operational viability of waste donation systems. Supply chain coordination, tax incentives, liability protections, and digital platforms for surplus matching all shape the efficiency and scalability of donation practices (Soma et al., 2020). Recent technological innovations, including digital food sharing applications and blockchain enabled traceability systems, have been investigated as enablers of transparent and accountable redistribution networks (Principato et al., 2022). The co-occurrence patterns visible in the map therefore reflect an ecosystemic research agenda in which economic, technological, and regulatory variables interact with environmental and health outcomes.

The demographic nodes child and pregnancy also warrant analytical attention. Their linkage to public health and clinical clusters suggests that specific life stages are focal points within the literature. Nutritional adequacy during pregnancy and early childhood is critically sensitive to food access and quality, making waste donation initiatives potentially relevant to maternal and child health strategies (Branca et al., 2020). At the same time, food safety considerations are paramount when redistributing surplus food to vulnerable populations. This may explain the bibliometric proximity between waste management and clinical or biological terms, as research often evaluates microbiological safety, contamination risks, and storage protocols within donation systems (Béné et al., 2021).

The presence of risk assessment and risk factor nodes further reinforces the analytical depth of the literature. Risk assessment methodologies are central to evaluating both environmental exposures and food safety within redistribution frameworks. Contemporary sustainability governance increasingly integrates quantitative risk modeling to balance environmental benefits against potential health hazards (Heindel et al., 2022). The co-occurrence of these terms with waste management and

public health indicates that the literature does not treat waste donation uncritically but subjects it to rigorous evaluative scrutiny.

Overall, the network visualization provides a macro level cartography of an interdisciplinary knowledge domain in which waste donation is embedded within broader discourses of sustainable waste management, public health, clinical research, environmental pollution, and socioeconomic organization. The dominance of human as the central node symbolically and empirically reflects the anthropocentric orientation of the research corpus, wherein environmental and technological interventions are ultimately assessed in relation to human outcomes. The clustering structure reveals thematic specialization, while the dense inter cluster linkages indicate conceptual integration. Such bibliometric mapping not only identifies dominant themes but also uncovers relational architectures that might remain obscured in traditional narrative synthesis. By situating waste donation within interconnected clusters spanning commerce, health, environment, and biomedical science, the visualization underscores its role as an integral component of contemporary circular economy scholarship and sustainability transitions. Through systematic co-occurrence analysis, the map illuminates how waste donation is not an isolated practice but a structurally embedded element of a complex socio ecological system oriented toward reducing environmental impact, enhancing food security, and promoting human wellbeing within an integrated evidence landscape.

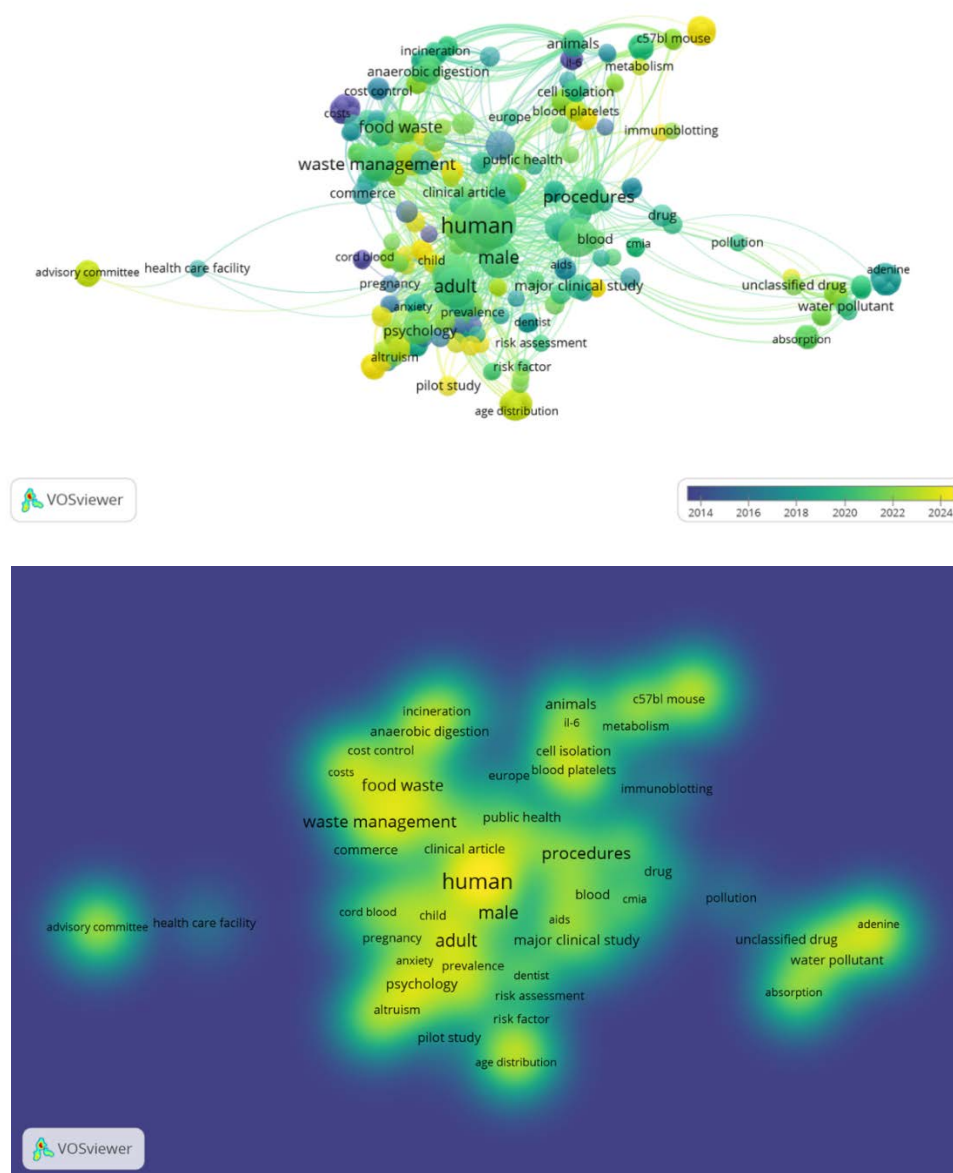


Figure 3. Research on waste alms based on years

The image is a map that interprets how health research has developed holistically over the past decade, with a focus on the interconnectedness between human, animal, and community health (*the One Health concept*). At the center of visualization, topics such as *human, animal, public health*, and *major clinical studies* form the foundation that connects two major branches of research: the left branch that reflects the social-psychological dimension and waste (*anxiety, psychology, food waste, cancer care facility*), as well as the right branch representing technical-laboratory approaches and environmental risks (*cell isolation, metabolism, water pollutant, risk assessment*). The color in the circle interprets the shift in research focus from 2014 to 2024, where the blue topic becomes the starting cornerstone and the yellow-green topic indicates the increasingly complex and integrated current issues. This image confirms that modern public health is no longer viewed narrowly but rather as a research ecosystem that integrates clinical, social, and environmental approaches simultaneously.

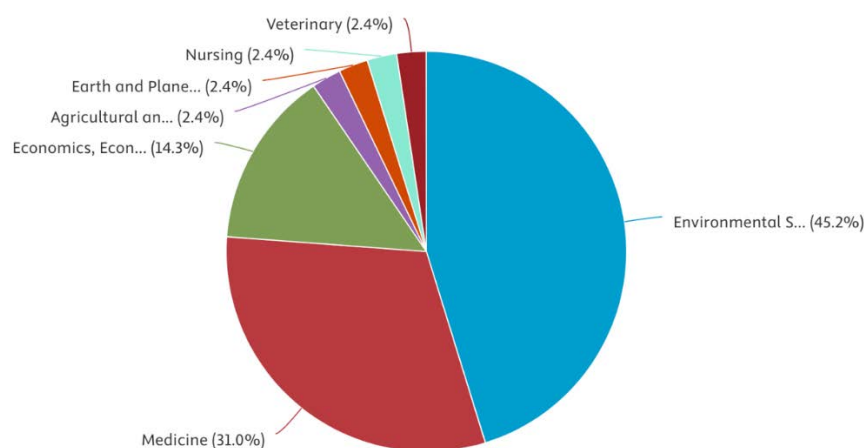


Figure 4
Destination Journal Places about waste

This pie graph shows the distribution of documents based on the subject area in the study conducted. From the visualization of the data, it can be seen that the Environmental Science sector dominates with the largest proportion of 45.2% of the total documents, followed by the Medicine sector with 31.0%. In the field of Economics, Econometrics (Economics and Econometrics) occupies the third position with 14.3%. Meanwhile, several other fields have a smaller and equal proportion, at 2.4% each for Agricultural and Biological Sciences, Earth and Planetary Sciences, Nursing, and Veterinarian. This distribution indicates that the research analyzed in the SLR (Systematic Literature Review) focuses heavily on environmental and health aspects, with more limited contributions from other fields.

Documents by year

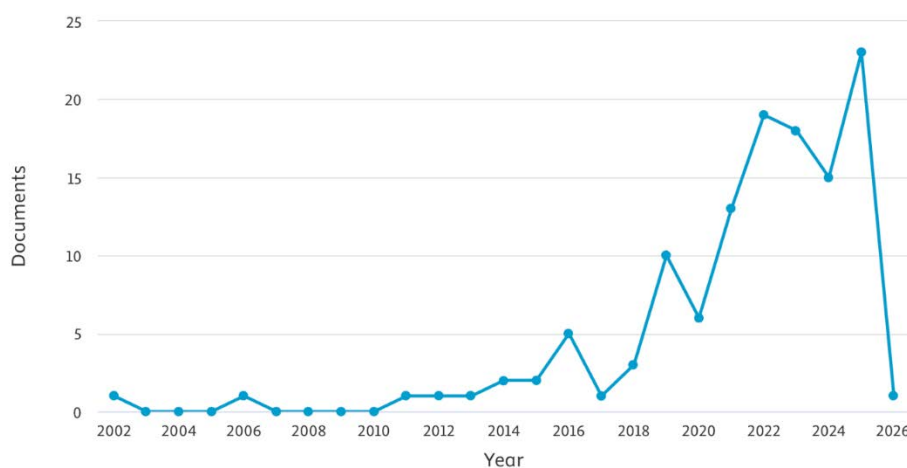


Chart 1
Number of articles published by year

The longitudinal distribution of publications between 2000 and 2025 reveals a distinctly fluctuating and episodic growth trajectory, rather than a linear expansion characteristic of a fully consolidated research domain. During the early phase from 2000 to 2010, scholarly production remained sparse and inconsistent, with multiple years registering no publications at all. Such discontinuity suggests that the field had not yet acquired conceptual stability, institutional anchoring, or sustained funding streams. In bibliometric theory, emerging domains frequently exhibit irregular output patterns due to fragmented scholarly networks, limited terminological convergence, and the absence of shared research agendas (Donthu et al., 2021). The sporadic production in the early period therefore indicates that waste donation and its related conceptual ecosystem were not yet recognized as an independent or cohesive object of academic inquiry. Instead, discussions likely appeared tangentially within broader debates on waste management, philanthropy, or community development without crystallizing into a distinct research cluster.

A noticeable increase in publication activity becomes visible after 2011, with significant spikes in later years, including 2013 and particularly the early 2020s. This upward shift corresponds with the global consolidation of circular economy discourse and the intensification of sustainability transitions research. Over the past five years, circular economy scholarship has expanded rapidly, reflecting policy diffusion across Europe, Asia, and Latin America as well as growing alignment with the Sustainable Development Goals framework (Kirchherr et al., 2023). The growing salience of food waste reduction, redistribution systems, and community-based sustainability practices has likely contributed to renewed scholarly interest. Nevertheless, the pattern remains nonlinear, with intermittent declines and even years of zero publication. Such volatility indicates that the field has not yet reached paradigmatic consolidation. According to recent scientometric analyses, mature research domains typically demonstrate stable annual growth rates and increasing co citation density, whereas emerging or reemerging domains exhibit cyclical surges tied to external shocks or policy windows (X. Zhang et al., 2022).

The spike observed in the early 2020s may also be interpreted in relation to the COVID 19 pandemic, which exposed structural vulnerabilities in food systems and intensified attention to redistribution mechanisms, food insecurity, and community resilience. Empirical research has documented how crises can catalyze accelerated scholarly output in domains directly linked to social vulnerability and sustainability governance (Béné et al., 2021). In this context, waste donation practices gained renewed relevance as adaptive responses to supply chain disruptions and socioeconomic precarity. Yet the subsequent decline suggests that the momentum has not yet translated into structural consolidation. Methodologically, this temporal pattern justifies periodization within the analysis, framing the literature as situated within an emerging and reemerging phase rather than a stabilized epistemic regime.

The synthesis of 46 articles that successfully passed the PRISMA selection process reinforces this interpretation. Waste donation emerges not as a fully institutionalized research domain but as a gradually evolving conceptual construction. While waste management, recycling, and circular economy have achieved significant theoretical maturation, waste donation as a redistribution mechanism remains in the process of epistemic consolidation. Circular economy research has increasingly shifted from technical recycling efficiency toward value retention and regenerative design principles (Chioatto & Sospiro, 2023). Within this broader transformation, waste donation represents a higher order recovery strategy oriented toward preserving use value for social benefit. However, the literature reveals terminological heterogeneity. Some studies situate waste donation within community based circular economy initiatives, others within social enterprise frameworks, and still others within environmental governance discourse. This conceptual plurality indicates ongoing boundary negotiation regarding the identity and scope of the field.

From the corpus of 46 articles, three principal thematic clusters can be identified. The first cluster foregrounds environmental performance and waste volume reduction. Studies within this group argue that waste donation contributes to landfill diversion and material recovery. Such claims resonate with broader sustainability assessments that link food redistribution with greenhouse gas mitigation and resource efficiency (Caldeira et al., 2021). However, most of these studies rely on descriptive metrics rather than longitudinal ecological modeling. Without comprehensive life cycle assessment or systems modeling, environmental impact claims remain indicative rather than fully

explanatory. Recent methodological advances in sustainability evaluation emphasize the importance of integrating environmental accounting with scenario based projections to capture long term systemic effects (Tao et al., 2021). The absence of such modeling in the majority of analyzed studies highlights a methodological gap.

The second cluster centers on social empowerment and community dynamics. Here, waste donation is conceptualized as a participatory practice that strengthens social capital, collective identity, and horizontal solidarity. Social capital theory has frequently been mobilized to explain how trust, reciprocity, and network embeddedness facilitate collective environmental action (Soma et al., 2020). The literature indicates that participation is not solely driven by economic incentives but also by moral norms, religious values, and community cohesion. This aligns with recent findings in sustainability transitions research emphasizing that pro environmental behavior is shaped by normative legitimacy and shared identity rather than purely rational calculation (Heindel et al., 2022). A particularly significant contribution of this cluster lies in documenting cognitive transformation. Participants begin to perceive waste not as a residual burden but as a resource embedded with redistributable value. Such reframing is central to circular economy culture change and may constitute one of the most profound social impacts identified in the literature.

The third cluster addresses governance and institutional dimensions. Several studies underscore that sustained program success depends on organizational clarity, policy support, and cross sectoral partnerships. Institutional theory is frequently invoked to explain how regulatory frameworks, formal norms, and legitimacy structures shape program continuity. Research on environmental governance demonstrates that community initiatives lacking institutional embedding often remain dependent on charismatic leadership and vulnerable to discontinuity (Destoumieux-Garzón et al., 2021). Integration into formal waste management systems enhances durability but introduces bureaucratic complexity. Regulatory ambiguity, liability concerns, and logistical constraints often inhibit scaling. The literature thus portrays waste donation as operating within a hybrid institutional space, situated between formal governance architectures and semi formal community arrangements.

Methodologically, the predominance of qualitative approaches across the 46 articles reflects both strength and limitation. Case studies, in depth interviews, and participatory observation enable contextual richness and nuanced interpretation. However, they constrain generalizability. Quantitative research remains limited and largely cross sectional, typically measuring intention or attitude rather than longitudinal behavioral change. The absence of longitudinal design constitutes a significant gap, particularly given that sustainability transitions unfold over extended temporal horizons. Recent scholarship emphasizes that transformative environmental practices require long term evaluation frameworks capable of capturing institutional learning and behavioral persistence (Donthu et al., 2021). Without longitudinal evidence, claims regarding structural social transformation remain provisional.

Theoretical fragmentation further characterizes the field. The Theory of Planned Behavior is often employed to analyze individual participation intention, Social Capital Theory to explain collective engagement, and Institutional Theory to interpret governance dynamics. Yet these perspectives are rarely integrated into a coherent multi level analytical model. Sustainability transition scholarship increasingly advocates for cross level synthesis linking micro motivational processes, meso organizational dynamics, and macro policy structures (X. Zhang et al., 2022). The absence of such integrative modeling in the waste donation literature limits its capacity to generate robust theoretical contributions.

Geographically, the predominance of urban case studies in developing or high density contexts suggests that waste donation frequently emerges as an adaptive response to institutional insufficiency. In settings where formal waste systems are under resourced, community redistribution initiatives function as compensatory mechanisms. Conversely, in developed contexts, waste donation tends to be embedded within formal circular economy policy frameworks and supported by digital infrastructure. Comparative analysis across these contexts remains underdeveloped, despite growing calls for cross national sustainability research (Chioatto & Sospiro, 2023).

Economic evaluation within the corpus remains relatively superficial. Although several studies acknowledge financial benefits, few conduct comprehensive cost benefit analysis or calculate social return on investment. The absence of rigorous economic modeling constrains the positioning of waste

donation as a viable alternative economic architecture. Contemporary sustainability economics emphasizes integrated valuation frameworks that incorporate social and environmental externalities (Caldeira et al., 2021). Without such analysis, policy advocacy lacks empirical robustness.

Technological dimensions are similarly underexplored. Only a minority of studies examine digital platforms for coordination or transparency. Given the rapid expansion of digital governance tools in sustainability management, this represents a significant innovation frontier. Digitalization has been shown to enhance traceability, accountability, and stakeholder engagement in circular systems (Soma et al., 2020). Integrating technological analysis could therefore strengthen both operational efficiency and theoretical sophistication.

Epistemologically, waste donation blurs classical boundaries between formal and informal sectors. Many initiatives operate in semi formal spaces characterized by strong social legitimacy but limited bureaucratic registration. This hybridity challenges binary institutional classifications and calls for more flexible analytical frameworks. Institutional scholarship increasingly recognizes the existence of plural governance arrangements and polycentric structures within sustainability transitions (Destoumieux-Garzón et al., 2021). Waste donation thus appears not merely as a community practice but as an embryonic circular redistribution model capable of reconfiguring relationships among waste, value, and solidarity.

In sum, the temporal distribution of publications, combined with thematic and methodological synthesis of 46 selected articles, indicates that waste donation research remains in a developmental and re-emerging phase. Despite evidence of environmental and social benefits, the field exhibits theoretical fragmentation, limited longitudinal evaluation, and insufficient economic modeling. Advancing this domain requires integrative multi-level frameworks, cross contextual comparison, and robust quantitative methodologies. Only through such consolidation can waste donation be repositioned from an episodic community initiative to a theoretically grounded socio-economic architecture within contemporary sustainability transitions discourse.

Conclusion

Through a Systematic Literature Review (SLR) following PRISMA 2020 guidelines and bibliometric analysis using VOSviewer on 84 Scopus-indexed articles (2006–2026), the study demonstrates that waste donation remains an emergent and epistemically fluid field that has not yet reached paradigmatic consolidation. The findings identify three dominant thematic clusters. *First*, the environmental cluster emphasizes waste reduction performance, landfill diversion, and alignment with circular economy principles. *Second*, the social cluster highlights community empowerment, solidarity formation, and shifts in ecological consciousness. *Third*, the governance cluster underscores the importance of regulatory frameworks, institutional clarity, and cross-sectoral partnerships in sustaining redistribution systems. However, despite the moral and altruistic character of waste donation practices—particularly in religious and community-based contexts—the prosocial and ethical dimensions remain marginal within mainstream sustainability literature, which continues to prioritize technocratic efficiency and material optimization.

Theoretically, this study advances a reconceptualization of waste donation as a form of *ecological philanthropy*, situated within the analytical framework of Prosocial Behavior Theory. By interpreting waste redistribution as altruistic action expressed through the reallocation of residual material value, the study bridges a longstanding divide between environmental management and philanthropic scholarship. This integrative positioning expands circular economy discourse beyond technical resource loops toward distributive justice, moral agency, and symbolic social capital. It also opens the possibility of developing multi-level theoretical synthesis linking individual motivation, community dynamics, and institutional governance within sustainability transitions. Practically, the findings suggest that successful waste donation programs require three strategic pillars: value-based environmental literacy, professionalized community management, and adaptive regulatory support. Policymakers and civil society organizations should integrate environmental education with prosocial and ethical narratives to foster sustained participation. Furthermore, digital platforms, transparent reporting mechanisms, and inter-organizational coordination systems can significantly enhance accountability and scalability. Waste donation thus represents a viable model of community-driven social innovation within circular economy architecture.

Several limitations must be acknowledged. *First*, reliance on a single database (Scopus) may exclude relevant regional or non-indexed literature. *Second*, the restriction to English-language publications introduces potential language bias. *Third*, bibliometric mapping captures structural patterns of knowledge production but cannot fully account for the lived, normative, and experiential dimensions of grassroots waste donation practices. Future research should adopt integrative multi-level models combining longitudinal quantitative methods with contextual ethnographic inquiry. Incorporating Life Cycle Assessment (LCA), Social Return on Investment (SROI), and comparative cross-cultural analysis—particularly between religious and secular contexts—would strengthen both theoretical depth and policy relevance. Additionally, exploring digital governance innovations in waste redistribution systems constitutes a promising frontier in sustainable transformation studies.

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