

# From Waste to Wealth: How Socially Responsible Waste Practices Empower Diverse Communities in Odisha

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## Abstract

The increasing urgency of sustainable development demands an inclusive approach to waste management that not only mitigates environmental degradation but also fosters social empowerment. This study explores the transformative potential of socially responsible waste management practices in empowering diverse and marginalized communities across Odisha. Anchored in the principles of sustainability, social equity, and community engagement, the research aims to evaluate and prioritize waste management initiatives that generate economic opportunities, promote environmental stewardship, and enhance social inclusion.

To systematically assess these practices, a Multi-Criteria Decision-Making (MCDM) approach Analytic Hierarchy Process (AHP) is employed. The study develops a structured framework involving key criteria such as social empowerment, economic impact, environmental sustainability, and inclusiveness. Data is gathered through expert surveys, stakeholder interviews, and secondary municipal reports. The findings reveal that initiatives led by self-help groups (SHGs), informal waste picker networks, and decentralized composting units demonstrate significant potential in converting waste into wealth while promoting equity among women, tribal, and underrepresented groups.

This research contributes to the discourse on sustainable waste governance by highlighting how localized, socially responsible interventions can drive both ecological and socio-economic transformation. The study concludes with policy recommendations to scale such models across similar developing regions and proposes an integrated strategy that aligns waste management with the Sustainable Development Goals (SDGs), particularly goals 5, 8, 11, and 12.

**Keywords:** Waste Management, Social Responsibility, Community Empowerment, Sustainability, Diversity and Inclusion, Waste-to-Wealth, Multi-Criteria Decision-Making (MCDM), AHP, Informal Sector, Self-Help Groups (SHGs), Circular Economy, Sustainable Development Goals (SDGs).

## INTRODUCTION

### Context background

India faces serious waste management problems. Cities across the country are producing more and more waste every day due to rapid urban growth, population growth and increased consumerism. According to the United Nations Environment Programme (UNEP, 2023), India generates more than 150,000 tons of fixed waste every day, and this number is expected to continue to increase. Odisha, a state in the East Indies, is also fighting to deal with urban waste.

Cities like Bhubaneswar and Cuttack have issues such as poor waste separation, overcrowded landfills, and lack of recycling systems (UnHabitat, 2024). Despite programs such as Swachh Bharat Mission, many cities in Odisha still follow the outdated central waste disposal methods that are neither environmentally friendly nor socially sustainable. Problem Statement: Exclusion of marginalized communities in traditional waste systems. One of the biggest problems with traditional waste development systems is the exclusion of marginalized groups. This includes

informal waste pickers, tribal communities and low income women. These people play an important role in waste collection, sorting and recycling, but are not officially recognized or supported by the system (Chikarman, 2012; Wilson et al., 2006). They often work under low income, uncertain and unsanitary conditions, and work without social security. As a result, their efforts are unnoticed and remain in poverty and social disadvantage. This also means that we are not fully able to achieve our waste recovery and recycling potential. The importance of socially responsible waste management: fairness, links to the environment. It is important to use socially responsible practices to design sustainable and integrated waste management. These approaches treat waste not only as a technical problem, but as an opportunity to improve human life and protect the environment. For example, if a Self Help Group (SHG) runs a composting unit or if a waste picker is officially included in the waste collection system, it creates jobs, earns a living, and reduces the burden of landfill sponsorship. These models support the idea of a circular economy in which waste is recycled instead of being dumped, and recycled, and help achieve social equity and justice (UNDP, 2023; Wilson et al., 2012). Socially responsible waste management combines three important goals.

Equity: by strengthening women, tribal groups and informal workers. Environment: By promoting recycling and reducing pollution. Economy: By converting waste into useful products and achieving revenue.

### **Research goals**

The purpose of this study is to examine and highlight how socially responsible waste practices can benefit both the Odisha environment. The main goals are: To Evaluate the ecological,

economic and social outcomes of the Community Waste Initiative. To Understand how these practices can help strengthen bad, marginalized and underrepresented communities, such as women, tribal populations, and informal workers.

### **Methodology overview:**

To perform this study, we use a Multi criteria decision making method called the Analytic Hierarchy Process (AHP). This is part of a large group of tools known as the MCDM methods (multi criterion decision making). AHP can help you compare different waste practices based on important criteria such as:

### **Social strengthening Economic impact**

Environmental sustainability Inclusiveness Collecting data on expert research, stake holder interviews, and official reports from city authorities. This allows for a round and fair comparison of the different approaches.

### **Paper Range and Structure**

This paper focuses on urban areas of Odisha, particularly Bhubaneswar, where there are several waste management programs led by municipalities. The structure of the paper is as follows: Section 2 includes a review of previous research and background literature. Section 3 describes the research methods used, in particular the AHP technology. Section 4 describes the results and results of the analysis. Section 5 contains detailed discussions in which the results are linked to broader political and social issues. Section 6 provides conclusions and political recommendations for expanding socially responsible waste management in Odisha and similar regions.

## **LITERATURE OVERVIEW**

Waste Management in Developing Countries: A Global and Indian Perspective

Municipal Solid Waste Management (MSW) is one of the biggest challenges for environmental and health in developing countries. Rapid urbanization, lack of infrastructure and weak regulatory enforcement have made it difficult for many cities to effectively treat waste (UNEP, 2023). In countries with low and medium incomes, more than 90% of waste is often disposed of in unregulated landfills or openly burned waste, leading to serious health and environmental hazards (World Bank, 2018). In the Indian context, urban areas produce more than 150,000 tons of MSW every day, but only about 20% are scientifically processed (CPCB, 2021). Most waste is indistinguishable. This will result in recycling and composting. Traditional centralized waste management systems focus on collection and disposal rather than waste reduction, reuse and recovery. Like many Indian countries, Odisha belongs to the formal system

(United Nations Habitat, 2024), and issues of inadequate waste separation in Quelle, limited participation of citizens, inadequate inclusion of informal workers (UnHabitat, 2024). Researchers and political decisions have spurred these challenges to research into decentralized, integrative and sustainable approaches.

The role of local governments in waste systems:

SHGS, informal sector, NGOs Community participation is becoming increasingly important in the field of waste management. In many developing countries, communities and basic organizations play an important role in recycling and waste regulation. For example, Self-Help Groups (SHGs) are particularly active in several women led Indian countries when they run composting units, door to door waste collection, and sensitization campaigns (UNDP, 2023). These models not only improve local waste

handling, but also provide low income women and families.

The informal sector, including waste pickers and recyclers, has contributed significantly to the recovery of waste in Indian cities. It is estimated that informal employees collect and organize more than 20% of recyclable materials, reduce the burden on landfills and save local government resources (Wilson et al., 2006). Despite their contributions, these employees are exposed to social condemnation, low income, and poor working conditions due to their informal status.

Nongovernmental organizations (NGOs) were also significantly involved in the waste picker cooperative organization, securing their rights and enabling partnerships with the community (Chirman, 2012). Together, these community actors represent important but underestimated forces in creating integrated circulation waste systems.

Social strengthening through waste initiatives:

Waste management is not only an environmental issue, but is deeply linked to social justice and inclusion. In India, many waste work is done by people from historically marginalized communities, such as Dalits and tribal groups. These communities often face discrimination, poor payments and lack of awareness, but provide essential environmental services (Bapat & Bhati, 2018). Several community led waste initiatives demonstrate great potential to promote social strengthening. For example, the inclusion of women in SHG led waste management projects has contributed to improving community income, decision making authority and social status (Agarwal & Singh, 2022). Similarly, programs that support tribal and Dalit workers through training, safety equipment

and formal contracts improve working conditions and reduce exploitation. The strengthening of these groups not only improves quality of life, but also strengthens resistance among local governments and communities. It reflects the shift towards a human centric approach to urban sustainability.

## **Evaluation Framework in Waste Management:**

### **Using MCDM and AHP**

Given the complexity of assessing various waste strategies, researchers often use multi reference equipment (MCDM) to compensate for environmental, economic and social aspects. Of these, the Analytical Hierarchical Process (AHP) is one of the most frequently used methods. This allows decision makers to build complex problems into hierarchies and assign relative weights to each criterion based on expert judgment (Saaty, 1980). Many studies have used AHP to compare waste development systems in urban areas. For example, Bapat and Bhati (2018) AHP was used to assess various strategies for smart city waste in India by assessing criteria such as cost, environmental impact, and social acceptance. Similarly, Ahmed et al. (2020) AHP was used to assess waste treatment options based on public health, resource recovery, and employment potential. AHP is particularly useful in environments such as Odisha where a variety of stakeholders, including city authorities, SHGS, NGOs and informal employees, have different goals and priorities. Using AHP allows researchers to objectively compare different waste practices and determine which ones are best suited to promote sustainability and social reinforcement.

## **METHODOLOGY**

### **Research Design**

This study employs a research design with a mixed method that integrates qualitative and quantitative methods to comprehensively assess Odisha's socially responsible waste management practices. The qualitative component focuses on the stakeholder perspective and social aspects of empowerment, whereas the quantitative component uses the Analytical Hierarchical Process (AHP), a multi criterion decision making (MCDM), to systematically prioritize based on selected sustainability and inclusion criteria. This dual approach ensures both context-related relevance and analytical rigor.

### **Justification of decision making (multi-criterion decision making) (MCDM)**

The waste management decision making process involves complex compromises between environmental, social and economic goals. Traditional cost benefit analysis is often not sufficient to capture the multidimensionality of sustainable and integrated development goal. In this context, the MCDM method provides a structured approach to evaluation and prioritization of alternatives based on several, often conflicting criteria. In various MCDM techniques, the Analytical Hierarchical Process (AHP) developed by Saaty (1980) is particularly suitable for this study. AHP allows decision makers to break down complex problems into hierarchical structures, perform comparisons between elements, and calculate consistency to validate decisions. This method was often used in environmental planning, sustainable development, and waste development research (Bapat & Bhati, 2018; Ahmed et al., 2020).

### **Choosing criteria and alternatives**

#### **Evaluation Criteria**

Based on an extensive literature overview, expert consultation, and field observation, this study identifies four

important criteria for the assessment of socially responsible waste management practices.

•**Social recognition:** To what extent interventions have improved, agents, dignity, and livelihoods in marginalized communities have improved (e.g., women, planned trunks, planned boxes). Economic impact: contributes to income generation, creates employment and cost-effectiveness for local waste systems.

•**Environmental sustainability:** Reduce greenhouse gas emissions, improve waste separation, promote recycling or composting. Inclusion: Traditionally excluded in the level of participation and presentation of social groups that require protection, or value chains for waste management.

### Alternatives to waste management

Four waste management models were selected as alternatives for the assessment: Each has a different operational structure and social commitment level.

1. **SHGled Recycling Units:** A selfhelp group for women who manage recycling activities at the community level.
2. **Informal Waste Picker Network:** Organized or semi organized groups of waste pickers involved in the collection, sorting and resale of valuable materials.
3. **Distributed composting units:** Local composting systems run by municipalities, usually using isolated biodegradable waste.
4. **Central Waste Treatment Plant:** Large community or PPP agency (public private partnership), waste is centrally disposed of and often limited involvement in municipalities.

These alternatives were chosen to reflect various strategies for waste disposal

and to propose in the urban context of Odisha.

### Data collection method

Data collection was carried out through three complementary sources to inform the AHP model and to ensure context related sensitivity.

**Expert Survey:** The structured AHP questionnaire was managed by 15 experts in science, government and civil society, and compared the available standards and alternatives in pairs. **Stakeholder Interviews:** Semi structured interviews were conducted with 10 stakeholder groups, including SHG members, informal waste workers, local government civil servants and NGO representatives. These interviews provided qualitative insights into operational challenges, community participation and relief. **Secondary data checks:** Local waste, political documents, and reports of previous academic research related to Odisha and other Indies were checked to support comparative assessments. Expert judgments, stakeholder narratives, and triangulation of secondary evidence improve the reliability and validity of the decision-making process.

### AHP implementation process

The AHP process was performed in five consecutive steps. 1. **Hierarchical structure:** A three stage hierarchy was created with objectives (selection of the most effective socially responsible waste practices), four assessment criteria at the intermediate level, and four alternatives on the ground. 2. **Comparative Comparison:** Experts compared comparisons of criteria and alternatives with the base scale to express the relative meaning of one element better than another. 3. **Priority Weight Calculation:** Eigenvalues and self vectors were derived from the comparison matrix to calculate the local priority of each criterion and the global priority value of

each alternative.4. Consistency Test: Consistency Rate (CR) was calculated for each matrix to verify the logical consistency of expert judgments. For analysis, all matrices of  $CR > 0.10$  were accepted. Inconsistent matrices were returned to respondents for revision.5. Synthesis and Ranking: The final ranking of alternatives was determined by aggregation of weighted results in all criteria. The results identify waste management models that are socially inclusive, environmental compatibility and most likely to have economically viable outcomes.

All AHP calculations were performed using Microsoft Excel.

## RESULTS AND DISCUSSION

AHP Results: Weights of Evaluation Criteria Priority

The pair of comparative analyses performed by the AHP methodology resulted in the following normalized weights for the four evaluation criteria:

Criteria	Weight (%)
Social Empowerment	34.2%
Environmental Sustainability	27.5%
Economic Impact	22.3%
Inclusiveness	16.0%

The results show that social strengthening of professionals is considered the most important factor in the assessment of socially responsible waste management practices. This corresponds to the growing academic and political consensus that social inclusion and strengthening, particularly women and marginalized groups, are of central importance to sustainable development goals (UnHabitat, 2020; Chakrabarti et al., 2021). Environmentally compatible sustainability gives a strong focus and reflects concerns about ecological degradation caused by unscientific waste

disposal and overuse of landfills (Gupta et al., 2021).

The consistency ratio (CR) of the pairs of comparative matrix was calculated within the tolerance limit of 0.10 (Saaty, 1980) to confirm the logical consistency of expert judgment.

## AHP Results: Ranking of Waste Disposals

Below are the final priority values for each alternative based on performance according to the criteria you selected:

Alternative Global Evaluation Rank

Alternative	Global Score	Rank
SHG-led Recycling Units	0.312	1
Informal Waste Picker Networks	0.274	2
Decentralized Composting Units	0.241	3
Centralized Waste Processing Plants	0.173	4

SHGled recycling units were the highest, particularly because of their contributions to women's social strengthening and income generation (Sarkar & Singh, 2020). Her decentralized nature promotes strong community commitment and drives behavioral change towards segregation and recycling (UNDP India, 2019). Informal Waste Picker Networks highlight its role in redirecting valuable materials and reducing the load on urban landfills. However, the lack of institutional awareness and safety networks continues to hinder socio economic pay increases (Wilson et al., 2009; Chikarman, 2012). The decentralized composting units were given an estimated

moderate score for environmental impact, but were limited to scale and economic benefits. Surgery in efficiency and lack of incentives remain important obstacles (Sharholly et al., 2008). Despite technical capabilities, due to minimal participation in the centralized processing system community and more frequent elimination of employees in the lowest informal sector (Agarwal et al., 2015).

## Discussion

AHP based prioritization provides several important findings.

1. The community centric model goes beyond the central system. The results confirm that decentralized participatory waste practices offer more socioeconomic and ecological benefits compared to top down model technocratic models (Scheinberg et al., 2010; Pariat et al., 2021).
2. Social strengthening as a central pillar: In contrast to traditional waste frames that prioritize infrastructure and cost effectiveness, this study shows that strengthening, particularly women and marginalized boxes and tribes, must be the main goals (Banerjee & Dey, 2017; Narayan & Chakrabarti, 2021).
3. The need for formal integration of informal actors: Von Wilson et al. (2009) can improve informal workers' perceptions and integration of urban waste systems, livelihoods, system performance, and sustainability outcomes. Local governments need to take over integrated guidelines that facilitate this transition.

## Verification from the perspective of stakeholders

Interviews with local SHG members and informal workers examine AHP results. SHG members said that financial independence and decision making rights at the household level are consistent with the results of UNDP India (2019). Informal workers expressed strong support for integration into formal systems, but

highlighted persistent challenges such as shortages in ID cards, uniforms and health benefits (Chikarman, 2012). Community officials acknowledged that intensive plants have an efficiency advantage, but often do not generate local employment or community wealth. NGOs have affirmed the importance of change in action and integrated governance. This indicates that the variance model is more adaptive and resilient.

## Effects and Recommendations of Guidelines

### Strengthen Self-Help Groups (SHGs) through Capacity-Building

SHG has been successful in promoting basic waste entrepreneurship and enhancing women in urban India (UNDP India, 2019; Sarkar & Singh, 2020). Target programs for capacity building programs, including technical training, financial capabilities, and operational management, can improve participation capabilities and lead initiatives (Banerjee & Dey, 2017).

### Formalize and protect informal waste workers

Informal waste workers have contributed significantly to the recovery of resources, but are exposed to continued exclusion from political frameworks (Wilson et al., 2009; Chikarmane, 2012). Formal initiatives, including displaying IDs and expanding Social Security benefits, are key to ensuring a livelihood (ILO, 2020; Wiego, 2021).

### Support Decentralized Waste Infrastructure

Decentralized systems such as community composting and localized recycling centres reduce transportation costs, create local employment, and promote sustainability (Sharholly et al., 2008; Pariat et al., 2021). Infrastructure

grants and urban support from PPP models can enhance livelihoods (Mohua, 2022).

### Institutionalize Community Participation in Waste Governance

Meaningful community commitment promotes transparency, local property, and behavioural change (Scheinberg et al., 2010; Un-Habitat, 2020). Institutionalisation of participation through community committees and feedback mechanisms ensures accountability and inclusiveness (Niti Aayog, 2021).

### Align Waste Strategies with SDGs and Urban Development Frameworks

The integration of social and ecological goals in waste governments corresponds to local practices with global obligations such as the Sustainable Development Goals (SDGS) (UNDP, 2020). This includes promotions that include women's management (SDG 5), decent work (SDG 8), cities (SDG 11), and circular resource flows (SDG 12) (UNSCAP, 2021).

## CONCLUSION

This study shows that waste management models affecting municipalities, particularly SHG and informal waste, provide sustainable and integrated methods for the urban waste government in Odisha. Through structured AHP based assessments, these models were most effective in combating socioeconomic inequality, improving environmental outcomes, and strengthening underestimated groups (Chakrabarti et al., 2021; Narayan & Chakrabarti, 2021).

The findings highlight the importance of transformation not only as an infrastructure challenge but as an opportunity for social change. The conditions of the political framework must evolve to reflect the potential of socially responsible waste systems to tackle some

SDGs, particularly in a context characterized by inequality and fast urbanization (UnHabitat, 2020; Niti Aayog, 2021). A multistakeholder approach is crucial for governments, SHGS, informal workers, NGOs and the private sector to realize a cyclical and just city future. An era of paradigm shifts from a concentrated and exclusive system to a community economy is ripe.

### Conflicts of interest

There is no conflict of interest between authors.

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