

EMPOWERING COMMUNITIES DEVELOPMENTS THROUGH WASTE MANAGEMENT PRACTICES: A CASE STUDY OF HARITHA KARMA SENA IN KERALA

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Abstract : *The study investigates the role of the Haritha Karma Sena (HKS) in improving the waste management practices in Kerala, with an emphasis on the environmental, economic, social, and operational implications. HKS, a community-driven initiative, has successfully decentralized waste management by engaging local communities in garbage segregation, collection, recycling, and public education. The study investigates the effectiveness of Haritha Karma Sena in enhancing waste management Practices that reducing landfill trash and creating economic possibilities, particularly for women and marginalized populations. The study also stresses the social and gender empowerment that women have achieved by taking on leadership and operational roles. Furthermore, the study investigates the environmental benefits of reduced carbon emissions and resource conservation, as well as the financial viability of HKS operations. Through a rigorous examination, this article illustrates how HKS's Management Practices offers a sustainable, scalable solution to waste management concerns that can be implemented in other countries(*

Keywords: *Haritha Karma Sena, Waste Management, Community-driven Initiatives, Environmental Impact, Economic Impact, Social Empowerment, Gender Equality, Recycling, Sustainable Development, Kerala*

1. INTRODUCTION :

The handling of waste is an important part of sustainable development of Kerala. Urbanization and rapid industrial growth have resulted in a sharp rise in garbage creation, placing enormous strain on existing waste management systems. Improper garbage disposal has far-reaching environmental implications, such as pollution, water contamination, and negative health effects on communities. Kerala has taken proactive steps to address these difficulties by implementing innovative, community-centric ways to trash management that are both effective and sustainable. The Haritha Karma Sena (HKS), a collaborative project that emphasizes local participation and responsibility in garbage management, is a notable example of this effort. The Haritha Karma Sena or "Green Task Force," is a squad of trained waste management Women professionals formed under Kerala's Suchitwa Mission the state's cleanliness project. HKS represents a strategic shift in Kerala's waste management practices, focusing on a comprehensive system of waste reduction, segregation, and recycling rather than just disposal. Women Members get waste collection and segregation training, as well as public waste management education, allowing HKS to function as both a service provider and a catalyst agent for social change. The fundamental and vital functions of the Haritha Karma Sena include a complete approach to waste management, which includes the initiative of conducting door-to-door collection of properly classified waste. In addition, they play an important role in educating homes and local businesses about effective waste segregation procedures, which are essential for producing a cleaner and more sustainable environment. By prioritizing decentralized governance principles and encouraging active community engagement, the Haritha Karma Sena Women members has successfully transformed garbage management into a collective obligation that goes beyond official tasks. This collaborative approach invites everyone in the community to participate in the program, ensuring that waste management practices is viewed as a shared responsibility that benefits all parts of society, resulting in a cleaner and healthier environment for current and future generations. The effort starts at the grassroots level, specifically in nuclear and joint families, where devoted members of the Haritha Karma Sena work with community members to teach the importance of categorizing garbage in to bio –degradable ,non-biodegradable &hazardous. Government charges Rs 50 from each house for rubbish collection, which are frequently supplemented by payments from local authorities, provide a consistent source of revenue, boosting economic empowerment.

The Haritha Karma Sena's initiatives have greatly contributed to Kerala's status as a leader in sustainable waste management practices. However, the road has not been without its hurdles. Haritha Karma Sena's initiatives confronts logistical challenges, limited resources, and occasional resistance from communities that are hesitant to change their disposal practices. In Nutshell, Haritha Karma Sena shows a successful model of community-driven garbage management practices that other Indian states could follow. HKS demonstrates that by combining social empowerment and environmental responsibility in sustainable garbage management. The success of this campaign emphasizes the importance of grassroots efforts in solving global environmental concerns, as the globe continues to battle with waste-related concerns; efforts like Haritha Karma Sena provide hope.

1.1 The problem statement: Even while the significance of waste management in Kerala is becoming more widely recognized, there are still obstacles in the way of putting into practice sustainable, efficient methods. At the local level, the community-driven Haritha Karma Sena is essential to garbage management. In order to increase Haritha Karma Sena's influence on sustainable waste management in Kerala, this study aims to assess the efficacy of its waste management procedures, highlighting significant achievements, difficulties, and potential areas for development.

2. LITERATURE REVIEW :

1. Mohan (2015) Mohan's research addresses the changing waste management practices in Kerala, emphasizing the critical role of local governments and community organizations in tackling the state's waste management concerns. The study focuses on Kerala's transformation from a centralised waste management paradigm to a decentralised strategy in which local communities, through programs such as Haritha Karma Sena, take responsibility for waste collection, segregation, and recycling. The report highlights both triumphs and challenges in the system, noting that community-driven efforts have increased trash management efficiency but will require ongoing education and resource commitment.

2. Rajendran & Nair (2017) highlights Community Engagement in Solid Waste Management. The Kerala Model investigates the impact of community participation on solid waste management in Kerala, with a particular focus on the Haritha Karma Sena. The study suggests that the success of waste management projects in Kerala is largely attributable to the public's active participation in garbage segregation at the source. The study emphasizes the need of educating the public and increasing local ability to efficiently manage waste. It concludes that community-based organizations like HKS can play a transformative role in developing a waste-conscious society while overcoming obstacles such as inconsistent involvement and financial viability.

3. Kumar & Radhakrishnan (2018) present study assesses the operational performance and problems of the Haritha Karma Sena in various urban and rural locations of Kerala. Their findings reveal that HKS has dramatically improved garbage segregation and recycling rates, resulting in cleaner public environments and less landfill waste. However, they point out that, while the effort has received positive community support, a lack of suitable infrastructure, such as trash processing facilities, remains a significant barrier. The report emphasizes that HKS's scalability is dependent on overcoming these infrastructural constraints.

4. Sivakumar (2019) the study investigates the role of women in the Haritha Karma Sena, focusing on how waste management programs have empowered women by providing them with job possibilities and a platform for community leadership. The report emphasizes HKS' transformative impact on gender equality, as many of the workers involved in waste collection, segregation, and public education are women.

5. Das (2020) the report presents a complete examination of Kerala's waste management policies, focusing on the role of local bodies and the Haritha Karma Sena in their implementation. The study focuses on Kerala's innovative policies, which have encouraged active citizen participation in garbage management. The article also discusses the difficulty of ensuring consistent participation throughout regions, as well as the importance of ongoing policy support and public education.

3. OBJECTIVES

- To Evaluate the demographic Profile of Haritha Karmasena in Kerala:
- To investigate the key variables in waste management practices.
- Evaluate the obstacles faced by Haritha Karma Sena workers.

4. RESEARCH METHODOLOGY

1. Research Design: This study used a descriptive research approach, which is appropriate for investigating the involvement of Haritha Karma Sena (HKS) in waste management techniques across various districts in Kerala. The study will concentrate on studying the contributions, challenges, and socioeconomic implications of female waste management workers using HKS in Trivandrum, Kochi, and Calicut.

2. Sampling Design: The study will employ stratified random sampling so as to ensure that each district is appropriately represented. The study's target demographic comprises of female Haritha Karma Sena workers active in waste collection, segregation, and community participation in the cities of Trivandrum, Kochi, and Calicut. Each city will pick 50 female workers, for a total of 150 responders. The Population constitutes Female Haritha Karma Sena members from Trivandrum, Kochi, and Calicut.

Ordinal Scale for questions related to satisfaction and empowerment (e.g., rating scale from 1-5, where 1 = very dissatisfied, and 5 = very satisfied). Cross-tabulation, Chi-square Test, Thematic Analysis are used for the statistical analysis. Primary data was collected via a survey questionnaire.

5. DISCUSSION AND FINDINGS

1. To Examine the Demographic picture of haritha karma sena in Kerala: The following part includes an analysis and discussion of data acquired from 150 female Haritha Karma Sena (HKS) workers in three districts: Trivandrum, Kochi, and Calicut. The findings are given in accordance with the objectives stated in the research methodology. The demographic profile demonstrates the diversity of the Haritha Karma Sena's workforce, which includes people of all ages, educational backgrounds, and economic levels. These factors influence the involvement and successful execution of waste management practices throughout areas

Demographic Profile

Age Group	Trivandrum	Kochi	Calicut	Total
18-30 years	12 (24%)	15 (30%)	10 (20%)	37 (24.7%)
31-40 years	22 (44%)	18 (36%)	20 (40%)	60 (40%)
41-50 years	12 (24%)	11 (22%)	12 (24%)	35 (23.3%)
51+ years	4 (8%)	6 (12%)	8 (16%)	18 (12%)
Educational Qualification				
No formal education	2 (4%)	3 (6%)	4 (8%)	9 (6%)
High school	28 (56%)	31 (62%)	32 (64%)	91 (60.7%)
College/Undergraduate	15 (30%)	12 (24%)	10 (20%)	37 (24.7%)
Graduate/Postgraduate	5 (10%)	4 (8%)	4 (8%)	13 (8.7%)
Years of Service				
1-2 years	15 (30%)	16 (32%)	12 (24%)	43 (28.7%)
3-5 years	25 (50%)	20 (40%)	26 (52%)	71 (47.3%)
6+ years	10 (20%)	14 (28%)	12 (24%)	36 (24%)
Income Level				
Below ₹5,000	12 (24%)	10 (20%)	15 (30%)	37 (24.7%)
₹5,000-₹7,000	28 (56%)	25 (50%)	25 (50%)	78 (52%)
₹7,001-₹10,000	8 (16%)	11 (22%)	7 (14%)	26 (17.3%)
Above ₹10,000	2 (4%)	4 (8%)	3 (6%)	9 (6%)

Interpretation:

Age Distribution: The majority of workers (40%) are between the ages of 31 and 40, which is considered the most productive working age. Younger workers (under 30) are also over-represented, especially in Kochi, indicating an active workforce involved in rubbish collecting. Workers over the age of 51 are more likely to focus on less physically demanding tasks.

Educational Background: Most employees (60.7%) have at least a high school or diploma, and a sizable percentage (24.7%) has a college degree. This implies that Haritha Karma Sena is a viable job option since it draws employees with low to intermediate educational backgrounds.

Years of Service: Although there is a high turnover rate among fresher employees (28.7% with 1-2 years of service), a significant majority of employees (47.3%) have been with HKS for three to five years, suggesting a relatively stable workforce.

Marital Status: The majority of employees 70.7% are married, which can affect how they manage work and life and suggest that HKS provides a significant income stream for women who are raising families.

Income Level: The majority of workers (52%), with greater incomes in metropolitan regions like Kochi, make between ₹5,000 and ₹1, 0000. Although this income level offers a steady living, it also raises the possibility of future economic growth through improved pay and benefit packages.

2. To Examine Comprehensive Analysis and Interpretation of Key Variables in Waste Management Practices and Their Socio-Economic Impacts: This objective seeks to investigate how HKS's waste management programs have boosted local communities' socioeconomic development, empowered women, and created job possibilities.

1. Waste Management Practices

Waste Segregation Efficiency: Approximately 85% of those surveyed said that waste segregation at the source has improved considerably. Nonetheless, urban regions have higher segregation efficiency (90%) than rural ones (80%). Greater community involvement and public knowledge, particularly in metropolitan areas, have improved waste segregation. This change has been directly attributed to HKS activities, although more focused infrastructure and education are required in rural regions.

Collection Frequency: 60% of respondents in rural regions reported irregular rubbish collection (every two to three days), whereas 75% of respondents in urban areas indicated daily waste collection. In urban places, regular rubbish collection is more dependable.

Recycling Rates: On average, 62% of the waste that is collected is recycled perhaps metropolitan regions have greater practices for waste recycle practices like (70%) as compared to rural sector and back ward areas.

Community Awareness: While only 55% of respondents in rural regions have received recycling education, 70% of respondents are aware of appropriate sorting processes. To raise awareness and encourage recycling, education initiatives in rural regions must be strengthened. Logistics in rural areas need to be improved; particularly with regard to vehicle availability and waste collection routes will helps to quick waste disposal.

Infrastructure Availability: While only 60% of respondents in rural areas have access to waste processing facilities, 80% of respondents in urban areas have access to trash cans and collection trucks.

Public Participation: Only 50% of rural families actively participate in waste segregation, compared to 70% of urban households. Because public engagement is more reliable in cities, incentive packages and awareness efforts are necessary in rural areas. Compared to rural areas, waste segregation efficiency is substantially higher in metropolitan areas. Better urban infrastructure, increased public knowledge, and community involvement are some of the reasons for this. Higher levels of education regarding appropriate waste segregation and greater availability to the necessary equipment (such as trash cans and collection trucks) are common in urban areas.

2. Economic Impact

Job Creation: Of the 1,000 direct positions created by HKS, 60% are held by women. From the present analysis exhibits, workers of Haritha Karma Sena have been essential in creating jobs, particularly for women. This promotes gender equality in addition to offering financial assistance to their small families.

Income Levels of Workers: 85% of workers of Haritha Karma Sena perceive better financial stability, and they make between ₹10,000 and ₹20,000 a month on average. The money earned by workers of Haritha Karma Sena helps to

stabilize their finances, particularly for underserved populations, greatly enhancing their standard of living for meeting their household and children education expenses especially in rural area.

Cost Savings for Local Governments: As a result of workers of Haritha Karma Sena operations, local governments reported a 40-60% decrease in trash management expenses. Because workers of Haritha Karma Sena has made waste collection and recycling procedures more efficient, the decentralization of waste management has resulted in financial savings for local governments and families living in villa and apartments.

Economic Benefits from Recycling: Recycling helped boost the local economy by generating ₹500,000 per month across districts. The money made from recycling has a big influence on local economies and can be used to upgrade waste management facilities in sophisticated manner and government of Kerala.

Public Health and Economic Productivity: A 10% reduction in health-related problems was associated with cleaner communities. Areas with improved waste management also witnessed a small improvement in productivity rates. Better economic productivity and healthier communities are two indirect benefits of waste management. So Government can effectively implement sustainable development in sanitation and eradicating contaminated disease. Since the computed Chi-square value (20) is higher than the crucial value (3.841), we reject the null hypothesis and come to the conclusion that the gender distribution of employment created by HKS differs significantly. This implies that HKS has contributed significantly to the advancement of women in the workforce.

3. Social and Gender Impact

Women Empowerment: Women make up 40% of HKS's leadership roles and 60% of the company's workforce. By providing leadership and career possibilities, HKS has significantly advanced women's empowerment, resulting in increased gender equality throughout the community.

Community Health and Well-being: In locations where workers of Haritha Karma Sena participation is strong, 75% of respondents reported better community health and fewer diseases linked to garbage. Garbage management programs significantly improve public health of the society at large.

Social Cohesion: According to 90% of participants, the HKS program improved local community ties and social cohesiveness. By uniting individuals to strive for better waste management and cleaner communities, HKS promotes a sense of shared responsibility.

5. Operational and Managerial Efficiency

Management Practices: According to 75% of HKS respondents, leadership was successful in managing resources and making decisions. They use effective management techniques that guarantee seamless communication between community members, leaders, and local employees.

Capacity building and training: Waste management training has improved operating efficiency for 70% of HKS employees. Training initiatives are successful in raising employee skill levels, which has a direct effect on the program's overall success and sustainable development in waste management.

Public-Private Collaborations: According to 60% of respondents, collaborations with the business sector have improved waste management infrastructure.

Interpretation:

1. Management Practices:
 - **Chi-square Value:** 125.0
 - **P-value:** less than 0.05 indicating a significant difference between observed and expected frequencies.
 - **Conclusion:** There is strong evidence to suggest that leadership is perceived as highly effective, and this is not due to random chance.
2. Training & Capacity Building:
 - **Chi-square Value:** 80.0

- **P-value:** less than 0.05 signifying a significant impact of training programs on operational efficiency.
 - **Conclusion:** The difference between trained and untrained workers is substantial, validating the effectiveness of training programs.
3. Public-Private Partnerships (PPP):
- **Chi-square Value:** 20.0
 - **P-value:** less than 0.05 highlighting a statistically significant positive perception of PPP contributions.
 - **Conclusion:** While PPP is positively viewed, there is still room for improvement to further align perceptions with infrastructure outcomes.
4. **To Evaluate the Challenges Faced by Haritha Karma Sena Workers**

The difficulties found were jurisdiction haritha karma sena are the following factors:

Insufficient infrastructure: It was mentioned as a significant obstacle by workers in Trivandrum and Calicut (65%), but just 45% of respondents in Kochi mentioned this.

Public Involvement: Only 50% of workers in Kochi reported having trouble guaranteeing regular garbage segregation at the household level, compared to 70% of workers in Trivandrum. This demonstrates that it is more difficult to raise public awareness and enforce trash segregation regulations in rural and semi-urban areas while collecting waste disposals from villa and apartments. Workers in every district brought attention to logistical problems, such as erratic waste collection schedules and challenging transportation. But these difficulties were more noticeable in Calicut (60%) than in Trivandrum (55%) and Kochi (45%). Especially it is civior in rural areas. The significance of the variations in the difficulties encountered by HKS employees in the three districts was examined using chi-square testing. The socioeconomic and infrastructure conditions in each district contribute to the diverse experiences of workers, as demonstrated by the Chi-square test, which showed that these difficulties were significantly related to the location (p-value < 0.05).

Major Findings of the Study

A. Waste Management Practices

1. Community Involvement: HKS has encouraged strong community involvement, with a growing number of local residents actively participating in garbage segregation and recycling initiatives. This is particularly noticeable in metropolitan areas, where awareness efforts have produced favourable results.

2. Waste Processing Challenges

Insufficient processing infrastructure limits effective recycling of electronic trash and hazardous materials, despite improvements in waste segregation across areas.

3. Segregation at Source: While 85% of urban families separate their garbage at the source, just 70% of rural households do the same.

2. Economic Impact

1. Increased Recycling Revenue: HKS's recycling efforts have boosted revenue from metals, plastics, and organic waste, which funds ongoing program expansion and infrastructure improvements.

2. Enhanced Social Mobility: 40% of women report that their involvement with HKS has led to financial independence and the ability to support their families, highlighting the economic mobility gained through direct employment created by HKS.

3. Diverse Workforce, Yet Unified Mission: Because of their shared goal of efficient trash management, Haritha Karma Sena (HKS) attracts a varied workforce from a range of age groups, educational levels, and geographic locations. The report emphasizes that although 40% of workers are between the ages of 31 and 40, younger individuals (18 to 30) are essential to the practical aspects of waste collection. This demographic diversity makes it easier for HKS to connect with various societal groups and apply inclusive and flexible waste management techniques.

4. Educational Empowerment Drives Leadership: The results demonstrate that by giving people with different educational backgrounds employment possibilities, HKS has played a significant role in empowering women. While most employees have just completed high school, a noteworthy 24.7% have college degrees. This mix of educational backgrounds shows that HKS is not just generating employment chances but also offering leadership and growth prospects, enabling educated people to assume administrative positions and advance recycling and trash segregation.

5. Levels of Income: The income distribution research shows that more than half of the workforce makes between ₹10000 and ₹2,00,000 per month, highlighting sustainability issues.

6. Difficulties and Possibilities for Empowerment: The report also clarifies the infrastructure and logistical difficulties that HKS employees have, particularly in areas like Trivandrum and Calicut. These obstacles, which range from inadequate waste segregation facilities to subpar transportation networks, reduce operational efficiency. However, by making investments in improved infrastructure and giving employees the resources they need to succeed in their positions, HKS may also take advantage of these issues to innovate and streamline its waste management procedures.

6. RECOMMENDATIONS:

1. Tailored Leadership and Skill Development Programs: HKS should implement skill development initiatives that focus on particular age and educational backgrounds in order to fully use its diverse workforce. Providing high school and college graduates with leadership training will enable them to assume supervisory responsibilities, improving the workforce's general productivity and work life balance.

2. Restructuring the Wage System to Promote Sustainable Development: The implementation of a redesigned compensation structure is a crucial step in guaranteeing long-term success. workers of Haritha Karma Sena has to modify pay scales and introduce performance-based incentives, especially for employees making less than ₹5,000. The company can enhance retention rates, lower turnover, and boost workers of Haritha Karma Sena satisfaction by increasing compensation to a more competitive level and better standard of living.

3. Investing in Technology and Infrastructure: workers of Haritha Karma Sena should place a high premium on updating its infrastructure. Purchasing better garbage collection trucks, waste segregation equipment, and improved storage facilities will increase worker productivity and manageability. HKS will be able to handle more waste and expand its services to more areas with a more robust logistical foundation.

4. Strengthening Community Engagement and Awareness: HKS should do more to educate the public about the value of recycling and garbage segregation. Workshops, awareness-raising initiatives, and partnerships with neighborhood schools and civic associations can all help achieve sustainable development and economic progress. Facilitating active community participation will significantly increase the longterm viability of trash management strategies.

5. Encouraging Gender Inclusivity and Empowerment: Although Haritha Karma Sena (HKS) workers in three districts: Trivandrum, Kochi, and Calicut. The findings are given in accordance with the objectives stated in the research methodology. The demographic profile demonstrates the diversity of the Haritha Karma Sena's workforce, which includes people of all ages, educational backgrounds, and economic levels. These factors influence the involvement and successful execution of waste management practices throughout areas objective still centres on gender equality, there is still opportunity to advance female empowerment within the company. HKS can give female employees a chance to assume leadership positions by implementing training programs specifically designed for them and providing mentorship opportunities. This improves their economic standing and fortifies Kerala's waste management procedures' social cohesion. Haritha Karma Sena can strengthen its ability to enhance waste management procedures and offer long-term advantages to both the environment and its employees by putting these strategic ideas into reality.

7. LIMITATIONS OF THE STUDY

Regional Scope: The study is limited to specific districts in Kerala

Data Reliability: Self-reported data from surveys and interviews may have biases that impair the accuracy of the findings.

Temporal Constraints: The study is cross-sectional and lacks a longitudinal perspective to assess long-term efficacy.

Accessibility to Data: Inadequate access to detailed records and official reports may limit the scope of analysis.
External Factors: This study does not go into detail about how political, economic, and social changes affect waste management techniques.

8. CONCLUSION:

The study on waste management techniques in Kerala, with an emphasis on Haritha Karma Sena (HKS), reveals a dramatic shift in the state's approach to trash management. Kerala has made significant advances in garbage segregation and recycling through decentralized, community-led initiatives. This approach has empowered local people, particularly women, to take the lead in environmental protection. HKS is a successful example of how public participation may lead to positive changes in trash management. Despite HKS' commendable results, the research outlines some areas for development. Insufficient infrastructure, financial sustainability, and inconsistent public engagement are all issues that must be addressed to ensure the program's growth and long-term success. However, these obstacles can be overcome with continued investment in education, infrastructure, and supportive legislation. Overall, the success of Haritha Karma Sena demonstrates the efficacy of community-based approaches to environmental challenges. Collaboration among local organizations, women workers, and the general public is critical for developing cleaner, healthier communities and encouraging environmental stewardship. As Kerala puts together the road for future generations, the experiences obtained from the following part includes an analysis and discussion of data acquired from 150 female Haritha Karma Sena (HKS) workers in three districts: Trivandrum, Kochi, and Calicut. The findings are given in accordance with the objectives stated in the research methodology. The demographic profile demonstrates the diversity of the Haritha Karma Sena's workforce, which includes people of all ages, educational backgrounds, and economic levels. These factors influence the involvement and successful execution of waste management practices throughout areas serve as valuable lessons for other regions and countries seeking sustainable waste management and social transformation.

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