

**"ASSESSING PUBLIC PERCEPTION AND ENGAGEMENT WITH
DECENTRALIZED WASTE MANAGEMENT SYSTEM
IMPLEMENTED BY KOCHI CORPORATION"**

**Dissertation submitted to
Mahatma Gandhi University, Kottayam in partial fulfillment of the requirement for
the degree of
Master of Social Work
Specializing in
Community Development**

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2021-2023**

CERTIFICATE

This is to certify that this dissertation titled "Assessing Public Perception And Engagement With Decentralized Waste Management System Implemented By Kochi Corporation" is a record of genuine and original work done by ARATHY S S, Reg. No 210011034048 of IV semester Masters of Social Work course of this college under my guidance and supervision and it is hereby approved for submission.

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DECLARATION

I, Arathy S S hereby declare that the research work titled " Assessing Public Perception and Engagement with Decentralized Waste Management System Implemented by Kochi Corporation" submitted to the M G University, Kottayam, is a record of genuine and original work done by me under the guidance of Dr. Sheena Rajan Philip, Head Of the Department ,Bharata Mata School of Social Work, Thrikkakara ,and this research work is submitted in the partial fulfillment of the requirements for the award of the degree of Master of Social Work specializing in community development.

I hereby declare that the results embedded in this research have not been submitted to any other University or Institute for the award of any degree or diploma, to the best of my knowledge and belief.

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ABSTRACT

The attitude and behavior change towards solid waste management among people in the Kochi corporate district. Initially, there were objections and skepticism against the concept of waste management as people got used to centralized systems. However, attitudes are changing with increasing awareness of the environmental impacts of inappropriate waste disposal and the benefits of segregation. Kochi's strong waste management system increases waste management awareness and practices by encouraging individuals and communities to take responsibility for their waste. Kochi community leaders and awareness campaigns have been instrumental in educating and encouraging residents to participate in solid waste management. The proposes changes in people's attitudes and behaviors towards waste management, resulting in a clean and healthy environment in Kochi.

The importance of understanding human behavior and attitudes towards waste management in order to develop effective strategies. It highlights the importance of proper waste management to reduce pollution, conserve resources, and improve public health and safety. Many incentives encourage people to practice appropriate waste management, including environmental awareness, responsibility, financial support and community involvement. Satisfaction with waste management services varies by region; some express dissatisfaction, some express satisfaction and some express satisfaction. The need for regular evaluation, review and discussion to develop waste management strategies, including activities such as collaboration with partners, regional differences and changes in waste management tools and methods.

ACKNOWLEDGMENT

I would like to acknowledge and give my warmest thanks to my supervisor Dr. Sheena Rajan Philip, Head of the department, Bharata Mata School Of Social Work Thrikkakara and other social work faculties who has helped and guided me in academics and co-curricular activities. Thank for their patience, love and invaluable constructive feedback which has made this work possible. Their guidance and advice carried me through all the stages of writing my thesis.

I would also like to give special thanks to my parents, siblings and my family as a whole for their continuous support and understanding when undertaking my studies all these years also during research and writing this thesis. Your prayer for me was what sustained me this far. Last not the least my sincere thanks to all colleagues for their continuous support, guidance, love and valuable feedback.

I sincerely thank all transgender people who participated in this study without which this study wouldn't be completed. I thank God almighty for the guidance in my life.

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CHAPTER 1

INTRODUCTION

WASTE MANAGEMENT SYSTEM

A waste management system refers to the processes, strategies and infrastructure put in place to handle, process and dispose of waste in an efficient and environmentally friendly manner. It includes the collection, transportation, sorting, recycling, processing and disposal of waste materials that arise during residential, commercial and industrial activities.

A well-designed waste management system aims to minimize the negative impacts of waste on human health, the environment and society as a whole. It focuses on reducing waste production, promoting waste sorting and recycling, and ensuring proper processing and disposal of residual waste.

Waste sorting is the practice of sorting different types of waste directly at the source, such as households, offices or public places. It involves categorizing waste into different streams such as organic (biodegradable) waste, recyclable waste (plastic, paper, metal, etc.) and hazardous waste. Proper sorting of waste facilitates efficient recycling and processing processes.

Waste collection involves the systematic collection of waste from various sources such as households, commercial establishments and public spaces. This includes the use of waste collection vehicles, bins and containers. After collection, the waste is transported to processing facilities or recycling centers for further processing.

Recycling is a vital aspect of waste management where materials such as paper, plastics, glass and metals are processed and transformed into new products. Recycling reduces the consumption of raw materials, saves energy and minimizes waste sent to landfills.

Resource recovery also includes other methods such as composting organic waste to produce nutrient-rich soil amendments.

Waste treatment involves processing waste to reduce its volume, mitigate potential environmental and health risks, and utilize valuable resources. Treatment methods can include biological processes, physical processes and chemical processes. The choice of treatment method depends on the nature and composition of the waste.

Landfills are designated places where residual waste that cannot be recycled or processed is disposed of in a controlled manner. Proper management of landfills includes measures that prevent contamination of soil and groundwater with methane emissions and odors. However, due to its impact on the environment, landfilling is considered the least desirable option in waste management.

A robust waste management system requires a supportive regulatory framework and policies at local, regional and national levels. These regulations cover waste management procedures, waste sorting requirements, recycling targets, landfill guidelines and penalties for non-compliance. Effective policies promote sustainable waste management practices and promote a circular economy.

Public awareness and education play a vital role in waste management. Informing and educating the public about waste sorting, recycling and responsible waste disposal helps to encourage behaviour change and active participation. Awareness campaigns, workshops and community engagement initiatives are important to promote a culture of sustainable waste management.

Establishing an effective waste management system requires cooperation between government authorities, waste management companies, local communities and other stakeholders. It is an ongoing process that involves continuous evaluation, improvement and adaptation to meet the evolving needs and challenges of waste management in a given area.

WASTE MANAGEMENT IN INDIA

Waste management in India is characterized by gradual development and increasing challenges due to rapid urbanization and population growth. Until the mid-20th century, waste management practices in India were largely decentralized, with communities relying on traditional methods such as composting and recycling. However, with the rise of urban areas and the emergence of a consumer society, the waste management system faced considerable pressure.

In the 20th century, India witnessed the introduction of centralized municipal waste management systems in large cities. The introduction of landfills and waste collection vehicles was intended to streamline the process, but insufficient infrastructure and insufficient resources hindered their effectiveness. As a result, open dumping and uncontrolled dumping became prevalent, leading to environmental degradation and threats to public health.

In recent years, the Indian government has recognized the need for sustainable waste management practices and has implemented various initiatives to address the problem, including waste segregation at source, promoting recycling and composting, and developing waste-to-energy projects. However, the challenges are enormous and sustained efforts are needed to achieve comprehensive and effective waste management across the country.

SUCHITWA MISSION AN INITIATIVE BY GOVERNMENT OF KERALA

Suchitwa Mission is an initiative by the Government of Kerala, India to promote sustainable waste management and create a clean and hygienic environment in the state. It is the Technical Support Group (TSG) in Waste Management sector under the Local Self Government Department, Government of Kerala. The mission was launched in 2008

and since then various programs and initiatives have been implemented to solve Kerala's waste management problems. It focuses on waste management at all levels, including waste separation, collection, transportation and disposal. It supports the concept of decentralized waste management and encourages local organizations and communities to manage waste effectively.

Suchitwa Mission promote the establishment of vermicomposting and biogas plants for the efficient use of organic waste. The facility helps convert biodegradable waste into valuable food and biogas, reducing the amount of waste sent to landfills. The project promotes the production of energy products from waste to convert non-recyclable and non-biodegradable waste into energy. This will help reduce waste and generate electricity or other energy. It has made significant progress in changing Kerala's waste practices. It helps develop waste management systems that reduce reliance on landfills and promote good practice for individuals and communities.

Suchitwa mission is to reduce, identify and properly dispose of waste. It promotes alternatives to single-use plastics and encourages the recycling and recycling of plastic waste. The Mission runs awareness campaigns, discussions and workshops to educate the public about the importance of waste management and sustainable practices. It also works to promote waste insurance among citizens. It Operates under the Swachh Bharat Mission, a nationwide eradication initiative by the Government of India. It contributes to the mission's goal of providing clean and appropriate waste management nationwide.

WASTE MANAGEMENT IN KERALA

The history of waste management in Kerala, a state located in the southwestern part of India, can be traced back several decades. Over the years, the state has seen significant changes in its waste management practices, moving from traditional methods to more organized and sustainable systems. Here is a brief overview of the development of waste management in Kerala.

Until the 1980s, waste management in Kerala primarily relied on traditional practices such as open dumping and incineration. Waste produced by households and commercial enterprises was often indiscriminately disposed of in open spaces or dumped into water bodies, leading to serious environmental and health problems. Lack of proper infrastructure and awareness of the effects of poor waste management have contributed to this unsustainable approach.

Recognizing the need for a more efficient waste management system, the state government initiated several measures in the 1990s. One significant step was the establishment of decentralized waste management units known as 'Nirmithi Kendras' in different parts of the state. These centers aimed to promote segregation, composting and recycling at the local level, reducing the burden on centralized waste management facilities.

In the early 2000s, Kerala witnessed the implementation of the Kerala City Solid Waste Management Rules, which laid down guidelines for waste segregation, storage, transportation and disposal. This move facilitated efficient waste management and promoted recycling and composting practices. The rules emphasized the importance of source segregation and encouraged households and institutions to separate their waste into biodegradable and non-biodegradable components.

Around the same time, the state government also introduced the concept of 'Clean Kerala Mission', a comprehensive campaign aimed at transforming waste management practices. The mission emphasized waste reduction, segregation and processing and included measures such as the establishment of material recovery facilities, management of construction and demolition waste, and promotion of organic farming using composted waste.

In recent years, Kerala has made significant progress in waste management by adopting innovative approaches. One such example is the introduction of decentralized waste

management systems, including biogas plants and aerobic composting units, at the local level. These systems not only support resource recovery, but also generate clean energy and organic manure. The state also actively supports public awareness and citizen involvement in waste management through campaigns, workshops and educational programs. The aim is to promote a sense of responsibility among individuals and communities to adopt sustainable waste management practices.

Kerala has also embarked on waste-to-energy projects aimed at harnessing the energy potential of waste while minimizing environmental impact. These projects involve converting organic waste into biogas or electricity using technologies such as anaerobic digestion or incineration with energy recovery.

Although Kerala has made significant progress in waste management, problems persist. The state faces challenges such as insufficient infrastructure, insufficient funding, and the need for constant monitoring and enforcement. However, with sustained efforts by the government, active participation of citizens and support for innovative solutions, Kerala is striving for a more sustainable and efficient waste management system.

CENTRALISED WASTE MANGMENT SYSTEM

Central waste management can face many problems, often not meeting the specific needs and characteristics of local communities. Different regions may have different waste products, waste regulations and practices. Centralized approaches can make up for this difference, leading to ineffective waste management strategies. Centralized systems should be divested and moved from several locations to a central location that may be away from the area. This transportation system incurs huge costs in terms of fuel consumption, emissions and maintenance. In addition, long transportation increases the risk of accidents and traffic accidents.

Central waste management systems can have an impact on the environment. Transporting waste over long distances causes greenhouse gas emissions that contribute to climate change. In addition, central facilities such as landfills and incinerators can cause air and water pollution, which can affect the health of nearby communities and ecosystems. In a centralized system, decision-making and waste management are usually controlled by a central agency or organization.

Improper management, favoritism and lack of consensus can lead to poor waste management, wasteful spending and impact on the environment and public health. It can be difficult for central systems to adapt to new technologies, recycling processes or waste reduction initiatives. The process of centralizing decision-making can hinder the implementation of new solutions and thus hinder progress in waste management.

The shift from a centralized waste management system to a decentralized model in Kochi represents a proactive and sustainable approach to waste management. This transition aims to promote community involvement, resource recovery and environmental protection while addressing the challenges associated with traditional centralized waste management.

DECENTRALISED WASTE MANAGEMENT SYSTEM

A decentralized waste management system offers several advantages over traditional centralized approaches. This model, which emphasizes local waste management, brings numerous benefits to communities and the environment.

Decentralized waste management means increased community participation. By involving residents and institutions in waste sorting, recycling and composting practices, a decentralized approach promotes a sense of ownership and responsibility among

individuals. It enables communities to actively contribute to waste management efforts, leading to a more engaged and greener society, Resource recovery support.

Decentralized waste management systems often include facilities such as composting units and biogas plants. These devices enable the conversion of organic waste into valuable resources such as nutrient-rich compost for agriculture or renewable energy in the form of biogas. By recovering resources from waste, the decentralized model helps reduce dependence on external inputs and minimizes the need for landfill space.

A decentralized system also offers logistical advantages. Waste produced locally is managed within the community, reducing the need for long-distance transport to centralized facilities. This not only saves transport costs, but also reduces greenhouse gas emissions associated with waste collection and transport. In addition, decentralized waste management reduces the burden on existing centralized facilities and allows them to focus on managing non-recyclable or residual waste.

From an environmental point of view, decentralized waste management contributes to reducing pollution. By segregating waste at source and introducing localized treatment methods, the decentralized model minimizes the release of harmful gases and pollutants into the air, soil and water bodies. It helps prevent contamination of natural resources and reduces the overall ecological footprint associated with waste disposal.

ADVANTAGES OF DECENTRALISED WASTE MANAGEMENT SYSTEM

While decentralized waste management systems have some advantages, they also face their own challenges. Some of the problems that a decentralized waste management system may encounter are: Lack of structure: Poor waste management often lacks consistency and standardization in waste collection Garbage, sorting and disposal. This can lead to confusion and inefficiency throughout the waste management process.

Coordination and cooperation: In the distribution process, many stakeholders such as families, businesses and local governments are involved in the management of waste. Coordinating and coordinating these disparate organizations can be challenging, especially when implementing an integrated management strategy and ensuring effective communication and collaboration.

Infrastructure and resource limitations: Establishing solid waste management systems such as landfills, recycling facilities and composting facilities requires significant investments. In some cases, the lack of financial resources and suitable land for infrastructure development can prevent waste management systems from working effectively.

Audit and Operations: Compliance with waste management regulations and practices will be more difficult in a decentralized system. Monitoring waste, identifying and disposing of water in multiple locations can be a difficult task, and policy enforcement will be even more difficult without centralized control.

Changes in public participation: Public participation and awareness play an important role in waste management. However, within a distribution system, different regions or communities may have different levels of participation and awareness.

While there are more caring and environmentally conscious people in some areas, there may be a lack of interest or knowledge in waste management in others. Inequalities and inequalities: Fragmented waste management systems can inadvertently exacerbate inequalities and inequalities. Wealthy regions may have better waste management and services than less resourceful regions.

This can lead to disproportionate consequences of waste management, with some communities or disadvantaged groups facing unacceptable environmental and health conditions. Integration with larger waste management systems: In some cases,

decentralized waste management systems may struggle to integrate effectively with larger municipal waste management systems or in the region.

Integrating the joint venture with a comprehensive waste management strategy can be a complex task that requires coordination, planning and policy reform. Solving these problems requires careful planning, collaboration with partners and good management. It is important to develop clear guidelines, invest in infrastructure, raise public awareness and encourage collaboration between different waste management organizations.

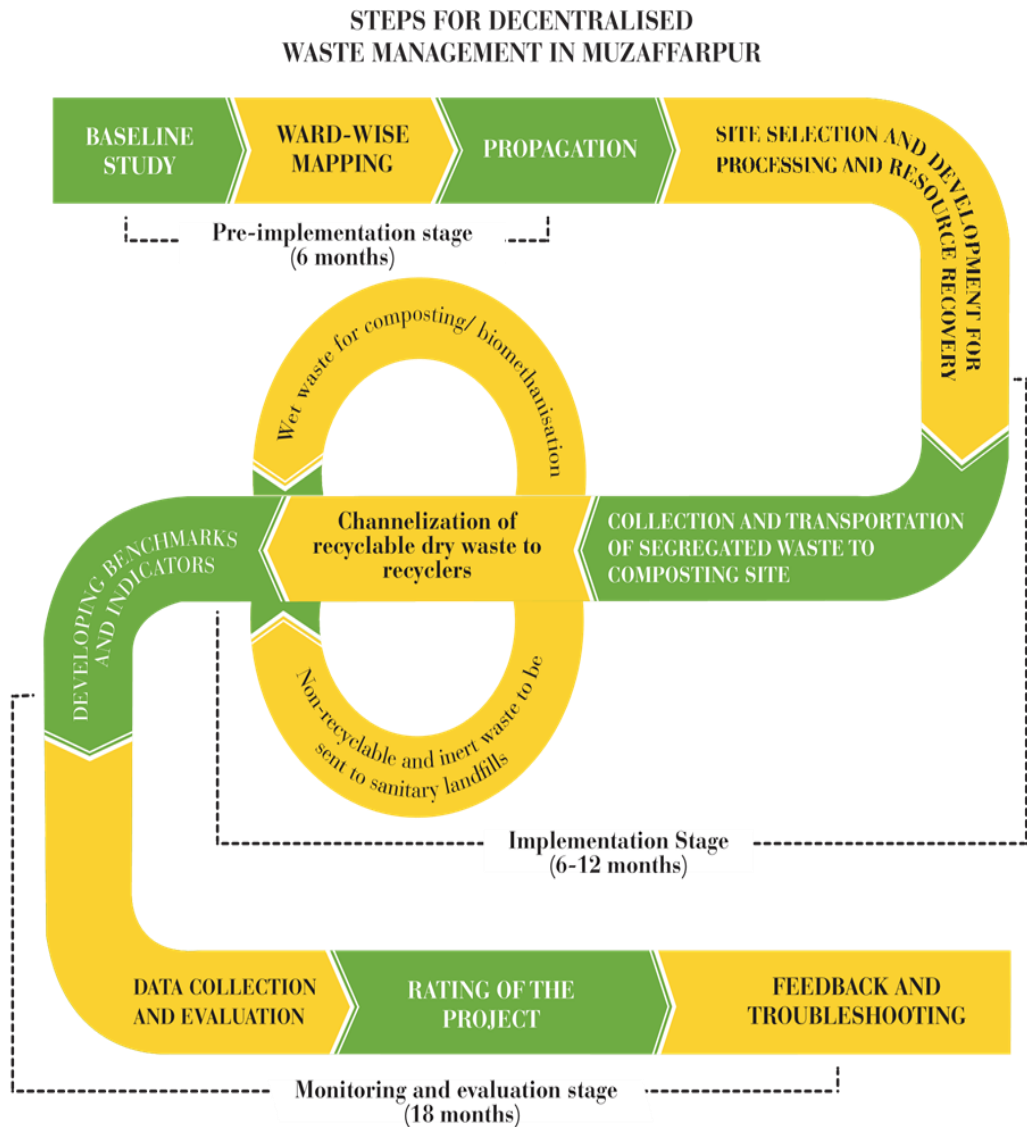


Image 1: stages for implementing decentralized waste management system

CHALLENGES FACED BY DECENTRALISED WASTE MANAGEMENT SYSTEM

A decentralized waste management system requires the active participation and cooperation of residents, local authorities and waste management agencies. However, the implementation of the system may vary in different areas of Kochi. In some places, proper segregation and collection procedures are followed, while in others the system may be poorly implemented or completely ignored. Inconsistent implementation hinders the overall effectiveness of a decentralized system.

A significant problem is the lack of awareness among the general public about the importance of waste sorting and decentralized waste management practices. Many residents may not be fully aware of segregation rules or the benefits of composting and recycling. As a result, there is a lack of active participation and incorrect waste disposal practices continue, leading to an increased landfill burden.

Successful implementation and maintenance of a decentralized waste management system requires adequate resources and funding. Kochi may face financial constraints in investing in infrastructure development, waste collection vehicles and composting facilities. Limited resources hinder the expansion and sustainability of the decentralized system, making it difficult to manage the growing waste production.

Effective monitoring and enforcement mechanisms are key to the success of a decentralized waste management system. However, there may be a lack of strict enforcement of waste segregation and waste disposal regulations in Kochi. Lack of control allows for non-compliance and illegal dumping, which undermines the goals of a decentralized system.

Informal waste collectors play an important role in waste management, especially in decentralized systems. However, their integration into a formal waste management system can be challenging. Issues such as lack of recognition, low wages, and limited

access to benefits and training hinder their inclusion. Addressing these challenges and providing better support to informal waste collectors is critical to the overall success of a decentralized system.

Efforts are needed to address these challenges and improve the decentralized waste management system in Kochi. This may include increased investment in infrastructure, awareness campaigns to educate the public, stronger enforcement of waste management regulations and better integration of informal waste pickers into the system. Collaboration between local authorities, waste management agencies and residents are essential to overcome these challenges and move towards a more sustainable approach to waste management.

KOCHI CORPORATION

Located in Kerala, India, Kochi Corporation is the governing body responsible for the management and development of the city of Kochi. As the largest municipal corporation in Kerala, Kochi Corporation plays an important role in the management of all aspects of urban infrastructure, utilities and urban planning. Founded in 1967, the company has been instrumental in transforming Kochi into a vibrant and prosperous city.

Kochi Corporation is subdivided into districts, each representing a specific area of the city. These neighborhoods are officials who provide good governance and ensure that residents' needs and concerns are appropriately addressed.

Currently, the company is divided into 74 districts, each with an elected councilor representing the interests of the people in that region. The zoning of companies makes the decision-making process more efficient and ensures that urban services and construction projects are carried out effectively in different parts of the city.

Overall, Kochi Corporation is divided into districts to provide better governance, public facilities and urban development for the people of Kochi. The department allows local representatives and support advisors to engage with stakeholders, learn about their problems and work to fix them. Through this decentralized approach, the company works to create a well-planned, inclusive city that meets the diverse needs of its residents.

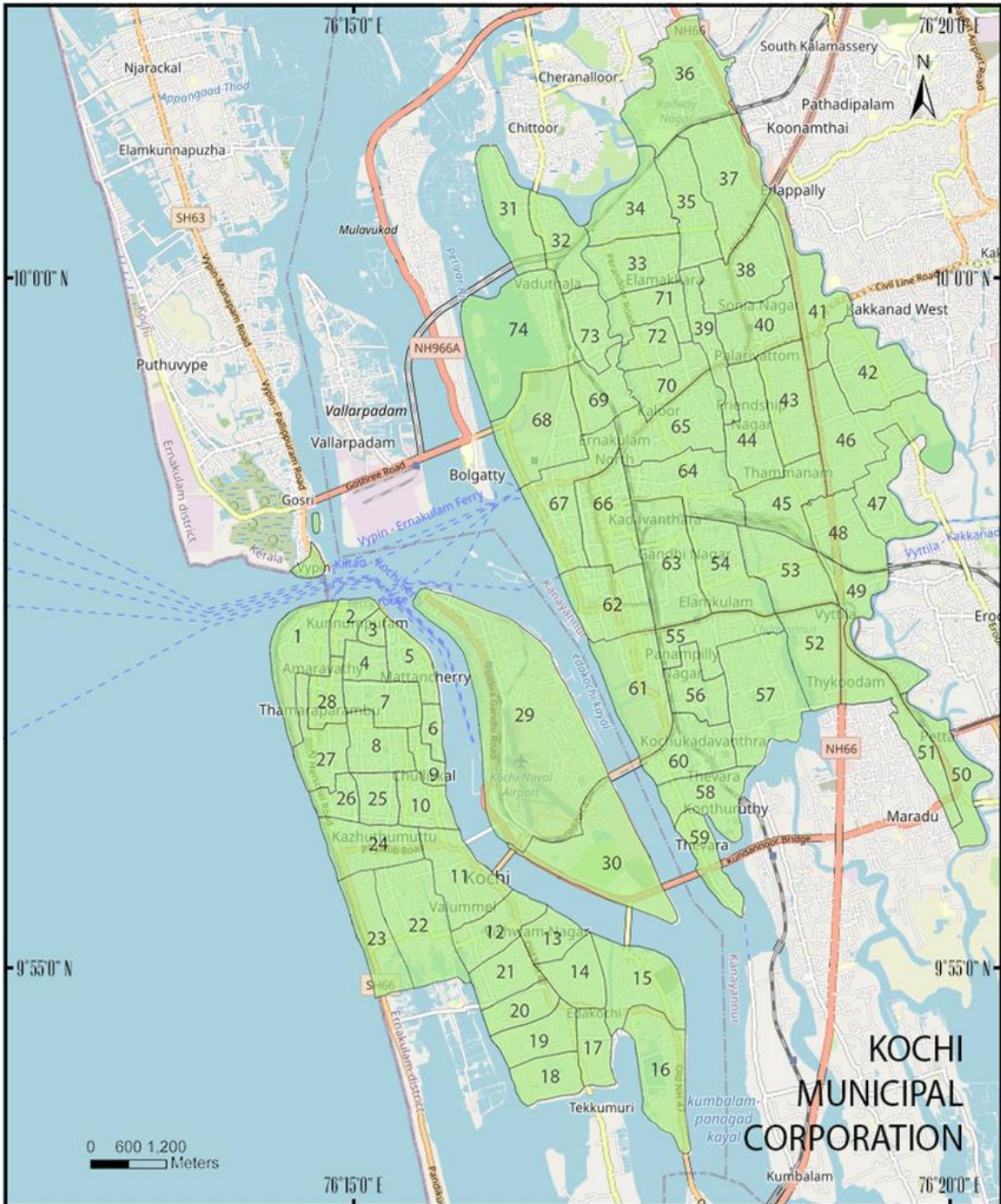


Image 2: Geographical Map of Kochi Corporation

THE PAST AND PRESENT SITUATION OF WASTE MANAGEMENT IN KOCHI

The city of Kochi, located in Kerala, India, has been making commendable efforts in recent years to improve its waste management practices. The current state of waste management in Kochi reflects a shift towards more organized and sustainable systems that aim to address the environmental and health issues associated with waste.

One of the notable developments in Kochi's waste management is the implementation of a decentralized waste management model. The city has introduced the concept of 'Clean Kochi' or 'Ente Kochi' which emphasizes segregation of waste at source. Households and institutions are encouraged to sort their waste into different categories such as biodegradable, recyclable and non-recyclable. This enables efficient management of each waste stream and facilitates recycling and composting.

To support this decentralized approach, Kochi has set up waste management facilities at the local level. Composting units and biogas stations have been set up in various neighbourhoods to turn organic waste into nutrient-rich compost and renewable energy sources. These decentralized units not only reduce the burden on centralized waste management facilities, but also promote resource recovery and minimize the amount of waste sent to landfills.

Kochi has also made progress in waste collection and transportation. The city has introduced separate waste collection systems with separate vehicles designed to collect different types of waste. This ensures that the separated waste remains separated during the collection process, reducing contamination and increasing the efficiency of downstream treatment processes.

In addition to these initiatives, Kochi actively promotes public awareness and participation in waste management. Various awareness campaigns, workshops and

training programs are organized to educate residents on the importance of waste segregation, recycling and responsible waste disposal. Citizen participation is encouraged through the creation of residents' associations and waste management committees, promoting a sense of ownership and collective responsibility.

Despite these positive steps, problems persist in Kochi's waste management. A significant problem is the disposal of non-recyclable and non-biodegradable waste. Although efforts are being made to minimize such waste through recycling and resource recovery, the management of residual waste remains a problem. The city is exploring alternatives such as waste-to-energy projects to exploit the energy potential of non-recyclable waste while complying with environmental regulations.

Kochi's current waste management situation overall shows a shift towards sustainable practices driven by decentralized waste management, segregation at source and citizen participation. The city's commitment to improving waste management practices and its proactive approach to problem solving indicate a positive trajectory towards a cleaner and greener future.

BRAHMAPURAM: A THREAT TO KOCHI

Brahmapuram, located near Kochi in Kerala, India, has been associated with several waste management problems over the years. The situation in there highlights the challenges we face in effective waste management and disposal in urban areas. Here's an overview of what happened and the problems associated with Brahmapuram's waste management.

Brahmapuram was established as a centralized solid waste management facility to handle the waste generated by Kochi and its surrounding areas. However, over time, the site has faced many problems that have posed significant environmental and health problems.

One of the primary problems was the indiscriminate dumping and accumulation of waste without proper sorting or treatment.

Uncontrolled waste disposal in Brahmapuram has resulted in emissions of foul odors and release of noxious gases, causing severe air pollution in the vicinity. Residents living in the surrounding areas have complained of health problems, including respiratory problems and allergies, due to the noxious fumes emanating from the landfill.

Besides, unmanaged waste in Brahmapuram posed a threat to water bodies in the area. Stormwater runoff from the site contaminated nearby water sources, including rivers and streams, affecting the aquatic ecosystem and potentially contaminating groundwater.

The extent and volume of waste accumulated in Brahmapuram also exceeded the capacity of the site, leading to overflowing of waste and encroachment on surrounding lands. The uncontrolled expansion of the landfill has raised concerns among local communities and environmental activists, who have stressed the need for immediate action to address the situation.

Realizing the gravity of the problem, the government and local authorities have taken steps to alleviate the problems in Brahmapuram. Efforts have been made to improve waste management practices, including the implementation of segregation at source, decentralized waste management models and promotion of recycling and composting.

In addition, plans have been put forward to move to more sustainable waste management practices, such as waste-to-energy projects, to harness the energy potential of non-recyclable waste while minimizing environmental impacts. The government has also initiated measures to close the Brahmapuram site and set up alternative waste management facilities in compliance with environmental regulations.

Despite these efforts, challenges remain in completely solving the Brahmapuram waste management problem. The closure and remediation of the site, together with the effective management of the old waste, present significant logistical and financial challenges. The

need for continuous monitoring, community involvement and public awareness campaigns is essential to ensure sustainable waste management practices and prevent similar problems in the future.

The situation in Brahmapuram issues related to uncontrolled waste disposal, including air and water pollution, encroachment and health hazards. Efforts are underway to address these challenges and transition to more sustainable waste management practices, but further steps and long-term planning are necessary to mitigate the impact and ensure a cleaner and healthier environment for surrounding communities.

SHIFT FROM CENTRALISED TO DECENTRALISED WASTE MANAGEMENT IN KOCHI

A remarkable shift in the waste management system from a centralized approach to a decentralized model. This transition reflects a growing recognition of the benefits and effectiveness of local waste management strategies.

Previously, Kochi relied on a centralized waste management system where waste produced by households and businesses was collected and transported to a single central facility, such as the Brahmapuram Waste Management. However, this centralized model faced several challenges, including the accumulation of large amounts of waste, environmental pollution, and health risks.

To address these issues, Kochi has adopted a decentralized waste management system in recent years. The focus has shifted to managing waste at source, that is, at the neighborhood or community level. This approach encourages residents and institutions to sort their waste into different categories such as biodegradable, recyclable and non-recyclable at the point of generation.

Under the decentralized model, Kochi has set up local waste management units in various districts. These units include composting plants and biogas stations, which enable the conversion of organic waste into compost or renewable energy. By local waste management, the city aims to reduce the burden on centralized waste management facilities, promote the use of resources and minimize the amount of waste sent to landfills.

Shifting to a decentralized waste management system in Kochi has several advantages. It promotes community participation and ownership in waste management practices as residents actively contribute to sorting and managing waste. This decentralized approach also supports the principles of sustainability, circular economy and resource conservation by emphasizing recycling, composting and renewable energy production.

In addition, decentralization of waste management helps to solve the logistical problems associated with transporting waste over long distances and reduces the impact of transport on the environment. It also allows for more localized monitoring and regulation of waste management practices and ensures better compliance with waste management guidelines and environmental standards.

While the transition to a decentralized waste management system in Kochi is a positive development, there are still challenges. It requires extensive community awareness and participation to ensure effective waste segregation and management practices at the local level. Adequate infrastructure, technical expertise and financial resources are also essential for the successful implementation of decentralized waste management units.

Decentralized waste management systems promote adaptability and scalability. They can be tailored to the specific needs and characteristics of different communities, taking into account factors such as population density, waste composition and available infrastructure. This flexibility enables efficient waste management in a variety of environments, from urban areas to rural or remote locations.

Benefits of a decentralized waste management system include increased community participation, resource recovery, logistical efficiency, pollution reduction and adaptability. This approach is in line with the principles of sustainability, circular economy and local self-sufficiency, which leads to more efficient and ecological waste management.

Kochi's decentralized waste management system, like any other system, faces several challenges in its implementation and operation. These challenges hinder the efficiency of the system and create barriers to achieving effective waste management. One significant problem is the lack of infrastructure to support decentralized waste management in Kochi. The system requires a well-established network of waste collection points, waste treatment facilities and composting units throughout the city. Inadequate infrastructure leads to a limited coverage area and makes it difficult to manage the waste generated by the large population.

In this context the transition from centralized waste management systems to decentralized waste management systems has brought about great changes in people's attitudes and behaviors towards waste. In centralized systems, waste is often seen as a problem to be solved and forgotten. People will throw their garbage in landfills or landfills and trust the authorities to take care of it. This leads to a sense of conflict and dissatisfaction with waste management because people are not directly responsible for the consequences of their actions.

However, with the proliferation of waste management practices such as community composting or local recycling projects, people are becoming more involved and responsible. This change has led to a change of attitude as people see residual waste as a valuable resource that can be reused, recycled or recycled. They are involved in waste sorting and sorting, reducing pollution and promoting recycling practices.

In addition, the distribution of waste management promotes a sense of ownership and interest in the community. People are now more connected to the waste they create

because they are the first to witness the impact of their actions on the environment. This has led to increased awareness of the need to reduce production waste, use sustainable practices and engage in circular economy strategies. The study focuses on the attitude and behavior change in the people who are residing under the Kochi Corporation due to the shift from centralized to decentralized waste management system.

CHAPTER 2

REVIEW

OF

LITERATURE

According to (Chithra & Yoonus, 2021) Solid waste management is a significant global issue, particularly in developing countries, due to its detrimental effects on the environment. In Kozhikode, the existing waste segregation and collection processes are inadequate, leading to challenges such as insufficient composting capacity and landfill dumping, which in turn result in health hazards and environmental pollution. The objective of this paper is to identify the types and quantities of waste generated and address the gaps in the current system by proposing a sustainable model for solid waste management.

The study reveals variations in per capita waste generation based on income levels and land use patterns, highlighting the need for tailored approaches. The main gaps identified are in waste collection and treatment, emphasizing the need for an improved system. In this context, community-level waste management emerges as a preferred approach due to its potential effectiveness and community involvement.

To overcome the constraints and challenges, the paper proposes a sustainable decentralized system for solid waste management in Kozhikode Corporation. This model combines the use of biogas plants and compost bins at the community level, offering a range of benefits. The integration of biogas plants can help convert organic waste into energy, reducing the reliance on conventional energy sources and minimizing environmental impact. Additionally, the compost bins facilitate the efficient decomposition of organic waste, leading to the production of nutrient-rich compost that can be used for agricultural purposes or landscaping.

The proposed model not only addresses the issues related to waste segregation, treatment capacity, and environmental impact but also considers the social equity aspect. By involving communities in waste management activities, the model promotes a sense of ownership and responsibility among residents, leading to improved waste management practices and a cleaner environment.

Overall, the sustainable decentralized system proposed in this paper offers a comprehensive solution to the challenges faced in solid waste management in Kozhikode Corporation. It addresses the gaps in the existing system, promotes environmental sustainability, provides economic viability through energy generation and compost production, and ensures social equity by involving the community. By implementing this

model, Kozhikode can achieve improved waste management outcomes and contribute to a cleaner and healthier environment.

According to (Unnikrishnan et al., n.d.)Waste management is a significant challenge in cities and townships across India. The increasing population and changing lifestyles have led to a substantial increase in waste generation. However, despite efforts to treat waste, urban local bodies (ULBs) struggle to fulfil their responsibilities effectively, leading to health problems and a decline in the quality of life. Waste management practices vary across different cities, with some implementing door-to-door collection services and others relying on centralized schemes. However, many cities face challenges, such as overflowing garbage bins at public collection sites and inefficient waste collection.

A decentralized waste management system offers advantages in terms of aesthetics and the elimination of secondary collection services by the municipality. The legal framework in India supports community-based waste management schemes, with rules requiring urban local bodies to promote waste segregation at the source. Financial support from municipalities, NGOs, or similar institutions is crucial for the sustainability of decentralized initiatives. The involvement of supervisors and the commitment of management and the community are important factors in ensuring smooth operation. However, technical challenges and the acceptance of composting sites by the locality can impact the sustainability of decentralized waste management units.

Decentralized waste treatment options have indirect benefits such as reducing the transportation of waste to distant dumping sites, minimizing diesel consumption, traffic congestion, air pollution, and road maintenance costs. Groundwater contamination can also be reduced through the prevention of leachate seepage.

To achieve long-term sustainability, stakeholders in the composting business should focus on technical improvements, municipal support, and parallel schemes by the government. Municipalities should provide financial support and integrate community initiatives into their waste management strategies. Government schemes that impose mandatory fees for waste collection may deter support for community ventures.

Collaboration with specialists and consultancy services can also contribute to the success of decentralized waste treatment options.

In conclusion, the sustainability of decentralized waste management options in urban India depends on the support of municipalities and residents, as well as the dedication of individuals involved in the operation. Adequate support and efforts are essential for achieving effective waste management in urban areas.

According to (Howe, 2014) India undergoes industrialization and urbanization; the increasing consumption patterns are resulting in a significant rise in waste generation. Traditional waste management systems, which relied on municipal waste collection and informal recycling, are facing challenges. Local communities living near landfills are protesting against their presence, and finding new landfill sites is becoming difficult as urban areas expand. This resistance to landfills is pushing cities to explore alternative waste management approaches.

Many municipal decision-makers are turning to private companies for waste collection and waste-to-energy facilities to process mixed waste. However, these centralized technological systems have drawbacks. They are socially inequitable as they burden a single community with waste processing, and they are not economically efficient due to high initial costs and long-term contracts. They also harm local air and water quality and create dependence on a single facility, making the system vulnerable to failure. Furthermore, these centralized systems threaten the livelihoods of waste pickers.

This combined approach successful, cities should create long-term waste management plans, focus on eliminating non-recyclable and non-biodegradable waste, invest in the capacities of the informal waste sector, process waste locally to minimize impacts on host communities, and ensure equitable siting by engaging the community through a consensus-building process. Incorporating these recommendations into a city's approach will lead to a more stable waste management system.

While engaging in a participatory public process may be perceived as expensive and time-consuming, it is essential to compare these costs to the current situation, where

opposition and delays in waste facility construction result in significant time and financial costs. Consensus-building activities may require investment, but they are more cost-effective than dealing with prolonged opposition and rushed construction.

These recommendations are specifically tailored to the waste management challenges in urban India but can also be relevant to other cities facing similar issues worldwide. Growing cities in Latin America, Africa, and other parts of South Asia with increasing populations and waste disposal needs can benefit from a focus on waste diversion, building recycling and the informal waste sector, and decentralized waste processing.

In conclusion, by leveraging the existing assets in Indian cities, particularly the informal waste sector, and investing in decentralized waste management, cities can develop more stable and effective waste management systems. These systems may not appear as efficient on the surface but will better serve cities in the long run as they continue to grow.

According to (Sharma et al., 2016)The focuses on decentralised waste management in the Indian Railways and provides recommendations for a sustainable waste management system. The brief highlights the significant amount of solid waste generated at major railway stations, with a considerable portion being recyclable and biodegradable. It discusses the potential of waste-to-energy plants, such as the Kishanganj plant in Delhi, to process biodegradable waste and generate electricity. The brief also highlights the energy recovery potential from biogas generation and the importance of water conservation and efficient toilet systems on trains.

An enabling environment for sustainable waste management in the Indian Railways, the brief recommends leveraging existing regulations, aligning with national missions and policies, and restructuring institutional arrangements. It proposes the formulation of a Comprehensive Environmental Management Plan (CEMP) that addresses waste management, resource use efficiency, energy management, and pollution control. Pilot studies and a detailed strategy are suggested for diverting a significant portion of solid waste from landfills. Additionally, the formation of a joint committee involving railway

authorities, the Ministry of Urban Development, Pollution Control Boards, and civil society experts is proposed to ensure effective implementation of interventions.

Overall, the brief emphasizes the importance of decentralised waste management, resource efficiency, and environmental considerations in the Indian Railways. It provides a roadmap for sustainable waste management practices and calls for collaborative efforts among different stakeholders to achieve effective and environmentally sound solutions.

According to (Jayakumar Menon & Palackal, 2022) This paper discusses the challenges and potential solutions for sustainable municipal solid waste management (MSWM) in urban settings, with a focus on the Thiruvananthapuram Municipal Corporation (TMC) in Kerala, India. The uncontrolled generation of solid waste due to rapid urbanization and lifestyle changes has led to negative health, environmental, and socio-economic impacts, particularly in developing countries. Two main approaches, centralized and decentralized, are being followed in MSWM, and their efficiency is a subject of ongoing debate.

To achieve sustainable MSWM, different management methods are needed to minimize waste production, maximize energy/material recycling, and meet economic, environmental, and social needs. The paper suggests adopting a decentralized approach as a priority, while implementing a semi-centralized approach for specific waste types such as treated sanitary waste, bio-medical waste, and inorganic waste storage. The success of centralized MSWM depends on source-level segregation, which is key to achieving effective centralized management.

The paper also addresses the proposal for centralized waste-to-energy plants for power generation. However, experts argue that the low calorific value of bio-waste in Kerala may not result in significant energy yield through incineration. Instead, they advocate for an integrated approach to solid waste management, which considers the different components of the waste stream and ensures separate disposal methods. The concept of "integrated solid waste management" is based on principles of equity, effectiveness, efficiency, and sustainability.

For the decentralized approach, the concept of "integrated sustainable waste management" involves active involvement of the municipal body, waste generators, and

formal and informal institutions associated with MSWM as stakeholders. The paper suggests developing a plan for integrated solid waste management in TMC, clearly defining the roles of all stakeholders, and addressing gaps in service implementation, inorganic waste management, sanitary waste management, biomedical waste management, and other areas.

In summary, the paper emphasizes the need for sustainable MSWM practices and suggests an integrated approach that combines decentralized and semi-centralized methods. It highlights the importance of stakeholder involvement, effective waste segregation, and addressing spatial and management gaps to achieve efficient and sustainable waste management in urban areas.

According to (Mohan & Kumar, 2023) the Brahmapuram fire incident in Kochi was a tragic event that brought attention to the urgent need for effective disaster prevention measures and improved waste management practices in India. This study aims to explore the lessons learned from the incident and provide recommendations for future disaster prevention strategies.

The study involves a comprehensive review of literature on disaster prevention and response, as well as an analysis of the factors that contributed to the Brahmapuram fire incident. Interviews with key stakeholders, including emergency responders, government officials, and community members, are conducted to gain insights into the challenges and opportunities for enhancing disaster prevention measures.

The findings of the study have relevance not only for the Kochi community but also for other regions vulnerable to similar disasters. The recommendations derived from the study can inform the development of effective disaster prevention strategies to reduce the risk of loss of life and property in future incidents.

In conclusion, the Brahmapuram waste disposal centre mishap in Kochi highlights the pressing need for improved disaster prevention policies and waste management practices in India. It reveals concerns about the safety of waste disposal facilities and exposes government negligence in waste treatment and disposal. While promises have been made to prevent similar incidents, their implementation remains uncertain.

Comparison with global disaster prevention policies underscores the importance of collaboration and adopting best practices from other countries. The UN's Sendai Framework for Disaster Risk Reduction provides a comprehensive framework that requires better implementation and enforcement at national and local levels.

Furthermore, the study reveals that waste disposal facility mishaps are not unique to India, emphasizing the need for governments to learn from such incidents and take preventive measures. This necessitates greater accountability, transparency, stronger regulations, and enforcement mechanisms in waste management practices.

The Brahmapuram fire incident resulted from multiple factors, including government negligence, ineffective disaster prevention policies, and inadequate waste management practices. To prevent similar incidents, a comprehensive approach is essential, encompassing improved policies, stronger regulations, and enhanced accountability and transparency in waste management practices.

According to (Singh Rozita, 2015)The potential of decentralized solid waste management as an alternative solution to address the shortcomings in municipal solid waste management in New Delhi, India is a topic of study that highlights the inadequacies of waste management services despite significant expenditure by the Municipal Corporation of Delhi (MCD).

One of the primary challenges faced by the MCD is the shortage of land and lack of planning, which has led to the existing landfill sites exceeding their capacities. Additionally, the implementation of the Municipal Solid Waste (MSW) Rules introduced in 2000 has been poor. In light of these challenges, decentralized solid waste management emerges as a promising approach that shifts the responsibility of waste management from solely relying on the government or local municipalities.

Decentralized waste management emphasizes reducing waste at its source through community involvement in practices like waste segregation, composting, and bio-methanation. By implementing decentralized systems, not only can costs be reduced for the municipal authority, but it also raises environmental awareness among beneficiaries and creates employment opportunities within the informal waste sector.

The concept of Integrated Solid Waste Management (ISWM), which focuses on managing and disposing of distinct waste components separately, aligns closely with decentralized waste management practices. By implementing ISWM principles, such as source separation of waste streams, recycling, and proper disposal of different waste types, the overall effectiveness of waste management can be improved.

The study aims to assess the feasibility of implementing decentralized waste management in Delhi, taking into account studies that indicate approximately 50% of the waste generated in the city is organic. Additionally, community waste management projects undertaken by NGOs are considered as potential models for decentralized waste management.

Overall, the study explores the potential benefits and feasibility of implementing decentralized waste management in New Delhi. It emphasizes the importance of community involvement, waste segregation, and the adoption of ISWM principles to address the shortcomings in municipal waste management and create a more sustainable and efficient waste management system in the city.

According to (Kyere et al.,2019) Decentralized solid waste management in the Berekum and Dormaa Municipalities in the Brong Ahafo Region of Ghana. It examined the involvement of the private sector in waste management and the quality of waste management services in these municipalities. A survey of 312 households was conducted to analyse performance improvement, regulatory policies, and sustainable service delivery in solid waste management. The findings of the study revealed that there were no mechanisms for full cost recovery, particularly for the majority of residents who patronize communal collection services. The study recommends the adherence to normative standards, the adoption of appropriate cost recovery strategies for low-income groups, and the restructuring of institutional arrangements to improve municipal solid waste management in Ghana. The study also highlighted the lack of funds and public education as barriers to the participation and involvement of households in waste management. Furthermore, the study identified weak regulatory practices and non-adherence to contractual obligations as factors that hindered full cost recovery and better service quality. Inadequate institutional capacity, including a lack of personnel and

logistics, also contributed to the challenges in waste management. The study emphasized the need for strict monitoring and enforcement of sanitation bye-laws, as the non-enforcement of these bye-laws has led to indiscriminate dumping in the municipalities. Overall, the study underscores the importance of addressing financial constraints, improving regulatory practices, strengthening institutional capacity, and enforcing sanitation bye-laws to enhance decentralized solid waste management in Ghana's municipalities. These measures can contribute to better service delivery, improved environmental outcomes, and the overall well-being of the communities involved.

According to (Iyer, 2016)The study focuses on solid waste management in the Mumbai Metropolitan Region (MMR) in India, which comprises seven municipal corporations. Currently, the waste management practices in these corporations rely on centralized methods, where waste is collected and disposed of in designated landfills. However, there is a growing recognition of the need for decentralized waste management solutions to address the challenges associated with centralized systems.

The study examines the extent to which various entities, including institutions, communities, and emerging recyclers, have implemented decentralized waste management practices in the region. It explores the successes and challenges faced by these entities in implementing such practices. One of the challenges highlighted is the lack of appropriate channels for managing rejects and sanitary waste, indicating the need for innovative solutions in these areas.

Additionally, the study acknowledges the limitations faced by municipal corporations, which are financially dependent on the central and state governments. This dependency can hinder the implementation of decentralized waste management practices. However, despite these constraints, the study emphasizes the importance of assessing the potential for energy and material recovery from waste and its correlation with municipal waste management. This highlights the need for exploring opportunities for waste-to-energy and recycling initiatives in the region.

To support its findings, the study provides examples of successful waste management practices and the involvement of a bio-medical waste technology provider. These

examples aim to demonstrate the feasibility and potential benefits of decentralized waste management approaches. The ultimate goal is to contribute to the creation of greener and more sustainable communities in the Mumbai Metropolitan Region.

Overall, the study underscores the importance of transitioning from centralized to decentralized waste management practices in the Mumbai Metropolitan Region. It highlights the challenges, limitations, and potential opportunities associated with such a transition, with the aim of promoting sustainable waste management practices and creating a more environmentally friendly region.

According to (Chithra et al., 2016)The impact of residential land use on urban environment, specifically in relation to municipal solid waste management. The rapid urbanization trend worldwide, projected to reach 70% of the total population by 2050, has made residential land use a crucial factor in urban infrastructure development. Municipal solid waste management has emerged as a major concern for urban local self-governments in India. The objective of this doctoral research-based paper is to assess the position of the municipal solid waste management sector in comparison to other sectors of the urban environment and develop a waste management index for comparing urban areas in terms of waste generation and management. The study conducted an expert questionnaire survey using the Analytic Hierarchy Process (AHP) methodology with 93 experts across India to determine the significance of the waste management sector and its impact on the urban environment. A household survey was also conducted in 51 wards of Kozhikode Corporation to validate the waste management index generated from the expert survey. The findings indicate that municipal solid waste management is the most affected sector among the urban environment sectors. The waste management index generated from the surveys aligned well with residential density and land-use characteristics in the surveyed wards. This index has the potential to identify areas in need of intervention, particularly in terms of infrastructure development for municipal solid waste management. The survey results are analyzed, compared, and presented in this paper, providing valuable insights for addressing waste management challenges in urban areas.

According to (Sekito et al.,2013) This study focuses on the level of environmental awareness and behaviors of residents towards waste management and recycling in Semarang city, Indonesia. The researchers conducted a questionnaire survey in areas with and without Community-Based Waste Management (CBWM) systems to compare resident behaviors and identify influencing factors on people's willingness to cooperate with source separation. They also estimated the waste flow in areas with CBWM and discussed the benefits and challenges of CBWM to provide recommendations for promoting it in developing countries.

The findings of the study indicate that the implementation of CBWM had positive effects on waste discharge behavior. In areas where CBWM was already in place, residents showed a reduction in inappropriate waste disposal behaviors such as disposing of waste on the side of the road, into river streams, or engaging in illegal burning. This suggests that CBWM plays a significant role in reducing improper waste disposal practices and contributing to environmental improvement.

The study emphasizes the importance of further investigating the relationship between CBWM implementation and waste management behaviors through future field studies. By highlighting the positive effects of CBWM on waste management behaviors, the study provides valuable insights for promoting CBWM in developing countries like Indonesia.

It is crucial for stakeholders involved in waste management to recognize the level of environmental awareness and behaviors of residents. However, the study also acknowledges the challenges and disadvantages associated with CBWM, which need to be addressed to develop effective strategies for its implementation.

Overall, this study contributes to the existing knowledge on CBWM and offers recommendations to enhance waste management practices in developing countries. It highlights the potential benefits of CBWM in improving waste disposal behaviors and emphasizes the need for further research and attention to the implementation of CBWM in similar contexts.

According to (Singh, n.d.)The problem of solid waste management in Indian cities, especially in unauthorized settlements and slums, is severe and poses significant public health and environmental challenges. The lack of waste segregation, inadequate infrastructure for treatment and disposal, and absence of municipal waste management systems contribute to these issues. To address these challenges, a decentralized approach to solid waste management is recommended. This approach can reduce waste quantity, transportation costs, air pollution, and groundwater contamination, while also improving the livelihoods of waste pickers and promoting citizen participation. It emphasizes community-based waste management with municipal support, the introduction of a zero-waste approach, and the development of policies for recycling products and compost. By implementing these measures, India can move towards a more sustainable and efficient solid waste management system.

However, there are several obstacles to overcome. The analysis of various technological options reveals that the lack of waste segregation results in low-quality recycled products that struggle to compete with virgin materials. Recycling industries face labour-oriented and compliance-related challenges, while the compost market remains underdeveloped due to competition from subsidized chemical fertilizers. To address these issues, it is crucial to prepare a policy paper or action plan that promotes community-based decentralized waste management, encourages waste minimization, and introduces guidelines and marketing policies for recycled materials and compost. Additionally, the government should focus on improving the quality of recycled products and creating a supportive regulatory framework. By doing so, India can make significant progress in tackling the solid waste management crisis and move towards a more sustainable and environmentally friendly future.

According to (Abhirami et al.,2021) The solid waste management issues faced by Kochi City in Kerala, India. It emphasizes the importance of implementing an improved and comprehensive solid waste management system to address the environmental challenges caused by improper management of municipal solid waste (MSW).

The study acknowledges that the current situation in Kochi City necessitates better planning and implementation of solid waste management practices. Municipal solid waste management (MSWM) is described as a systematic approach involving various stages, such as storage, collection, transportation, resource recovery, processing, and disposal of solid waste.

The paper highlights the significance of effective MSWM in terms of its impact on health, environment, and aesthetics. It emphasizes the importance of following the principles of Integrated Solid Waste Management (ISWM) Hierarchy, which aims to reduce waste generation and manage the remaining waste efficiently.

The study identifies the main problems associated with waste management in Kochi City, and it suggests assessing all possible alternatives to address these challenges. The proposed methods should be economically viable and consider the characterization of the waste, which indicates a significant presence of biodegradables and plastics. Population forecasting suggests that waste generation will continue to increase in the future.

The paper concludes that through a collective effort involving individuals at the household level and the implementation of an effective MSWM system, Kochi City can properly manage the waste generated. Additionally, the study recommends conducting future research to evaluate the efficiency of the proposed waste management methods.

In summary, the provided information highlights the urgent need for improved solid waste management practices in Kochi City. It emphasizes the importance of an integrated approach, the identification of alternatives, and the involvement of the community in order to address the waste management challenges and ensure a sustainable future.

According to (Otterpohl et al., 2002) Implementing source separation concepts in municipal wastewater management enables efficient treatment of different flows based on their characteristics, facilitating the reuse of water, energy, and fertilizers. By introducing separate collection and treatment of toilet waste in households, which contain pathogens and nutrients, significant progress can be made. Innovative sanitation systems like vacuum toilets, urine sorting, and dry toilets have been successfully implemented, demonstrating their feasibility and potential for reducing fresh water consumption by

80% and recovering nutrients. Source control not only offers economic benefits but also improves hygiene as low volumes are easier to sanitize. Various systems, such as urine-sorting and vacuum-biogas, have been explored, and ongoing research at institutions like the Technical University Hamburg is focused on developing modular integrated systems like the black- and greywater cycle system that can be implemented in densely populated urban areas without relying on central water and wastewater infrastructure. Recent advancements in membrane technologies have enabled these developments. Decentralized wastewater systems have the potential to revolutionize water management, allowing for nearly full recovery of water and nutrients in a cost-effective manner. Given the increasing water scarcity, prioritizing water-efficient reuse technologies is crucial, and further pilot installations and research are needed to fully harness the available solutions. It is essential for societies to take responsibility for preserving precious resources like water and fertile soil. The positive shift towards decentralization in urban areas empowers individuals to take action without relying solely on government initiatives. The future holds great potential for decentralized and integrated water systems, paralleling the advancements in energy systems.

According to (Reimann et al., 2019) This article focuses on the link between remanufacturing and the potential to reduce variable remanufacturing costs through process innovation. It analyses a supply chain involving a manufacturer and a retailer, where only the manufacturer can undertake process innovation, while remanufacturing can be done by either the manufacturer or the retailer.

Traditional process innovation for manufacturing allows incremental improvements, which can enhance profit margins by reducing production costs. Remanufacturing, however, requires stepwise innovation to significantly lower variable remanufacturing costs and make it economically viable. The manufacturer should prioritize cost-reduction opportunities that can reduce variable remanufacturing costs beyond the threshold required for profitability. If investing in process innovation for remanufacturing (PIR) is profitable, the manufacturer should carefully determine the optimal PIR level based on whether remanufacturing is performed by itself or the retailer.

In industries like heavy machinery, global manufacturers may find it challenging to conduct remanufacturing operations worldwide, creating an opportunity for local retailers. Even without cost advantages, retailers can strategically use remanufacturing to compete with new products and influence manufacturers to lower wholesale prices. If the retailer engages in remanufacturing, the manufacturer may choose to invest in PIR, even if it's not the global optimal strategy. This reduction in variable remanufacturing costs benefits the retailer.

The government typically supports the remanufacturing sector due to its sustainability benefits. Comparing manufacturer-remanufacturing and retailer-remanufacturing, the study finds advantages in retailer-remanufacturing. Retailers are more likely to initiate remanufacturing, even without cost efficiency, making it easier to trigger. The manufacturer may overinvest in PIR when the retailer carries out remanufacturing, leading to reduced virgin material consumption. Therefore, the government should prioritize retailer-remanufacturing when formulating policies to develop the remanufacturing sector.

In conclusion, the study highlights the potential benefits of process innovation for remanufacturing but cautions against decentralized decision-making and potential conflicts between economic and environmental indicators. Future research should explore the relationship between remanufacturing and product innovation, particularly regarding the long-term implications of remanufacturing on new product introductions and the debate on planned obsolescence.

According to (A. Kumar & Agrawal, 2020) It provides an overview of the challenges faced by Indian cities in solid waste management (SWM) due to rapid urbanization. It highlights issues such as increasing waste generation, inadequate disposal practices, environmental pollution, and the impact of single-use plastics. The passage also mentions the generation of hazardous chemical waste and the need for improved recycling and management practices. It concludes by noting the positive efforts of certain cities and the

potential for clean and sustainable urban environments through government support, public awareness, and the integration of informal waste management sectors.

The current status of solid waste management (SWM) in India. It mentions that while the average per capita waste generation in India is lower compared to other countries, the high population density makes it a severe problem. The composition of Indian solid waste consists mainly of organic substances with high moisture content, while developed countries generate more packaging waste with low moisture content.

There are variations in waste generation patterns among Indian states and regions, including quantity, quality, and typology of waste. The challenges faced by Indian municipalities include the segregation of waste at the source, social taboos associated with waste, lack of general awareness among citizens, and inadequate implementation of government policies. Issues with storage, collection, and transportation of solid waste are also mentioned, along with the shortage of land for decentralized waste treatment.

The solutions for Indian MSW, such as focusing on decentralized waste management systems, utilizing the potential of organic waste for composting and biogas generation, and exploring technologies like refuse-derived fuel (RDF) and incineration. The importance of incorporating advanced techniques like GIS, remote sensing, IoT, and IEC-based systems for effective SWM is highlighted. The involvement of private stakeholders, NGOs, self-help groups, and coordination among various departments is seen as crucial for the success of SWM in India

The municipalities in India still perceive waste as a problem rather than recognizing its potential. The challenges are intensified by the high population density and the lack of proper waste segregation at the source. The country's MSWM (Municipal Solid Waste Management) faces significant challenges due to the social taboo and attitudes of citizens towards waste management. The passage suggests the need to sensitize the public through national and international best practices.

While some municipalities have shown positive intent and developed appropriate mechanisms for solid waste management, others are still in the developmental phase. Effective solid waste management is a long-term goal that requires incorporating strategies tailored to the unique composition of Indian waste. Recycling and processing

of waste should be carried out more efficiently, with resourceful waste segregated at the source for composting, biogas generation, energy plants, RDFs, recycling, and reuse.

Advanced treatment processes such as gasification and pyrolysis should be economically and environmentally assessed before implementation. A combination of centralized and decentralized strategies is suggested for managing solid waste at various sources to achieve sustainable MSWM. Involving the organized informal waste sector, along with private and government agencies, is seen as crucial for addressing MSWM challenges and transforming them into future opportunities for Indian cities.

According to (Paul & Paul, 2021)Indore, a city in India, has made significant progress in solid waste management (SWM). The city collects all solid waste generated, whether from residential or commercial establishments, through a door-to-door collection service. They achieved 100% waste segregation with the active involvement of citizens. Indore generates over 1115 metric tons of garbage daily.

Kochi, another city in India, has faced challenges in SWM due to poor maintenance of infrastructure, inadequate waste management by the Municipal Corporation, and the rapid growth of high-rise apartments. The city is projected to require an area equivalent to its current size by 2050 if the current trend of waste generation continues.

In Kochi, waste treatment methods vary depending on the type of residence. Independent houses tend to treat waste on-site, while apartments rely on municipal services. However, there are issues with the treatment of waste, including non-segregation and improper disposal. The involvement of NGOs and self-help groups in door-to-door waste collection has been efficient in some areas, but in others, the municipal staff's service delivery has been unsatisfactory.

Kochi collects 40% of the waste produced and transports it to the treatment plant. However, due to poor planning and operations, only 10% of the waste reaching the facility is treated, while the rest is landfilled. The Brahmapuram solid waste treatment plant faced structural issues and environmental impacts due to inadequate planning. Excessive waste accumulation in the landfill has caused leachate percolation and water pollution.

Indore has implemented effective waste management systems, including door-to-door collection and segregation. The city covers 100% of its wards and ensures 100% waste collection. Different types of waste generators are classified, and the waste is segregated accordingly. Dry waste is sent to Material Recovery Facilities, wet waste goes to composting plants, and hazardous waste is treated separately. Indore Municipal Corporation has constructed garbage transfer stations, strengthening the secondary collection mechanism. The entire waste generated in Indore is processed, and the corporation has transformed the previous landfill site into a garden.

The success of Indore's waste management system can be attributed to the efforts of citizens and information, education, and communication initiatives. These initiatives brought about a behavioral change in residents, commercial establishment owners, and industrial experts.

In conclusion, Indore has achieved significant success in waste management through segregation, door-to-door collection, and active citizen participation. Kochi faces challenges in waste management due to poor infrastructure, inadequate treatment facilities, and improper waste disposal practices.

According to (S. Kumar et al., 2017)The rapid population growth and urban development in India have led to significant challenges in solid waste management (SWM). Currently, India relies on inadequate waste infrastructure, the informal sector, and waste dumping practices. There is a lack of public participation and responsibility towards waste management in communities. To address these issues, it is crucial to cultivate community awareness and change people's attitudes towards waste. Developing sustainable and economically viable waste management systems requires maximizing resource extraction from waste while ensuring the safe disposal of residual waste through engineered landfills and waste-to-energy facilities. However, India faces challenges related to waste policy, technology selection, and the availability of trained professionals in the waste management sector. Until these fundamental requirements are met, India will continue to face poor waste management practices, leading to negative impacts on public health and the environment.

India is confronted with significant environmental challenges stemming from waste generation and inadequate waste collection, transport, treatment, and disposal. The current systems in place are unable to handle the growing volumes of waste generated by urban areas, resulting in adverse effects on the environment and public health. The paper highlights the importance of transitioning from reliance on unregulated waste dumps to sustainable waste management systems that prioritize resource retention within the economy. Key strategies include waste segregation at the source and the implementation of specialized waste processing facilities for recycling and material recovery. Proper disposal of residual waste can be achieved through engineered landfill sites or investments in waste-to-energy facilities. The paper also emphasizes the potential for energy generation from landfill gas or thermal treatment, although the shortage of qualified professionals with expertise in waste management poses a significant barrier. Addressing these challenges and seizing the opportunities for improved waste management in India requires concerted efforts to build capacity and develop effective waste management systems throughout the country.

According to (Khamkeo et al., 2021) This study focuses on solid waste management in the BKN Ramsar site in Champasack Province, Laos PDR. The objectives of the research were to analyse and characterize the amount and composition of solid waste and to develop strategic solid waste management approaches for the area. The study was conducted through a survey and waste sampling, a questionnaire distribution among villagers and staff from the Department of Natural Resources and Environment (DNRE), and a preliminary laboratory study of value-added products from waste.

Yard waste was the dominant component in Thabou village, while packaging materials dominated the waste composition in Kiat Ngong village. Open burning, open dumping, and landfilling were the common waste management practices in both villages. The study also revealed a large amount of golden apple snail shells (GAS) in the solid waste, which were dumped in public areas and landfills.

The questionnaire responses highlighted a lack of knowledge and understanding of solid waste separation and the 3Rs (reduce, reuse, recycle) in both villages. Thabou village

showed better attitudes and behaviours towards solid waste management compared to Kiat Ngong village. The DNRE staff demonstrated greater knowledge and understanding of solid waste management, but further training on waste-to-energy and waste-to-value added products was needed.

The preliminary laboratory study focused on the utilization of GAS shells as raw material for value-added production. Incineration was used to remove organic matter, and the study compared three combustion temperatures and three treatment methods. The highest value of calcium carbonate (CaCO_3) was obtained through Treatment B (400°C), indicating its potential application in industry and agriculture.

Based on the findings, the study suggests implementing education and knowledge programs related to waste management, waste separation, and the 3Rs. Additionally, training on waste-to-value added products and waste-to-energy technologies should be conducted. These strategies aim to promote sustainable solid waste management in the BKN Ramsar site.

CHAPTER 3

RESEARCH

METHODOLOGY

INTRODUCTION

The attitude and behaviour of people towards the decentralized waste management system under the Kochi Corporation has shown a significant shift in recent years. Initially, there was scepticism and resistance to the concept of decentralized waste management, as people were accustomed to the traditional centralized system. However, with increasing awareness about the environmental impact of improper waste disposal and the benefits of decentralized systems, there has been a notable change in people's attitudes.

The decentralized waste management system in Kochi has empowered individuals and communities to take responsibility for their waste management. People have become more conscious about segregating their waste at the source and adopting sustainable practices. There has been a growing acceptance of decentralized waste treatment methods such as composting and biogas generation, which allow for the conversion of organic waste into valuable resources. Additionally, community-level initiatives and awareness campaigns by the Kochi Corporation have played a crucial role in educating and encouraging residents to actively participate in the decentralized waste management system. As a result, there is a positive shift in people's behaviour, with increased enthusiasm and willingness to embrace sustainable waste management practices, leading to a cleaner and healthier environment for the city of Kochi.

STATEMENT OF THE PROBLEM

The transition from a central waste management system to a centralized waste management system can lead to significant changes in people's attitudes and behaviours towards waste. At first, one of the difficulties is not to change. Maybe people have gotten used to the convenience of a centralized system where garbage is kept at home and thrown away without thinking. With decentralization, people now have to take more responsibility for waste management, such as categorizing and making organic waste.

This behaviour change requires education and awareness campaigns to help people understand the benefits of the new system and motivate them to participate.

Another problem that may arise is the lack of infrastructure and resources to support waste management. In centralized systems, waste is collected and treated in large facilities, often owned and operated by governments or waste management companies. In a decentralized system, responsibility for waste management is delegated to individuals, communities or small organizations. This deployment can put pressure on existing systems and require the new construction and repair of small medical facilities. In addition, the availability of resources such as recycling centres or waste treatment facilities may be limited, making it difficult to find suitable sites for different types of waste.

Overall, the transition from centralized waste management systems to decentralized waste management systems must overcome resistance to change and address infrastructure and limitations. However, with appropriate education, awareness and investment in waste management, positive attitudes and behaviours towards waste management can be encouraged.

SIGNIFICANCE OF THE STUDY

Analysing people's behaviour and attitudes towards decentralised waste management is important for solving waste management problems in society. The study examines people's attitudes and behaviours from an ethical perspective, providing an understanding of the factors that affect their acceptance and use of ethical practices. This information can guide policy makers, urban planners and environmental agencies in developing effective waste management strategies that meet community interests and needs. In addition, understanding attitudes and behaviours can help identify barriers and support for the use of decentralized systems so that response plans can be used to engage public and cultural participation in waste management. Finally, the findings of this research can help develop more effective, safer, community-based solutions for waste management that contribute to safety, redesigned for present and future generations.

AIM OF THE STUDY

The analysis of people's attitude and behaviour towards decentralised waste management system under Kochi corporation. To analyse the knowledge of the people about the present waste management system in Kochi. The behaviour and attitude change in the people from the centralised to decentralised waste management system. The change which sustainable and ecofriendly so that the harm caused by the waste can be reduced to a certain limit.

GENERAL OBJECTIVE

- To assess people's attitude and behaviour towards decentralised waste management system under Kochi corporation

SPECIFIC OBJECTIVES

- To assess the attitude of people towards the decentralised waste management system
- To evaluate the behavioural approach towards decentralised waste management system
- To understand understanding of people about the decentralised waste management system

DEFINITIONS OF CONCEPTS- THEORETICAL AND OPERATIONAL

Decentralised waste management:

THEORETICAL: It is a system to provide a clean environment and hygienic living condition by reducing the quantity of waste at source.

OPERATIONAL: A system that provides a clean and hygienic environment by reducing the amount of waste in the field.

Centralised waste management

THEORETICAL: It is a system where all unsegregated waste will be dried using bio driers, and then will be converted to energy through gasification but the cost of procuring energy will be higher.

OPERATIONAL: It is a system in which all wastes that are not disposed of are dried in the dryer and converted into energy using gas, but the energy will be more expensive to obtain.

Attitude

THEORETICAL: The way in which a person views and evaluates something or someone, a predisposition or a tendency to respond positively or negatively toward a certain idea, object, person, or situation.

OPERATIONAL: The way a person sees and evaluates something or someone, the desire or desire to feel good or bad about an idea, thing, person, or situation.

Behaviour

THEORETICAL: It is what a person does to make something happen, to make something change or to keep things the same.

OPERATIONAL: It is something someone does to make something happen, change something, or preserve something.

RESEARCH DESIGN

The researcher is doing the research in descriptive manner based on quantitative method.

UNIVERSE

The universe includes whole public in Ernakulam district.

SAMPLING PROCEDURE AND SAMPLE

The non probability purposive sampling is used to collect data from the respondents.

INCLUSION AND EXCLUSION CRITERIA

Inclusion:

People in the middle adulthood

Residing in the Kochi for more than one year

Exclusion:

People with temporary settlement

People living beside the Kochi corporation

TOOL OF DATA COLLECTION

The standardized questionnaire tool Likert scale and multivariate tobit tool was used to collect the data.

METHOD OF DATA COLLECTION

Researcher used web-based questionnaire for data collection.

PRE-TEST

The researcher has done a baseline study about the issues that are faced by the people during the shift of waste management system from the centralized waste management system to decentralized waste management system in Kochi corporation. During the fourth semester internship at Kochi Corporation as part of the Suchitwa Mission, the

researcher obtained initial findings on the decentralized waste management system and public attitudes and behaviors towards it among the residents of Kochi.

DATA ANALYSIS AND INTERPRETATION

The economic consequences of waste management are different and show that there is no agreement or uncertainty on this issue. Additional research may be needed to explore the potential economic benefits and job creation associated with solid waste management. The importance of recycling and waste separation, most respondents are interested in these practices. However, there is still room for raising awareness and encouraging separate waste segregation from people who do not separate their recyclables or who do not know about recycling centers or locations in their area. Communities become involved in waste management by participating in clean water or waste management projects and demonstrate awareness of the importance of participation in managing a clean and stable environment. Proper waste management for decentralized waste management, community engagement and environmental sustainability. Develop ideas and strategies to promote sustainable and effective waste management.

CHALLENGES/LIMITATIONS YOU FORESEE

The analysis will be based on responses or observations from specific groups of people and will not reflect differences in thinking and behavior of the larger group. Additionally, attitudes and behaviors can be influenced by many factors such as culture, socioeconomics, and geography, making it difficult to study in many contexts. In addition, biased self-reports and social biases can affect the accuracy of the data collected, as people may provide answers that follow societal expectations rather than their actual character and character. Thus, while these analyses provide good insights, they should be interpreted with caution and supported by a good understanding of the wider cultural context.

CHAPTERISATION

- Chapter 1: Introduction
- Chapter 2: Review of literature
- Chapter 3: Research Methodology
- Chapter 4: Data Analysis and Interpretation
- Chapter 5: Finding, Recommendation, Implication of social work practice

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

TABLE 1. The concept of decentralized waste management is a viable solution for improving waste management practices.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Agree	23	31.1	31.1	31.1
Disagree	5	6.8	6.8	37.8
Neither Agree nor Disagree	19	25.7	25.7	63.5
Strongly Agree	21	28.4	28.4	91.9
Strongly Disagree	6	8.1	8.1	100.0
Total	74	100.0	100.0	

The data suggests that a significant majority of respondents either agree or strongly agree with the concept of decentralized waste management as a viable solution for improving waste management practices. The number of respondents who agree or strongly agree is considerably higher than those who disagree or strongly disagree. Additionally, a notable proportion of respondents neither agree nor disagree. This indicates that there is a general recognition of the potential benefits and effectiveness of decentralized waste management in addressing waste management challenges. The findings highlight the importance of considering decentralized approaches as a means to enhance waste management practices and promote more sustainable and efficient waste management systems.

TABLE 2. The implementation of decentralized waste management systems requires proper infrastructure and logistical support.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	27	36.5	36.5	36.5
	Disagree	4	5.4	5.4	41.9
	Neither Agree nor Disagree	18	24.3	24.3	66.2
	Strongly Agree	20	27.0	27.0	93.2
	Strongly Disagree	5	6.8	6.8	100.0
	Total	74	100.0	100.0	

The data reveals that a significant majority of respondents either agree or strongly agree that the implementation of decentralized waste management systems necessitates the provision of proper infrastructure and logistical support. The number of respondents who agree or strongly agree is notably higher than those who disagree or strongly disagree. Moreover, a substantial proportion of respondents neither agree nor disagree. This indicates a widespread recognition of the importance of having adequate infrastructure and logistical support for successful implementation of decentralized waste management systems. These findings emphasize the need for investment in infrastructure development and logistical planning to ensure the effective functioning and sustainability of decentralized waste management practices.

TABLE 3. Decentralized waste management systems can lead to more efficient and cost-effective waste disposal.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Agree	23	31.1	31.1	31.1
Disagree	4	5.4	5.4	36.5
Neither Agree nor Disagree	25	33.8	33.8	70.3
Strongly Agree	17	23.0	23.0	93.2
Strongly Disagree	5	6.8	6.8	100.0
Total	74	100.0	100.0	

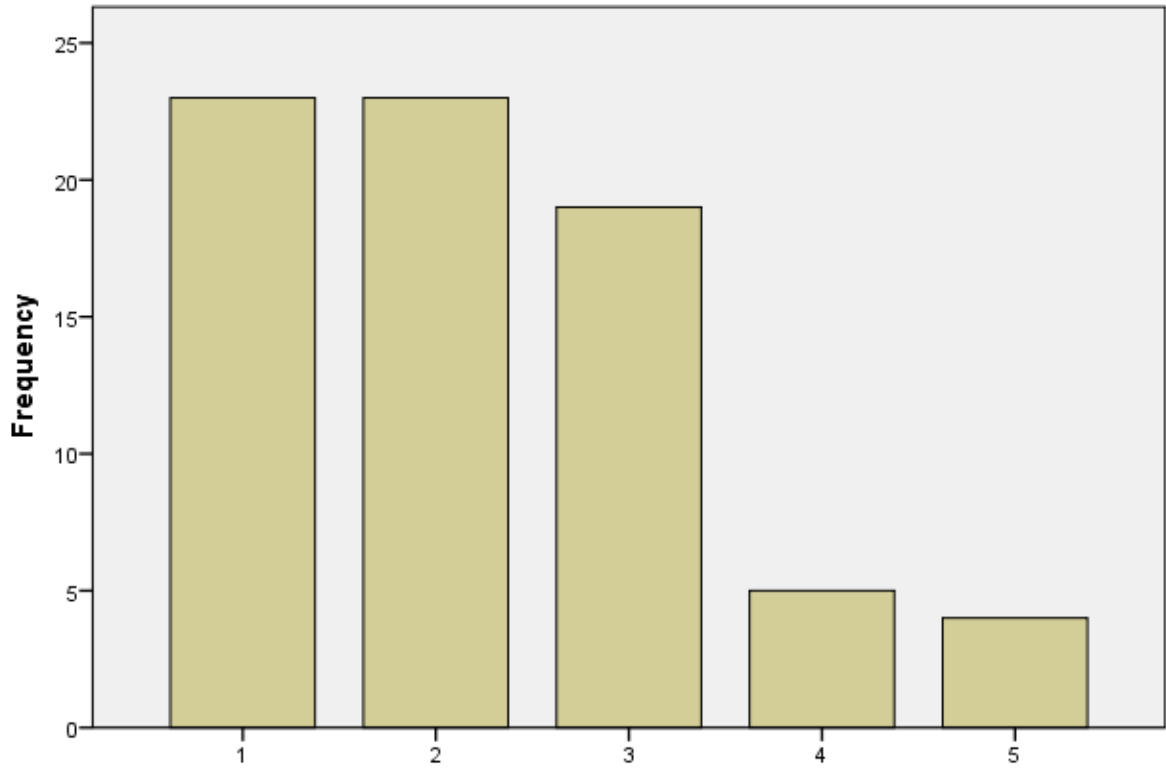
The data suggests that a significant proportion of respondents either agree or strongly agree that decentralized waste management systems can lead to more efficient and cost-effective waste disposal. The number of respondents who agree or strongly agree is notably higher than those who disagree or strongly disagree. Additionally, a considerable portion of respondents neither agree nor disagree. This indicates a general recognition of the potential benefits of decentralized waste management systems in terms of improving efficiency and reducing costs associated with waste disposal. The findings highlight the importance of considering decentralized approaches as a means to enhance waste management practices and achieve greater efficiency and cost-effectiveness in waste disposal processes.

TABLE 4.I believe that decentralized waste management systems promote local involvement and community participation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	22	29.7	29.7	29.7
	Disagree	6	8.1	8.1	37.8
	Neither Agree nor Disagree	18	24.3	24.3	62.2
	Strongly Agree	23	31.1	31.1	93.2
	Strongly Disagree	5	6.8	6.8	100.0
	Total	74	100.0	100.0	

The data indicates that a significant majority of respondents either agree or strongly agree that decentralized waste management systems promote local involvement and community participation. The number of respondents who agree or strongly agree is considerably higher than those who disagree or strongly disagree. Moreover, a notable proportion of respondents neither agree nor disagree. This suggests that there is a widespread belief in the positive impact of decentralized waste management systems in fostering local engagement and encouraging community participation. The findings highlight the importance of decentralized approaches in empowering local communities to take an active role in waste management processes, which can lead to improved efficiency, sustainability, and a sense of ownership over waste management practices.

10. Decentralized waste management can contribute to the reduction of environmental pollution and the conservation of natural resources.



10. Decentralized waste management can contribute to the reduction of environmental pollution and the conservation of natural resources.

The data suggests that a significant majority of respondents either agree or strongly agree that decentralized waste management can contribute to the reduction of environmental pollution and the conservation of natural resources. The number of respondents who agree or strongly agree is notably higher than those who disagree or strongly disagree. Additionally, a considerable proportion of respondents neither agree nor disagree. This indicates a widespread belief in the positive environmental impacts of decentralized waste management systems. The findings highlight the potential of decentralized approaches in mitigating environmental pollution through efficient waste management practices and promoting the conservation of natural resources through recycling, resource recovery, and waste reduction strategies. By involving local communities and implementing decentralized waste management systems, there is a greater potential for achieving environmental sustainability and reducing the strain on natural resources.

TABLE 5. Decentralized waste management systems offer more flexibility in adapting to the specific needs and characteristics of different regions.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	25	33.8	33.8	33.8
	Disagree	6	8.1	8.1	41.9
	Neither Agree nor Disagree	16	21.6	21.6	63.5
	Strongly Agree	23	31.1	31.1	94.6
	Strongly Disagree	4	5.4	5.4	100.0
	Total	74	100.0	100.0	

The data indicates that a significant majority of respondents either agree or strongly agree that decentralized waste management systems offer more flexibility in adapting to the specific needs and characteristics of different regions. The number of respondents who agree or strongly agree is notably higher than those who disagree or strongly disagree. Moreover, a substantial proportion of respondents neither agree nor disagree. This suggests a widespread belief in the inherent flexibility of decentralized waste management systems in accommodating the unique requirements and conditions of various regions. The findings highlight the potential of decentralized approaches to tailor waste management strategies to suit local contexts, including variations in waste generation patterns, infrastructure availability, and community preferences. By embracing decentralized waste management, there is greater potential for customized solutions that address the specific challenges and opportunities present in different regions.

TABLE 6.I trust that decentralized waste management systems can effectively handle different types of waste, including hazardous materials.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	26	35.1	35.1	35.1
	Disagree	7	9.5	9.5	44.6
	Neither Agree nor Disagree	19	25.7	25.7	70.3
	Strongly Agree	17	23.0	23.0	93.2
	Strongly Disagree	5	6.8	6.8	100.0
	Total	74	100.0	100.0	

The data indicates that a significant majority of respondents either agree or strongly agree that decentralized waste management systems can effectively handle different types of waste, including hazardous materials. The number of respondents who agree or strongly agree is notably higher than those who disagree or strongly disagree. Additionally, a considerable proportion of respondents neither agree nor disagree. This suggests a widespread trust in the capability of decentralized waste management systems to handle diverse waste types, including hazardous materials. The findings highlight the potential of decentralized approaches to employ appropriate technologies, infrastructure, and operational practices to safely and efficiently manage various waste streams. By embracing decentralized waste management, there is a greater potential to address the specific challenges and risks associated with different types of waste, including hazardous materials, while promoting environmental and public health protection.

TABLE 7. Decentralized waste management systems have the potential to create new job opportunities and boost the local economy.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Agree	15	20.3	20.3	20.3
Disagree	14	18.9	18.9	39.2
Neither agree nor disagree	23	31.1	31.1	70.3
Strongly agree	5	6.8	6.8	77.0
Strongly disagree	17	23.0	23.0	100.0
Total	74	100.0	100.0	

The data indicates that opinions regarding the potential of decentralized waste management systems to create new job opportunities and boost the local economy are varied. There is no clear consensus among the respondents, as the distribution of responses is relatively evenly spread across agree, disagree, neutral, strongly agree, and strongly disagree. The findings suggest a lack of consensus or uncertainty regarding the economic impact of decentralized waste management systems. It is important to note that the neutral response category also holds a substantial proportion of respondents. Further research and analysis may be required to understand the potential economic benefits and job creation opportunities that can arise from decentralized waste management systems.

TABLE 8. How do you dispose of your household waste?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Composting	16	21.6	21.6	21.6
Donating items	7	9.5	9.5	31.1
Garbage collection	30	40.5	40.5	71.6
Other	6	8.1	8.1	79.7
Recycling	15	20.3	20.3	100.0
Total	74	100.0	100.0	

The data indicates that respondents dispose of their household waste in various ways. The majority of respondents utilize garbage collection services, suggesting a reliance on municipal waste management systems. A significant proportion of respondents engage in composting, recycling, and donating items, indicating a preference for sustainable waste management practices and reducing waste through reusing or recycling. Additionally, a smaller number of respondents mentioned other methods of waste disposal, which could include alternative waste management approaches such as incineration or private waste disposal services. The findings highlight a diversity of waste disposal practices among respondents, reflecting a range of personal choices and local waste management options.

TABLE 9. How often do you recycle household waste?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Daily	17	23.0	23.0	23.0
Monthly	20	27.0	27.0	50.0
Never	3	4.1	4.1	54.1
Rarely	11	14.9	14.9	68.9
Weekly	23	31.1	31.1	100.0
Total	74	100.0	100.0	

Recycling household waste is an important practice that promotes sustainability and reduces the strain on natural resources. It is encouraging to see that a significant number of respondents in this survey have embraced recycling as part of their routine. Many individuals expressed a commitment to recycling on a weekly basis, indicating that they prioritize the proper disposal of recyclable materials. Furthermore, a notable portion of participants mentioned recycling on a monthly basis, showcasing a conscious effort to contribute to environmental preservation. It is worth noting that a few respondents admitted to rarely or never recycling, suggesting a potential area for improvement in terms of raising awareness and encouraging sustainable waste management practices. Overall, the findings emphasize the significance of incorporating recycling into our daily lives and fostering a culture of environmental responsibility.

TABLE 10. Do you separate different types of recyclable materials?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No, never	5	6.8	6.8	6.8
Sometimes	40	54.1	54.1	60.8
Yes, always	29	39.2	39.2	100.0
Total	74	100.0	100.0	

When it comes to separating different types of recyclable materials, the survey reveals a positive trend. A majority of respondents indicated that they either sometimes or always separate their recyclables. This demonstrates a level of awareness and understanding regarding the importance of sorting materials to maximize recycling efficiency. It is encouraging to see a significant portion of participants consistently making the effort to separate their recyclables, as this contributes to the overall effectiveness of the recycling process. However, a small percentage of respondents admitted to never separating their recyclable materials, highlighting a potential area for improvement in terms of educating individuals about the benefits of proper waste sorting. Overall, the findings suggest a generally positive attitude towards the separation of recyclables, but there is still room for further promotion and education on this important aspect of sustainable waste management.

TABLE 11. Are you aware of the recycling facilities or centre's available in your area?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No, not aware	8	10.8	10.8	10.8
Somewhat aware	46	62.2	62.2	73.0
Yes, very aware	20	27.0	27.0	100.0
Total	74	100.0	100.0	

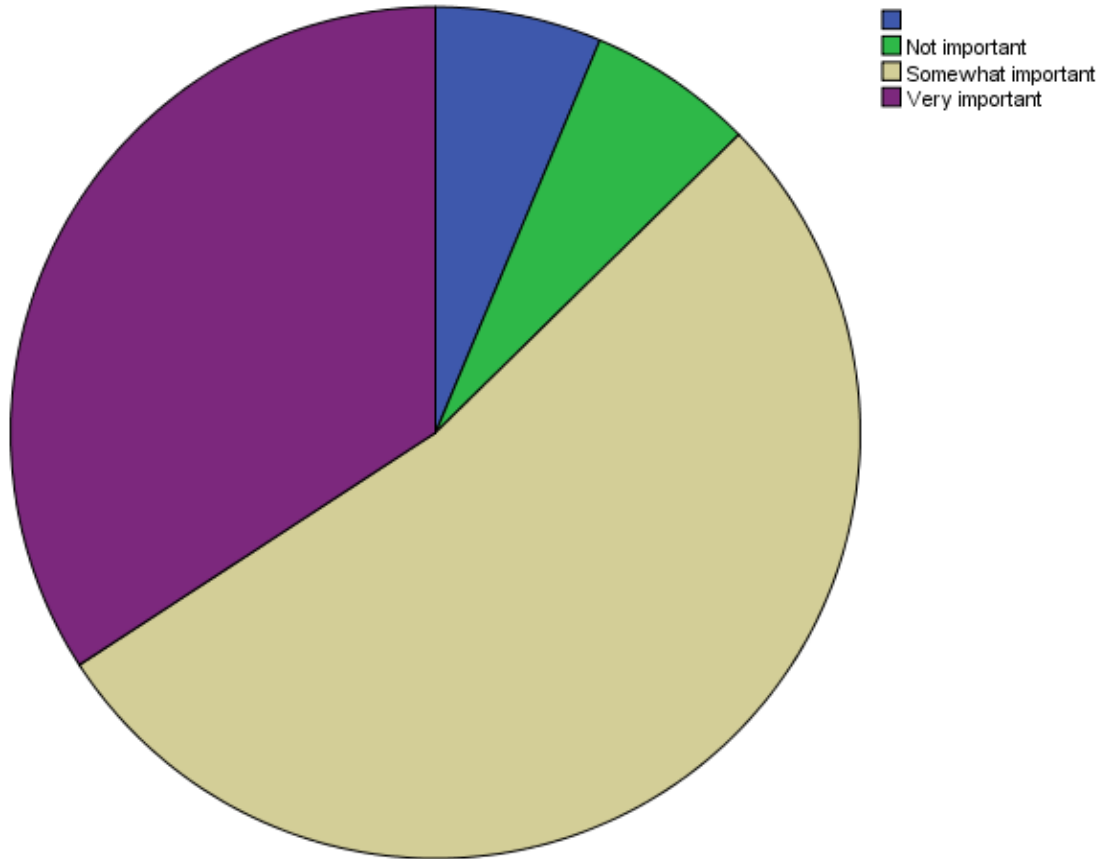
The survey results indicate that a significant number of respondents have some level of awareness regarding the recycling facilities or centers available in their area. The majority of participants indicated being somewhat aware, suggesting that they have some knowledge of the recycling options available to them. This level of awareness is promising as it indicates that individuals are at least somewhat informed about the resources and opportunities for recycling in their community. However, a smaller percentage of respondents admitted to not being aware of the recycling facilities or centers in their area, highlighting the need for increased dissemination of information about recycling options. It is important to continue efforts to raise awareness and educate the public about the existence and benefits of local recycling facilities or centers, as this can encourage more individuals to participate in sustainable waste management practices.

TABLE 12. Have you ever participated in community clean-up events or waste management programs?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No, never	12	16.2	16.2	16.2
	Occasionally	40	54.1	54.1	70.3
	Yes, frequently	22	29.7	29.7	100.0
	Total	74	100.0	100.0	

The survey findings indicate that a considerable portion of respondents have participated in community clean-up events or waste management programs to varying degrees. A majority of participants indicated that they have occasionally taken part in such activities, demonstrating a willingness to contribute to the cleanliness and sustainability of their community. This level of occasional participation suggests that individuals recognize the importance of actively engaging in efforts to manage waste and maintain a clean environment. Furthermore, a notable percentage of respondents stated that they have frequently participated in community clean-up events or waste management programs, indicating a higher level of commitment to these initiatives. These individuals are actively involved in making a positive impact on their surroundings and fostering a sense of collective responsibility. However, a smaller number of respondents admitted to never having participated in such events or programs, highlighting an opportunity to raise awareness and encourage greater community involvement in waste management and clean-up activities. Overall, the findings reflect a positive inclination towards community engagement in waste management, with the potential for increased participation through further promotion and outreach.

20.How important do you consider waste management for environmental sustainability?



The survey results reveal that the majority of respondents recognize the significance of waste management for environmental sustainability. A significant portion of participants indicated that they consider waste management to be very important, highlighting a strong awareness of the environmental impact of proper waste disposal and recycling. This acknowledgment demonstrates a clear understanding of the role waste management plays in preserving the ecosystem and mitigating pollution. A considerable number of respondents expressed that waste management is somewhat important, suggesting a general recognition of its importance but with potential room for further education and awareness. However, a small percentage of participants indicated that they do not consider waste management to be important. This highlights an opportunity for raising awareness and promoting the understanding of how waste management practices contribute to environmental sustainability. Overall, the findings indicate a positive overall

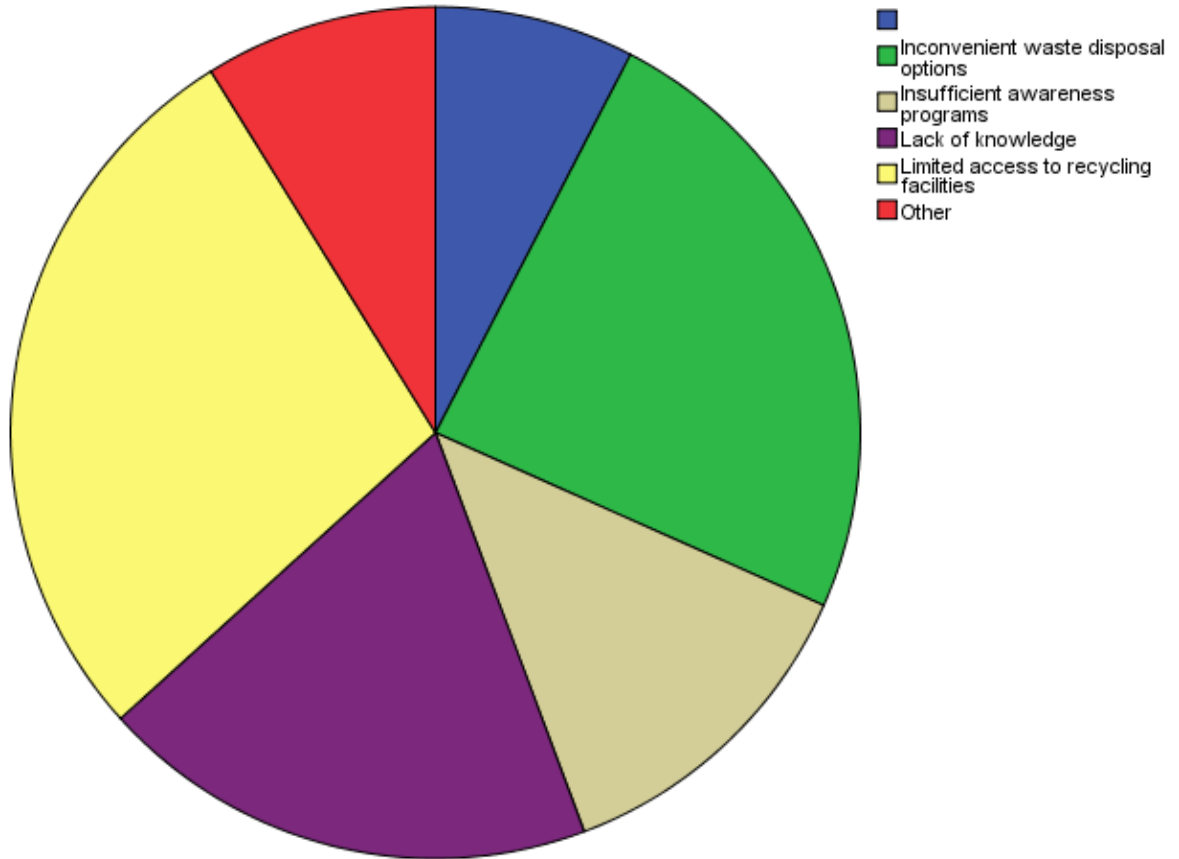
sentiment towards waste management as a crucial factor in achieving and maintaining a sustainable environment.

TABLE 13. What motivates you to practice proper waste management?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Community pride	17	23.0	23.0	23.0
Convenience	6	8.1	8.1	31.1
Environmental concerns	20	27.0	27.0	58.1
Health and hygiene	17	23.0	23.0	81.1
Legal obligations	9	12.2	12.2	93.2
Other	5	6.8	6.8	100.0
Total	74	100.0	100.0	

The survey responses indicate that individuals are motivated to practice proper waste management for various reasons. Environmental concerns emerged as a significant motivator, with a notable percentage of respondents expressing a desire to protect and preserve the environment. This reflects a genuine understanding of the impact of waste on ecosystems and a commitment to sustainable practices. Health and hygiene considerations also played a role, as respondents recognized the importance of proper waste disposal for maintaining a clean and healthy living environment. Additionally, community pride emerged as a motivating factor, suggesting that individuals feel a sense of responsibility towards their community and take pride in contributing to its cleanliness. Some respondents also mentioned convenience as a motivator, indicating that efficient waste management practices can simplify their daily lives. Legal obligations were cited by a smaller percentage, suggesting that adherence to waste management regulations is a factor for some individuals. Lastly, a few respondents mentioned "other" reasons, which could encompass personal values, ethical beliefs, or specific circumstances that drive their commitment to proper waste management. Overall, the findings highlight a diverse range of motivations, indicating the multifaceted nature of why individuals engage in proper waste management.

22.Are there any challenges or obstacles you face in practicing proper waste management?



Practicing proper waste management can be accompanied by various challenges and obstacles. One common hurdle is the availability of inconvenient waste disposal options. In some areas, individuals may have limited access to proper waste bins or recycling facilities, making it difficult to dispose of their waste responsibly. Additionally, insufficient awareness programs play a role in hindering effective waste management practices. Many people may not be fully aware of the importance of proper waste disposal or the environmental consequences of improper waste management. This lack of awareness can contribute to improper waste handling habits. Another challenge is the lack of knowledge regarding the appropriate methods of waste management. Without proper education and information, individuals may struggle to make informed decisions about waste disposal and recycling. All these factors collectively pose obstacles to

practicing proper waste management and highlight the need for comprehensive waste management initiatives.

TABLE 14. How satisfied are you with the waste management services provided in your locality?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Neutral	18	24.3	24.3	24.3
Somewhat dissatisfied	11	14.9	14.9	39.2
Somewhat satisfied	18	24.3	24.3	63.5
Very dissatisfied	7	9.5	9.5	73.0
Very satisfied	20	27.0	27.0	100.0
Total	74	100.0	100.0	

Based on the provided responses, it seems that the satisfaction level with waste management services in the locality varies. Some individuals expressed a neutral stance, indicating a lack of strong satisfaction or dissatisfaction. Others expressed being somewhat dissatisfied, suggesting that they have certain concerns or issues with the waste management services provided. On the other hand, there were also individuals who reported being somewhat satisfied with the services. Additionally, a notable portion of respondents expressed being very satisfied, indicating a high level of contentment with the waste management services in their locality. Overall, it appears that there is a mix of satisfaction levels, ranging from neutral to very satisfied, reflecting diverse experiences and opinions regarding the waste management services in the area.

TABLE 15. Would you be willing to pay a higher waste management fee to improve waste management services in your area?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	32	43.2	43.2	43.2
	Not sure	14	18.9	18.9	62.2
	Yes	28	37.8	37.8	100.0
	Total	74	100.0	100.0	

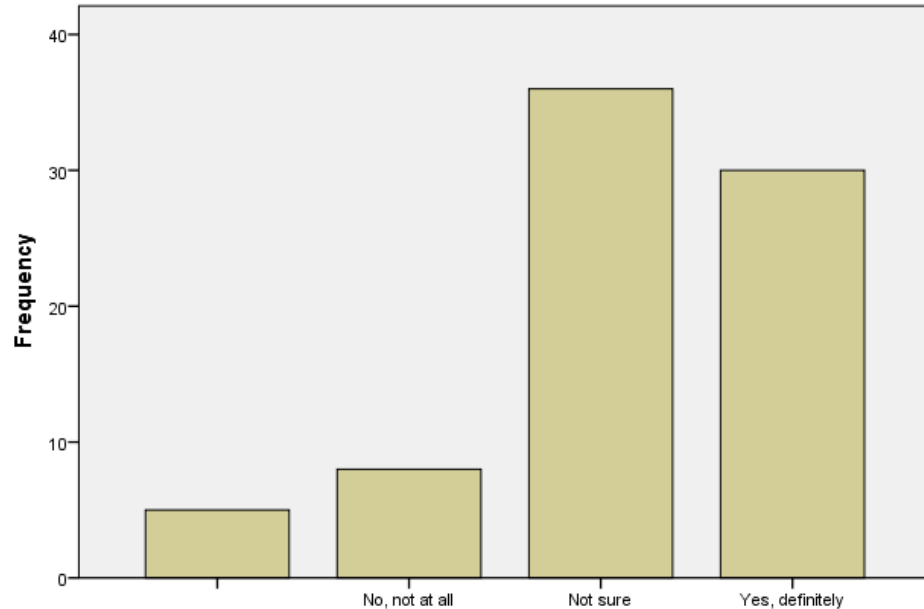
Based on the responses provided, the willingness to pay a higher waste management fee to improve waste management services in the area appears to be mixed. A significant portion of respondents answered "No," indicating that they are not willing to pay a higher fee for improved services. On the other hand, there were individuals who responded with "Not sure," suggesting a level of uncertainty or hesitation regarding this matter. However, it is worth noting that a considerable number of respondents answered "Yes," indicating their willingness to pay a higher fee to enhance waste management services in their locality. This suggests that there is a portion of the population who recognizes the value of investing in improved waste management and are willing to contribute financially towards that goal. Overall, it appears that there is a mix of satisfaction levels, ranging from neutral to very satisfied, reflecting diverse experiences and opinions regarding the waste management services in the area.

TABLE 16. How frequently do you engage in discussions or initiatives related to waste management in your community?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequently	18	24.3	24.3	24.3
	Never	6	8.1	8.1	32.4
	Occasionally	29	39.2	39.2	71.6
	Rarely	21	28.4	28.4	100.0
	Total	74	100.0	100.0	

Based on the responses provided, it appears that the frequency of engagement in discussions or initiatives related to waste management in the community varies among individuals. A significant portion of respondents indicated that they occasionally engage in such discussions or initiatives, suggesting that they participate in waste management activities or conversations from time to time. On the other hand, there were also individuals who reported engaging in these discussions frequently, indicating a more active involvement in waste management initiatives within their community. However, a notable number of respondents answered that they rarely or never engage in such discussions or initiatives, indicating a lower level of participation or interest in waste management activities. These responses highlight the diversity of engagement levels among community members when it comes to waste management discussions and initiatives.

26. Do you feel that decentralized waste management initiatives are more effective compared to centralized waste management systems?



26. Do you feel that decentralized waste management initiatives are more effective compared to centralized waste management systems?

The efficiency of the waste management system compared to the central waste management system. While negative opinions were expressed by some participants, 8 of them said that waste management is not good at all. Respondents were also unsure, with 35 saying they were unsure about the effectiveness of solid waste management compared to the average. On the other hand, the main respondents gave positive opinion, while 31 said that the management system is more effective than the internal system.

Overall, the responses reflected various views and uncertainties regarding the effectiveness of waste management systems compared to centralized systems. It highlights the need for further evaluation, analysis and discussion to understand the advantages and disadvantages of different waste management techniques.

Table 17: Group Statistics

3.Gender	N	Mean	Std. Deviation	Std. Error Mean
V17 Male	9	20.11	4.859	1.620
Female	65	23.26	5.693	.706

Table 18:Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
V17 Equal variances assumed	.343	.560	-1.580	72	.119	-3.150	1.994	-7.126	.825
Equal variances not assumed			-1.783	11.280	.101	-3.150	1.767	-7.028	.727

The t-test gave a p-value of 0.560, indicating that there was no significant gender difference in decentralized waste management behavior. In other words, people's gender does not seem to have a significant impact on their attitudes towards waste management.

This means that men and women have similar attitudes towards centralized waste management. The absence of gender differences indicates that attitudes towards this particular waste management system are not influenced by gender related factors. It is worth noting that this interpretation assumes that the assessment is well done and that the data used in the analysis are representative and reliable. It's worth mentioning that this interpretation is unique given the p-value of 0.560. Different P values can lead to different results, so some context and significance should be taken into account when interpreting the results of statistical tests.

Analysis of the data shows that most respondents agree on the benefits and effectiveness of decentralized waste management. Most respondents recognized the importance of proper infrastructure and logistical support for the success of decentralized waste management. They also recognize that different approaches can increase the efficiency and reduce costs of waste management, encourage local and community participation, reduce environmental pollution circulation, conserve natural resources, provide flexibility to different regions, and manage different types of waste.

However, opinions on the economic impact of waste management differ, indicating a lack of consensus. Additional research may be needed to explore the potential economic benefits and job creation associated with solid waste management.

The data also shows the importance of recycling and waste separation, with a high percentage of respondents participating in these practices. However, there is still room for raising awareness and encouraging separate waste from people who don't separate their recycling or don't know about recycling centers or places in their area.

Community involvement in waste management, including participation in clean water or waste management projects, is generally positive and shows awareness of the importance of participation in maintaining a clean and sustainable environment.

Overall, the findings show the importance of waste management, community involvement and appropriate waste management to ensure environmental sustainability. These findings can inform the development of strategies and plans to promote sustainable and efficient waste management.

However, further research and analysis is needed to address some of the issues and uncertainties identified in the literature, such as financial results and willingness to pay more for development services.

CHAPTER 5

FINDINGS,

RECOMMENDATION

AND

IMPLICATIONS FOR

PROFESSIONAL SOCIAL

WORK PRACTICE

FINDING

- Effective waste management is recognized for its significant impact on the environment, reducing pollution, conserving resources and mitigating climate change. In addition, proper waste management can help improve public health and safety by reducing the health risks associated with improper disposal.
- It also creates the economy through job creation, recovery of investment and improvement of the business cycle. Public awareness and education play an important role in promoting good habits of waste management, because people are aware of the importance of the role of waste for sanitation, healthy and beneficial consumption for the future.
- Proper waste management is driven by various motivations that reflect the various circumstances of the person involved in this practice. Some are motivated by concern for the environment and a desire to protect the earth's sky for future generations.
- They are aware of the negative impact of improper disposal on ecosystems, wildlife and overall environmental health. Others do this out of a sense of responsibility and a desire to contribute to clean, healthy people. They understand that proper waste management will help prevent pollution, reduce health risks and create a safe environment.
- Additionally, business support plays a role in helping people understand how to save money, save money and create jobs by recycling and returning waste products. Additionally, social influences such as peer relationships, social norms, and education can encourage individuals to engage in necessary constructive practices. Overall, the motivations behind proper waste management are many, including environmental awareness, accountability, financial support and community involvement.
- Satisfaction with waste management services in the region elicited a wide range of responses ranging from moderate to very satisfied, reflecting a variety of experiences and opinions.

- Some may express their dissatisfaction by stating that they are not particularly happy or particularly dissatisfied with the disposal services. Others will have a moderate level of satisfaction indicating overall satisfaction with the service, but there will also be room for improvement.
- On the other hand, some are said to be quite satisfied and satisfied with the disposal services in their region. Their expertise will include timely and reliable waste collection, recycling services and effective communication with waste management authorities.
- The area of interest reflects the diverse experiences and views of the community and highlights the need to continually evaluate and improve waste services to meet the diverse needs pressure and needs of residents.
- Responses to the discussion about waste management and plans revealed a wide range of contributions from community members. Some advocate for sustainable practices and contribute to initiatives, while others take an interest in and support good practices in everyday life. Some feel that participation is lower because of other priorities or things they don't like.
- It is important to consider waste management strategies and strategies in order to meet the diverse interests and motivations of community members, to ensure sharing together, and to maximize the benefits of sustainable waste management. Various factors indicate the need for further analysis, analysis and discussion to better understand the advantages and disadvantages of different management tools.
- Waste management continues to evolve as new technologies and processes evolve. These innovations should be evaluated to determine their effectiveness, efficiency and potential impact on the environment and public health.
- In addition, regional and regional areas play an important role in waste management, as the availability and efficiency of technologies can vary depending on factors such as population density, availability of materials and waste. Evaluation and analysis should be done to determine the most suitable equipment for a particular location.

- In addition, long-term sustainability and financial use should be considered to ensure that the chosen method is consistent with broader environmental objectives and financial considerations.
- stakeholder engagement and public engagement are crucial to understanding community perspectives, solving problems, and ensuring that the tools that manage Material disposal are social and inclusive.

RECOMMENDATIONS

- Environmental impact of different waste management to identify effective and sustainable processes.
- The economic benefits and job creation potential of waste management projects to encourage investment and business participation in the industry.
- Strengthen public awareness and education on waste management by emphasizing the importance of self-employment in maintaining hygiene, health and well-being.
- Personal commitment and attitude towards appropriate waste management, including factors such as environmental concerns, responsibility and community involvement.
- The effectiveness of waste management services in various regions to identify areas of improvement and meet different community needs.
- Issues and challenges people face in implementing appropriate waste management include difficult disposal options, lack of awareness, and restrictions on the use of recyclable materials.
- Social influences such as peer relationships and cultural norms can encourage individuals to adopt waste management practices.
- Residents engage in waste management services to inform decisions and make improvements first.
- The effectiveness and impact of waste management projects in the community, taking into account the involvement of individuals and organizations in promoting cultural practices.
- New technologies and methods in waste management to ensure they are efficient, effective and compliant with environmental and financial targets.

IMPLICATIONS FOR PROFESSIONAL SOCIAL WORK PRACTICE

Professional social work practice in the field of decentralized waste management systems has many roles and responsibilities that are connected to the community. The social work has a vast area that could be covered by the interventions and other aspects.

- **Environmental Conservation:** Decentralized waste management systems promote environmental conservation by reducing the reliance on centralized landfills and incinerators. Social workers can play a crucial role in raising awareness about the environmental impact of waste and advocating for decentralized systems that prioritize recycling, composting, and resource recovery.
- **Community Engagement and Empowerment:** Implementing decentralized waste management systems requires community participation and engagement. Social workers can facilitate community meetings, organize workshops, and conduct outreach campaigns to involve residents in decision-making processes, waste reduction initiatives, and the establishment of recycling programs. This approach empowers individuals and communities to take ownership of waste management practices.
- **Health and Sanitation Improvement:** Inadequate waste management can lead to health hazards, especially in marginalized communities. Social workers can collaborate with public health agencies and community organizations to educate residents about proper waste disposal methods, hygiene practices, and the prevention of vector-borne diseases. They can also address the specific needs of vulnerable populations, such as the elderly or individuals with disabilities, to ensure their access to waste management services.

- **Socioeconomic Development:** Decentralized waste management systems can contribute to local economic development. Social workers can support the creation of job opportunities by promoting waste reduction and recycling industries within the community. They can collaborate with vocational training programs, small businesses, and cooperatives to train individuals in waste management practices, entrepreneurship, and the establishment of micro-enterprises focused on recycling and upcycling.
- **Social Justice and Equity:** Waste management often disproportionately affects marginalized communities, exacerbating existing social inequalities. Social workers can advocate for equitable distribution of waste management services, ensuring that underserved areas and vulnerable populations receive adequate resources and infrastructure. They can also address environmental racism by highlighting the disparate impacts of waste management on communities of colour and advocating for policy changes.
- **Policy and Advocacy:** Social workers can engage in policy analysis, development, and advocacy to shape regulations and legislation related to decentralized waste management systems. They can collaborate with local governments, NGOs, and grassroots organizations to promote sustainable waste management policies, regulations that support recycling and waste reduction, and initiatives for extended producer responsibility.
- **Education and Capacity Building:** Social workers can contribute to waste management education by developing and delivering training programs for professionals, community leaders, and educators. These programs can focus on waste reduction strategies, recycling practices, composting techniques, and the importance of behaviour change. By building the capacity of individuals and organizations, social workers empower them to take an active role in waste management and sustainability efforts.

- **Community Education:** Social workers can organize workshops, training sessions, and public forums to educate community members about the benefits of decentralized waste management. These sessions should emphasize the environmental impact of waste, the importance of waste reduction, recycling, and composting, and how decentralized systems can contribute to a sustainable future.
- **Information Dissemination:** Utilize various channels to disseminate information about decentralized waste management. This can include creating and distributing informational brochures, pamphlets, and fact sheets. Social workers can also leverage social media platforms, local newsletters, community websites, and radio broadcasts to reach a wider audience and provide updates on waste management practices.
- **Community Outreach:** Engage in direct community outreach to reach individuals who may not have access to traditional information sources. Social workers can conduct door-to-door campaigns, participate in local events and festivals, and collaborate with community-based organizations to reach diverse populations. These efforts can involve engaging in face-to-face conversations, answering questions, and addressing concerns related to waste management.
- **Collaboration with Schools and Educational Institutions:** Social workers can collaborate with schools and educational institutions to incorporate waste management education into their curriculum. By conducting workshops, presentations, and interactive sessions with students, social workers can instil environmentally responsible behaviours from an early age and encourage students to become change agents within their families and communities.
- **Engaging Key Stakeholders:** Social workers can collaborate with key stakeholders, such as local government officials, waste management companies, community leaders, and environmental organizations. By forming partnerships, social workers

can leverage their expertise and networks to organize awareness campaigns, develop educational materials, and advocate for policy changes that support decentralized waste management.

- **Case Studies and Success Stories:** Sharing case studies and success stories of communities that have implemented decentralized waste management systems can be a powerful way to inspire others. Social workers can document and share examples of communities that have successfully reduced waste, improved recycling rates, or implemented innovative waste management practices. These stories can demonstrate the feasibility and positive impact of decentralized systems.
- **Engaging Media and Public Relations:** Social workers can collaborate with local media outlets to raise awareness about decentralized waste management. This can involve writing op-eds, contributing articles, or participating in interviews to highlight the importance of sustainable waste management practices. Engaging with the media can help reach a wider audience and increase public understanding and support for decentralized waste management.
- **Monitoring and Evaluation:** Social workers should also monitor and evaluate the effectiveness of their awareness-spreading initiatives. This can involve collecting feedback from community members, conducting surveys to assess knowledge and behaviour change, and tracking the adoption of decentralized waste management practices over time. This data can inform future awareness campaigns and help refine strategies for maximum impact.

CONCLUSION

The study shows significant changes in attitudes and behaviors towards waste management in the context of Kochi Corporation. Growing awareness of the environmental impact of illegal waste dumping, initially met with skepticism and opposition, has led to a shift in thinking. Decentralized waste management systems enable individuals and communities to take responsibility for their waste, reduce waste and use sustainable practices such as composting and biogas. Community leaders and awareness programs played an important role in educating and encouraging residents to participate in the new project.

The problems to be solved such as resistance to change and the need for infrastructure to support the management of the system were also identified. It emphasizes the importance of waste management education, awareness and investment to foster positive attitudes and behaviors. These findings highlight the importance of stakeholder engagement, public participation and continuous evaluation of new technologies to ensure effective and efficient waste management. Overall, the research provides insights for policy makers, urban planners and environmental organizations to develop strategies to meet the needs and interests of communities and create a clean, healthy and healthy environment for the future.

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APPENDIX

1. Age

- a. 30 to 35
- b. 35 to 40
- c. 40 to 45
- d. 45 to 50
- e. Above 50

2. What is the monthly household income?

- a. Less than 10000
- b. 10000 to 20000
- c. 21000 to 30000
- d. 31000 to 40000
- e. Above 40000

3. Gender

- a. Male
- b. Female
- c. Transgender

4. For how long have you been a resident of the Kochi corporation area?

- a. Less than 2 years
- b. More than 2 years

5. Which ward do you currently reside in within the Kochi corporation area?

6.The concept of decentralized waste management is a viable solution for improving waste management practices.

- a. Strongly Agree
- b. Agree
- c. Neither Agree nor Disagree
- d. Disagree
- e. Strongly Disagree

7.Decentralized waste management systems can lead to more efficient and cost-effective waste disposal.

- a. Strongly Agree
- b. Agree
- c. Neither Agree nor Disagree
- d. Disagree
- e. Strongly Disagree

8.I believe that decentralized waste management systems promote local involvement and community participation.

- a. Strongly Agree
- b. Agree
- c. Neither Agree nor Disagree
- d. Disagree
- e. Strongly Disagree

9. Decentralized waste management can contribute to the reduction of environmental pollution and the conservation of natural resources.

- a. Strongly Agree
- b. Agree
- c. Neither Agree nor Disagree
- d. Disagree
- e. Strongly Disagree

10. The implementation of decentralized waste management systems requires proper infrastructure and logistical support.

- a. Strongly Agree
- b. Agree
- c. Neither Agree nor Disagree
- d. Disagree
- e. Strongly Disagree

11. Decentralized waste management systems offer more flexibility in adapting to the specific needs and characteristics of different regions.

- a. Strongly Agree
- b. Agree
- c. Neither Agree nor Disagree
- d. Disagree
- e. Strongly Disagree

12. I trust that decentralized waste management systems can effectively handle different types of waste, including hazardous materials.

- a. Strongly Agree
- b. Agree
- c. Neither Agree nor Disagree
- d. Disagree
- e. Strongly Disagree

13. Decentralized waste management systems have the potential to create new job opportunities and boost the local economy.

- a. Strongly Agree
- b. Agree
- c. Neither Agree nor Disagree
- d. Disagree
- e. Strongly Disagree

14. The implementation of decentralized waste management systems should be supported by educational programs to promote awareness and behaviour change.

- a. Strongly Agree
- b. Agree
- c. Neither Agree nor Disagree
- d. Disagree
- e. Strongly Disagree

15. How do you dispose of your household waste?

- a. Recycling
- b. Composting
- c. Garbage collection
- d. Donating items
- e. Other

16. How often do you recycle household waste?

- a. Daily
- b. Weekly
- c. Monthly
- d. Rarely
- e. Never

17. Do you separate different types of recyclable materials?

- a. Yes, always
- b. Sometimes
- c. No, never

18. Are you aware of the recycling facilities or centres available in your area?

- a. Yes, very aware
- b. Somewhat aware
- c. No, not aware

19. Have you ever participated in community clean-up events or waste management programs?

- a. Yes, frequently
- b. Occasionally
- c. No, never

20. How important do you consider waste management for environmental sustainability?

- a. Very important
- b. Somewhat important
- c. Not important

21. What motivates you to practice proper waste management?

- a. Environmental concerns
- b. Health and hygiene
- c. Community pride
- d. Legal obligations
- e. Convenience
- f. Other

22. Are there any challenges or obstacles you face in practicing proper waste management?

- a. Lack of knowledge
- b. Limited access to recycling facilities
- c. Inconvenient waste disposal options
- d. Insufficient awareness programs
- e. Other (please specify)

23. How satisfied are you with the waste management services provided in your locality?

- a. Very satisfied
- b. Somewhat satisfied
- c. Neutral
- d. Somewhat dissatisfied
- e. Very dissatisfied

24. Would you be willing to pay a higher waste management fee to improve waste management services in your area?

- a. Yes
- b. No
- c. Not sure

25. How frequently do you engage in discussions or initiatives related to waste management in your community?

- a. Frequently
- b. Occasionally
- c. Rarely
- d. Never

26. Do you feel that decentralized waste management initiatives are more effective compared to centralized waste management systems?

- a. Yes, definitely
- b. Not sure
- c. No, not at all