SOLID WASTE MANAGEMENT IN DHAKA CITY: EVALUATING CURRENT PRACTICES AND FUTURE PROSPECTS

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ABSTRACT

Dhaka is one of the most populous and rapidly growing cities in the world, facing significant challenges with solid waste disposal. It has a strained waste management system because each day, the amount of trash generated exceeds 6,800 tons due to insufficient infrastructure, poor coordination, and a lack of citizen participation. This paper evaluates the current solid waste management practices in Dhaka, focusing on collection, transportation, treatment, and disposal methods. A mixed-methods approach is used in the study, combining municipal statistics, household surveys, field observations, and key informant interviews to identify system-related issues such as inadequate waste separation, low recycling rates, and high reliance on landfills. The informal sector plays a key role in waste recovery but remains neither recognized nor supported officially. Financial and institutional challenges also limit the quality of services and innovation. Despite these constraints, the paper highlights new opportunities, including decentralized composting, community-based initiatives, and the potential for technology-driven improvements. The findings emphasize the need for a joint, multi-stakeholder plan that includes policy reform, capacity building, and investment in environmentally friendly infrastructure. To improve their chances of long-term success, efforts should focus on increasing public awareness and formalizing the inclusion of informal workers. This paper contributes to the discussion on urban environmental governance in South Asia and offers practical suggestions for developing a more effective and equitable waste management system in Dhaka.

Keywords: Solid Waste Management, Urban Waste, Dhaka City, Municipal Services, Recycling, Composting, Informal Sector, Waste Collection, Environmental Governance, Sustainable Development.

I.INTRODUCTION

Dhaka is one of the fastest-growing megacities in the world. Realized urbanization, in addition to the growth in the populace, has put tremendous pressure on the city's infrastructure and other requisite amenities **[1]**. The control of solid waste is one of the most pressing issues. With millions of people flocking to Dhaka in search of better opportunities, the city has to contend with the rising number of household, commercial, and industrial waste. Recent estimations show that over 6,000 tons of solid refuse are being generated in Dhaka, and this figure continues to grow. However, much of this wastes are either not collected or is disposed of improperly, causing environmental degradation, water pollution and health problems.

What worsens the problem is the lack of comprehensive and coordinated waste management. Informal waste collectors offer an essential but under-prioritized role, and the case is similar to municipal waste service, where there are limits on resources, human capacities, and funding. The open dump sites and improperly operated landfills still exist, especially in those geographical areas that are remote **[2]**. Planning has not adequately addressed these problems, and this has left neighborhoods (especially the low-income neighborhoods) exposed to unhygienic conditions. The picture described above illustrates that it is not only an environmental consideration but also a key determinant of citizen health and livelihood in Dhaka to enhance solid waste management. The process of resolving this issue will require an in-depth understanding of the existing system and its failures **[3]**.

Effective solid waste management is crucial for preserving public health, environmental integrity, and sustainability, particularly in densely populated urban areas such as Dhaka. Inadequate practices in waste collection, treatment, and disposal can lead to significant systemic issues, including contamination, public health risks, and environmental degradation. It is essential to implement advanced waste management strategies that prioritize efficiency and sustainability to mitigate these challenges. It is not uncommon to find accumulated refuse clogging the drainage systems, leading to increased flooding in the cities due to the monsoon season. The resultant breakdown of the waste products releases harmful emissions of gases and leachate, which pollutes the air, water, and soil. It is these risks to the environment that are directly linked to an increase in the waterborne diseases, respiratory diseases and other health-related issues especially in the low-income areas since its inhabitants have an increased vulnerability to the uncontrolled garbage **[4]**. Besides health and environmental problems, poor waste management affects the economy as well. It heightens city cleaning costs, lowers the value of property, and prevents investment and tourism. On the other hand, a productive and comprehensive system of waste management can turn waste into an invention **[5]**.

II.OBJECTIVES:

This study aims to assess Dhaka City's solid waste management practices, identify key challenges, and propose sustainable solutions for developing an efficient and resilient waste management system.

1. To assess the current waste management practices in Dhaka City and identify their strengths and weaknesses.
2. To examine the role of the informal sector and community-based activities in Dhaka's waste management system.
3. To explore and recommend sustainable and eco-friendly practices for improving solid waste management in the city.

III.JUSTIFICATION OF THE STUDY:

Solid waste management is a critical challenge in Dhaka, exacerbated by rapid population growth that has outstripped infrastructure capabilities. With daily waste generation exceeding 6,800 tons, current collection, transportation, treatment, and disposal methods are inadequate. Issues like poor waste segregation, minimal recycling, and over-reliance on landfills worsen environmental degradation and public health risks, while the informal sector's role in resource recovery remains largely ignored. Financial and institutional barriers hinder innovative, sustainable practices. This study aims to explore existing limitations and opportunities, such as decentralized composting and technology-driven solutions, to provide evidence-based insights and actionable recommendations for policy reform, multi-stakeholder collaboration, and investment in sustainable waste management systems in Dhaka.

IV.LIMITATIONS OF THE STUDY:

This study faces several limitations that may have affected its findings. First, due to limited manpower and time, it could not comprehensively cover all wards of Dhaka City, resulting in a constrained sample size for surveys and observations. Second, technological constraints limited the use of advanced data collection tools that could have enriched insights into waste management practices. Third, physical challenges such as traffic congestion and inadequate access to waste disposal sites hindered data collection. Lastly, the bureaucratic complexities and lack of transparency in Bangladesh's political context restricted access to official data, affecting the examination of waste management policies and governance. These limitations underscore the need for more extensive studies with enhanced resources and stakeholder collaboration.

V.CASE STUDY

Waste generation statistics of Dhaka City

The level of solid trash in general has been on the rise in Dhaka due to rapid urbanization. According to recent reports and records of the municipal corporations, the city produces an approximate daily amount of solid trash that is 6,800 tons per day (TPD) **[6]**. Annual Waste Generation is calculated using the following equation

Day generation (TPD) x 365 days = Annual Waste Generation (tons/year) **[7]**

Our projections are that we will produce about 2,482,000 tons a year. There are residential sources that total about 55% (3,740 TPD), and the commercial and industrial sectors provide an estimate of 30% (2,040 TPD). Markets, street sellers and building waste generate the remaining 15% (1,020 TPD). The per capita production is approximately 0.8 kg/ day with a population estimate of 8.5 million inhabitants. This is because the maximum generation rates vary with affluent wards averaging 1.1 kg/person/day, as the less-affluent areas do a comparative 0.6 kg/person/day. There are also seasonal fluctuations in volumes- the rates are approximately 10% lower in the dry month of winter as against the monsoon peak rates. The latter statistics give a graphic indication of both the extent and diversity of waste flows and establish a foundation on which to assess the issues of collection, treatment, and disposal **[8]**

According to secondary information, Dhaka generates more than 6,500 tons of solid waste daily, with about 4,550 tons being collected, resulting in a collection efficiency of 70 percent. It was found that 62 percent of the surveyed households do not receive regular waste collection, while 38 percent rely on informal scavengers.
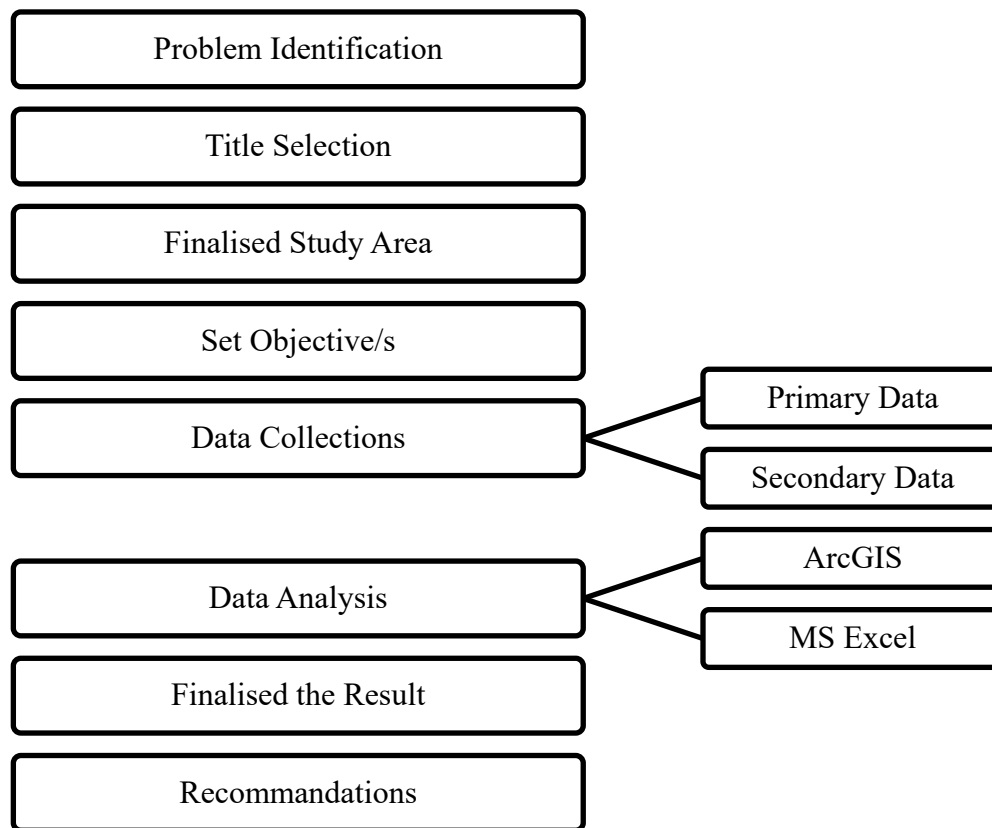
VI.METHODOLOGY

Figure 01: Research Methodology

Data sources
In this study, a mix of methods will be used, incorporating both primary and secondary sources of data. The primary data was gathered through field studies in five wards of the Dhaka North and South City Corporations, supplemented by interviews with 25 municipal employees, 10 trash collectors, and 8 residents. A survey of 100 households was also conducted to understand how they dispose of garbage. Secondary information was collected from official reports provided by Dhaka City Corporation, the Department of Environment (DoE), and relevant NGOs.

Field observations
Data were collected through field observations conducted over four weeks in five study wards, including two in Dhaka North City Corporation (Wards 12 and 19) and three in Dhaka South (Wards 23, 45, and 56). 100 samples.

KII Methods
Key Informant Interviews (KII) were used in this study to have an informed view of the concerned informants who actively participate or who have an overview of solid waste management in Dhaka, as given in table 01:

Table 01: Overview of solid waste management in Dhaka

Expert ID	Affiliation/Role	Position	Area of Expertise	Involvement Rating (1–10)
KII-01	DNCC	Waste Management Officer	Municipal waste operations	8
KII-02	DSCC	Sanitation Inspector	Urban sanitation	7
KII-03	DoE	Environmental Analyst	Policy and regulation	6
KII-04	NGO (Waste Concern)	Program Manager	Community-based waste solutions	9
KII-05	Private Waste Collection Contractor	Operations Manager	Logistics and waste collection	8
KII-06	Academic (BUET – Urban Planning)	Professor	Urban infrastructure	7
KII-07	Informal Waste Sector Representative	Recycler Cooperative Leader	Informal recycling systems	9
KII-08	DNCC Zonal Office	Assistant Engineer	Landfill and transfer station ops	6
KII-09	Journalist (Environment Desk)	Reporter	Public awareness and media	5
KII-10	Urban Health Expert (ICDDR,B)	Public Health Researcher	Environmental health risks	8

Analytical approach

To be able to quantify the effectiveness of solid waste management in Dhaka, the analytical methodology has combined both quantitative determination and qualitative information. The efficiency of waste collection was identified by using the following formula [9]:

Collection Efficiency (%) = (Waste Collected) / (Waste Generated) x(100)

Ward-level data were analyzed using Microsoft Excel to identify discrepancies in service delivery. The transcripts of the interviews were qualitatively coded using NVivo to identify recurring themes, such as a lack of dumpsters, delayed collection, and underrepresented communities. Triangulating insights from key informant interviews with field sources and municipal data helped ensure the consistency and credibility of the results.

VII.FINDINGS

Study Area:

Figure 2: Map showing location of Study Area

Dhaka, the capital and largest city of Bangladesh, is located on the eastern bank of the Buriganga River at 23°43′N and 90°24′E. Home to over 20 million people, it is one of the world's fastest-growing and most densely populated megacities. This rapid growth, while driving economic development, has created immense environmental and infrastructural challenges, particularly in solid waste management. The city is governed by Dhaka South City Corporation (DSCC) and Dhaka North City Corporation (DNCC), both under the Ministry of Local Government. However, both sites are overburdened, with waste often disposed of without proper segregation, treatment, or recycling. As a result, open dumping, clogged drains, and river pollution—especially in the Buriganga- pose severe public health and environmental risks. This study, therefore, examines the current practices, challenges, and prospects of solid waste management in Dhaka, highlighting how sustainable solutions can transform waste from a growing urban burden into a potential resource.

Waste Management Scenario
The Amount of Waste Collection/ Management in Different Authorities of Dhaka City is provided in Figure 3
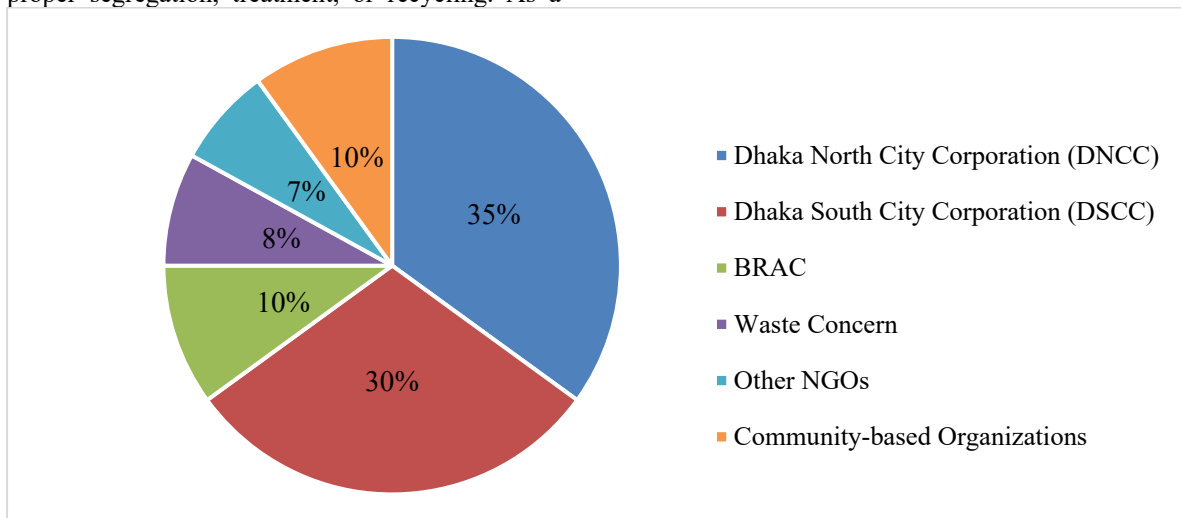

Figure 3: Amount of Waste Collection/ Management in Different Authorities

The Dhaka North City Corporation (DNCC) and the Dhaka South City Corporation (DSCC) are the principal entities responsible for waste management within the region. These two corporations serve as the primary facilitators of waste collection in Dhaka City. Additionally, non-governmental organizations and community groups play a crucial supportive role in this process. Collectively, these various organizations adopt a mixed public-private and community-based approach to waste management in Dhaka City.
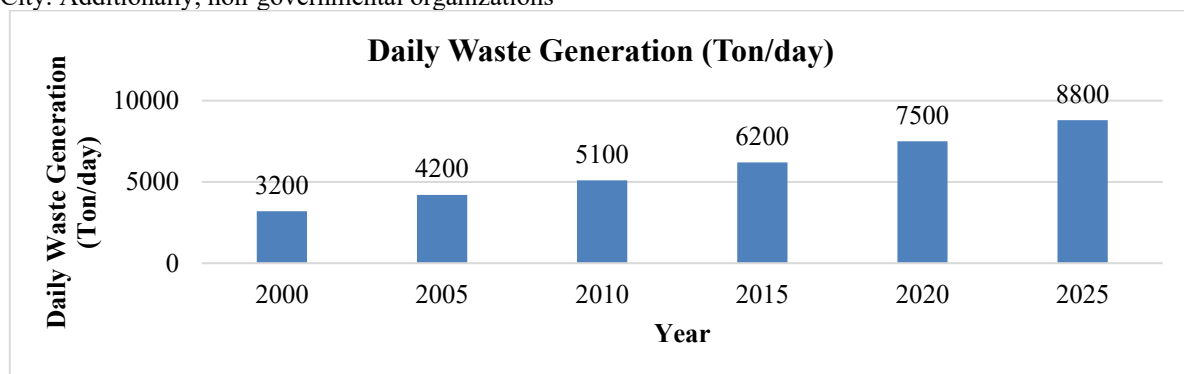

Figure 4: Timeline of Daily Waste Generation (Ton/day)

Between 2000 and 2025, daily waste generation in the study area increased significantly and consistently, more than doubling over these 25 years, which are show in chart 02. In 2000, daily waste generation started at 3,200 tons. By 2010, this figure had increased to 5,100 tons, indicating a steady upward trend. Projections for 2025 indicate a further significant increase, with daily waste expected to reach 8,800 tons. This significant increase highlights a growing environmental challenge that requires the implementation of effective and sustainable waste management strategies to address the increasing volume of waste. Otherwise, this waste will cause significant damage to Dhaka City's environment in the future. The Amount of Waste Composition in the Household, Schools and Colleges, Factories and Industries are providing in table 02, 03 and 04.

Table 02: Amount of Waste Composition in the Household

Waste Type	Percentage (%)	Waste collection methods
Organic / Food Waste	68	
Paper & Cardboard	8	
Plastics	7	
Metals	3	
Glass	2	
Textiles & Leather	6	
Others (ceramics, dust, ash, etc.)	6	

Table 03: Amount of Waste Composition in Schools and Colleges

Waste Type	Percentage (%)	Waste collection methods
Paper & Cardboard	45	
Plastics	18	
Organic / Food Waste	15	
Metals	5	
Glass	4	
Textiles	6	
Others (dust, e-waste, broken furniture, etc.)	7	

Table 04: Amount of Waste Composition in Factories and Industries

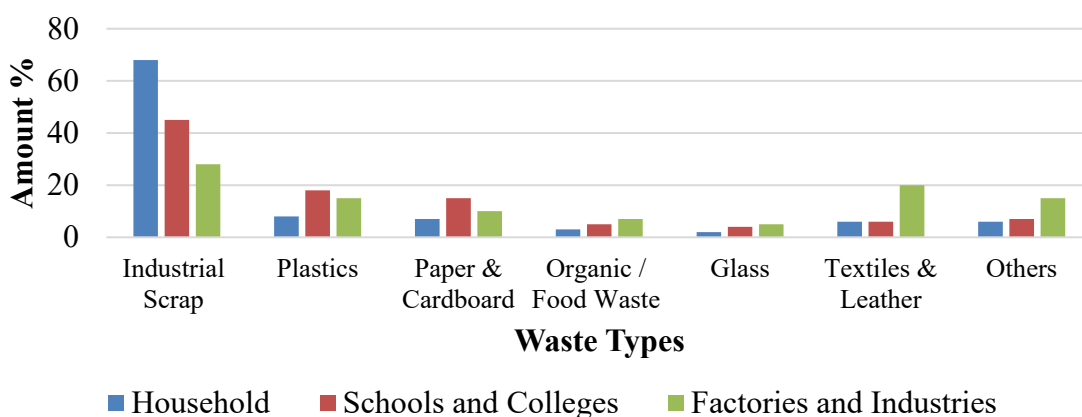| Waste Type	Percentage (%)	Waste collection methods
Industrial Scrap (metal, wood, rubber)	28	
Plastics	15	
Paper & Cardboard	10	
Organic / Food Waste (canteens)	7	
Glass	5	
Textiles & Leather	20	
Others (hazardous chemicals, sludge, ash, etc.)	15	

Figure5: Amount of Waste Composition in Dhaka City in the different Sources (%)

VIII.DISCUSSION

Dhaka, one of the most densely populated and rapidly urbanizing megacities in the southwest, faces significant challenges in solid waste management. The city currently collects about 70% of its waste through formal channels every day, with the remainder often disposed of illegally or informally. This gap causes widespread environmental degradation, air and water pollution, and serious public health risks, especially for marginalized urban communities.

The inefficiency of Dhaka's waste management system is largely attributable to ageing infrastructure, inadequate logistical capacity, poor coordination among municipal authorities, private operators, community-level stakeholders, and a lack of public awareness. Waste disposal facilities are limited and often poorly maintained, while recycling and composting methods remain rudimentary and underutilized. In addition, the role of informal waste collectors, who provide an essential but unacknowledged service in the recovery of recyclable materials, is marginal, leaving significant potential for resource recovery untapped.

Institutional and regulatory shortcomings compound the problem. Despite municipal bylaws and policies for waste collection, segregation, and disposal, enforcement remains weak. Citizens have limited awareness of source segregation, waste reduction, and sustainable disposal practices, resulting in indiscriminate dumping and low household participation in recycling initiatives. Nevertheless, there is considerable scope for improving Dhaka's waste management system. Integrating the informal sector with a formal, inclusive framework can increase resource recovery, reduce landfill dependency, and create livelihood opportunities. Adoption of GPS-based collection tracking and digital monitoring tools, such as smart waste bins, as well as investment in decentralized composting and waste-to-energy technologies, can significantly improve efficiency and accountability. Moreover, community-driven initiatives, including awareness campaigns, household-level waste segregation programs, and partnerships with local non-governmental organizations, have shown promising results in pilot projects across South Asia and could be scaled up in the Dhaka context.

The path to sustainable waste management in Dhaka requires a multi-stakeholder approach. Effective collaboration between government authorities, private enterprises, civil society organizations, and local communities is essential to design and implement long-term strategies that address both infrastructural deficiencies and behavioral challenges. By doing so, Dhaka can move towards a more circular waste economy, reduce environmental impacts, and improve the quality of urban life.

IX.RECOMMENDATIONS

1. **Source Segregation and By-law Enforcement:** Introduce mandatory household- and institution-level waste segregation with a 2–3 bin system (organics, recyclables, and residuals). Roll this outward by ward, providing free start-up kits and a grace period of six months, after which fines should be enforced for non-compliance.

2. **Citywide Organic Waste Management:** Given that Dhaka's waste stream is predominantly organic, establishes an inclusive neighborhood scale composting and anaerobic digestion program, targeting high-volume waste generators such as wet markets, hotels, and restaurants. This will reduce landfill methane emissions, odor, and transportation costs.

3. **Formalization of the Informal Sector:** Regularize and integrate informal waste pickers and dealers by registering them, providing PPE, ensuring safe sorting zones, and granting access to social protection. Waste pickers should be organized to manage ward-level Material Recovery Facilities (MRFs), with a ban on child labour to protect adult earnings.

4. **Expansion of Decentralized Material Recovery Facilities:** Set up small-scale MRFs close to waste generation points to sort paper, plastics, glass, and metals. Ensure quality benchmarks for recyclable sales to increase market value, reduce contamination, and improve recycling chain efficiency.

5. **Extended Producer Responsibility (EPR) and Plastic Waste Control:** Adopt EPR schemes for packaging, supported by collection charges and MRF operations. Implement deposit-return systems for PET bottles, enact targeted bans on single-use plastics, and promote affordable substitutes to reduce plastic pollution.

6. **Improvement and Gradual Closure of Landfills:** Upgrade existing landfill sites (Matuail and Aminbazar) by treating leachates, covering waste daily, improving storm water management, and capturing landfill gas. Implement engineered cells with progressive capping and develop an incremental closure plan to transition towards sanitary landfilling and post-closure land utilization.

7. **Use of Digital and Monitoring Technologies:** Deploy GPS tracking on waste collection vehicles and install fill-level sensors on community bins in high-density areas. Establish an open digital dashboard to report collection rates, complaint resolution, recycling performance, and methane reduction progress, thereby improving transparency and accountability.

8. **Financial Sustainability and Public–Private Partnerships:** Introduce pay-as-you-throw schemes for large waste generators, rational tipping fees for private haulers, and performance-based payments tied to waste diversion outcomes. Strengthen partnerships with the private sector through PPPs to ensure sustainable financing.

9. **Specialized Waste Streams Management:** Develop separate collection and treatment systems for construction and demolition waste, healthcare waste, and electronic waste. Promote recycling of construction debris into aggregates, enforce strict healthcare waste treatment standards, and launch electronic take-back pilot programs with certified recyclers.

10. **Behavioral Change and Community Participation:** Invest continuously in public awareness campaigns to foster sustainable waste practices. Initiatives could include school- and mosque-based awareness programs, neighborhood contests such as "Best Kept Street," and partnerships with community committees to encourage long-term behavioral transformation.

X.CONCLUSION

Dhaka faces a waste management crisis due to rapid urbanization, inadequate infrastructure, and governance issues. While some waste is collected formally, problems like illegal dumping, ineffective recycling, and the marginalization of informal workers worsen environmental and public health risks. Outdated landfills and limited community awareness further hinder the system's effectiveness. However, Dhaka has the potential to develop a sustainable waste management framework. Solutions should include social inclusion, infrastructure investments, technological advancements, and policy reforms. Key interventions could involve decentralized composting, material recovery facilities, and enhanced producer responsibility. Empowering informal waste workers and increasing community awareness through campaigns can also promote citizen engagement. A successful strategy will require collaboration among the government, NGOs, and local communities. By adopting a circular economy model and integrating global best practices with local innovations, Dhaka can address its waste challenges, improve environmental conditions, and enhance city livability.

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