Muhammed Alamgir, S.M. Tariqul Islam, Mahmudul Hasan, N.J. Pollen (Eds.)
ISBN: 978-984-35-7297-4

Full Paper of the WasteSafe 2025 – 9th International Conference on
Sustainable Solutions for Waste Management in Developing Countries
22-23 February 2025, Dhaka, Bangladesh

ASSESSMENT OF MUNICIPAL SOLID WASTE MANAGEMENT PRACTICES IN KUSHTIA: EXPLORING OPPORTUNITIES FOR SUSTAINABLE WASTE MANAGEMENT

Ashraful Islam Raju[1], Most. Khairunnahar Lima[2] and Rafi Islam Suchona[3]

[1,2,3]Islamic University, Kushtia-7003

ABSTRACT

This paper presents an overview of the current state of municipal solid waste (MSW) management and an analysis of existing problems in MSW collection, segregation, recycling, and disposal in Kushtia Municipality. In Kushtia, along with urbanization, population growth, and industrialization, the quantity of municipal solid waste generated has been increasing rapidly. The total MSW amount increased from 25– 27 metric tons per day in 2016 to 30–32 metric tons per day in 2023. This indicates that the waste generation rate is increasing in Kushtia Municipality. About 45% of people don't have any idea about solid waste management, while 22% of people have negative thoughts about it. The majority of the people (36%) transfer their waste to the waste van, which is a newly added facility by the waste management authority in the municipality. However, 16% and 14% of people throw their trash into bodies of water and open spaces, respectively. About 8% of people transfer their daily waste to the streets. The findings of this study provide a strategic framework to further support solid waste management, which will be helpful for municipal authorities and planners in ensuring proper management of municipal solid waste and ecologically responsible municipal management.

INTRODUCTION

One of the biggest problems in the urban world today is managing municipal solid waste (MSW), especially in emerging nations' quickly growing cities, towns, and metropolitan areas. Wastes like durable items (like tires and furniture), nondurable items (like newspapers, plastic plates, and cups), containers and packaging (like milk cartons and plastic wrap), and other wastes (such yard waste and food) are all included in municipal solid waste (MSW), also referred to as trash or rubbish. Common domestic waste, office waste, and retail waste are all included in this category; however, industrial, hazardous, and construction waste are not. The environment, as well as the social and professional lives of city dwellers, developers, urban planners, and other interested parties, are negatively impacted by these rising MSW rates (Alamgir et al., 2005). Residential, institutional, and commercial garbage as well as municipal services trash (street sweeping) are the main sources of MSW. In contrast to commercial and industrial trash, which have largely constant compositions over time, residential wastes are abundant and fluctuate with the seasons.

Residents of Kushtia municipality currently endure potential stressors from these polluted waste sources as they go about their daily lives. This issue pertains to environmental quality, which is critical for both human health and the potential for toxic substances to spread to other ecosystems. Ineffective industrial waste management affects biodiversity, crop productivity, and ecosystem degradation. By 2025, the amount of solid waste (SW) discharged worldwide will have increased from 10.4 billion tons in 2010 to 148 billion tons. Approximately 56% of the global SW is contributed by developing nations (JICA, 2015; Visvanathan et al., 2007). The rate of individual waste generation (WGR) is elevated in industrialized nations, but developing nations have a higher overall WGR (Ashraf et al., 2015; Welivita et al., 2015). With more than 522 urban centers, Bangladesh is classified as a developing Asian country (DAC). From a variety of sources, they collectively produce thousands of tons of MSW per day (Anon, 2010; Uddin et al., 2011; Yasin et al., 2013). But altogether, the methods for managing, treating, and disposing of MSW are not up to par. Lack of relevant research and adequate data regarding the current municipal solid waste management (MSWM) system exacerbates it (Ahsan et al., 2005). The fact that solid waste management will shield our homes from the possibly harmful impacts of solid waste is just one of the many reasons it is so important in our community. If we correctly dispose of these waste products, we can really

ISBN: 978-984-35-7297-4

prevent health problems for both ourselves and the environment. Centuries ago, individuals disposed of their trash by digging a hole into a secluded land area. This approach of garbage disposal was meant to be successful because of the low population density at the time. Waste management was made easier by the low population, which resulted in less waste being created. However, waste output has greatly increased due to population growth, making disposal difficult. Non-biodegradable and inorganic materials are part of today's garbage. This garbage will take a long time to break down organically if it is dumped in a landfill. trash management enables users to properly and efficiently dispose of all kinds of trash. The objective of this study is to explore the waste management system and to figure out main problems that causing by municipal solid waste and find out the possible way to reduce it. Also it is a goal-oriented evaluation of solid waste management to make it more sustainable strategically.

METHODOLOGY

Bangladesh's cultural hub, Kusthia, is located in the southwest of the country. It is part of the administrative region of Khulna. Rajshahi, Natore, and Pabna districts border it on the north; Chuadanga and Jhenaidah districts border it on the south; Rajbari and West Bengal, India, districts border it on the east; and Meherpur districts border it on the west. Kushtia Municipality is the major city and administrative hub of the district (Banglapedia, 2012). The coordinates are 23°42' to 24°12' north latitude and 88°42' and 89°22' east longitude. On April 1, 1869, the Kushtia Municipality was established.

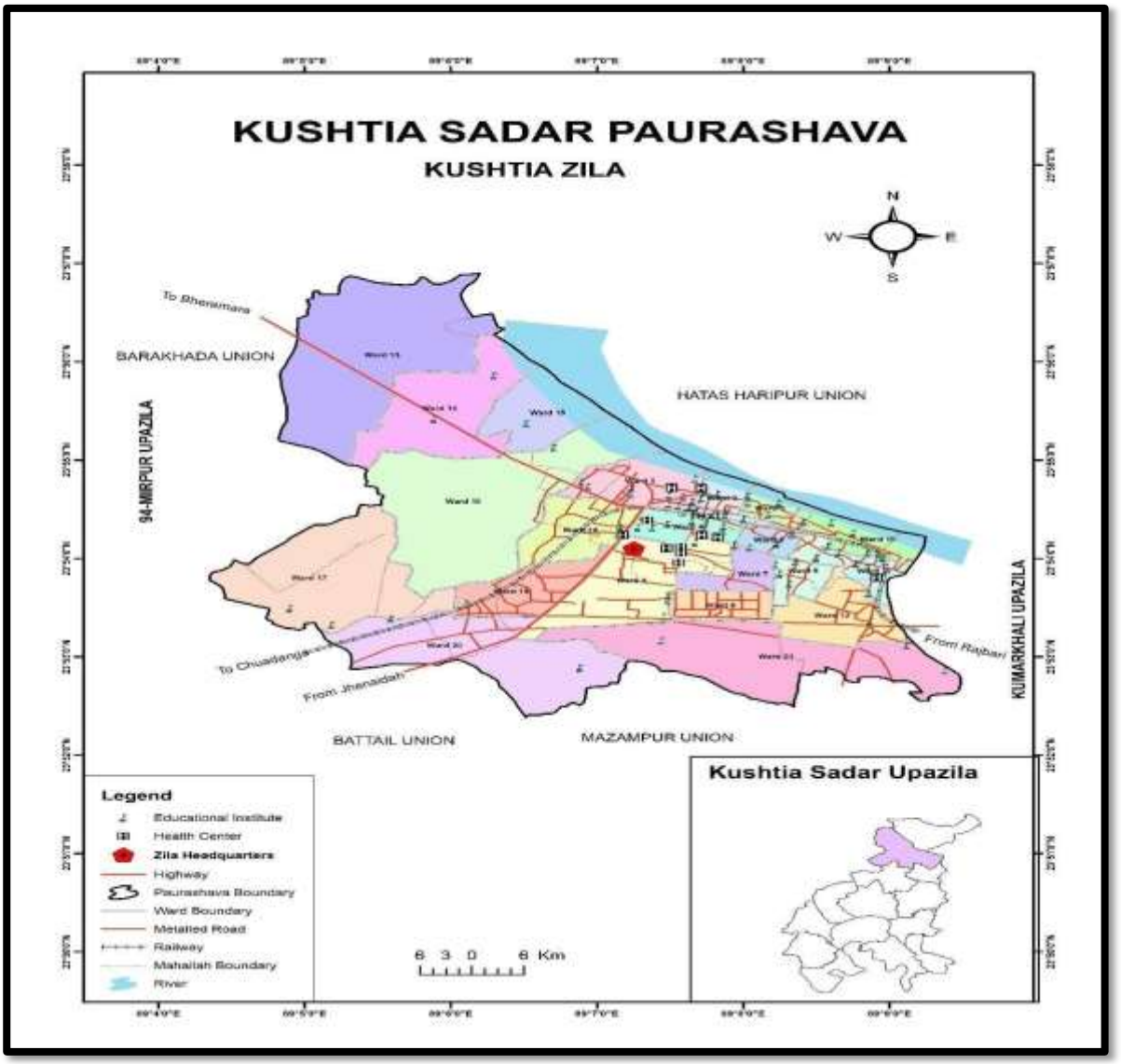


Figure 1 Study area map

ISBN: 978-984-35-7297-4

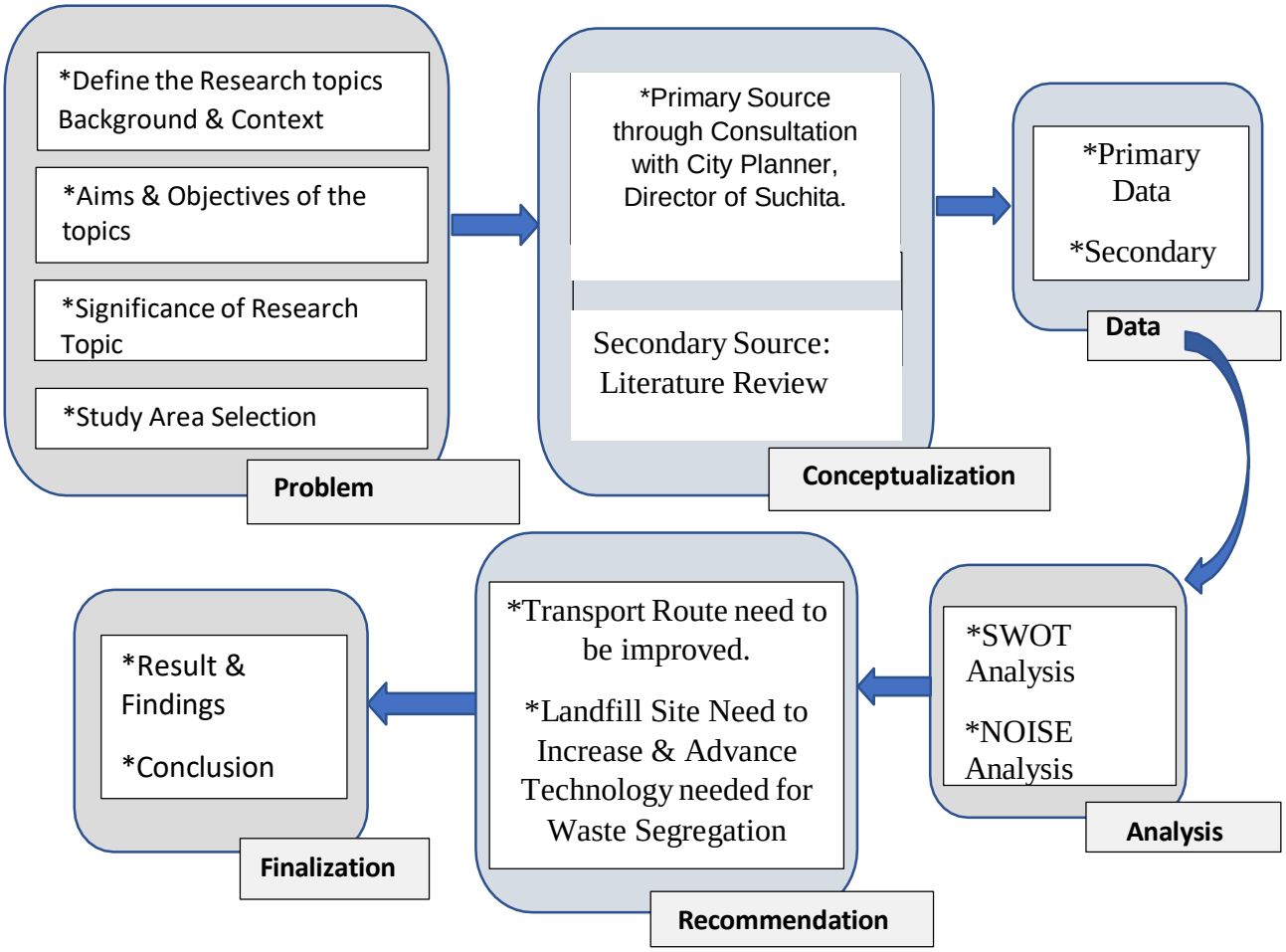


Figure 2 Methodology

Research Design and Approach

The study's primary goal was to assess Kushtia Municipalities MSW management methods with an emphasis on crucial components such MSW generation, composition, storage, collection, transportation, disposal, and recycling, and offer strategies for establishing a waste management system that is sustainable.

The implementation of this investigation is divided into six phases. The first step is to identify problems. Urban garbage is a major problem everywhere in the world. Therefore, managing urban garbage is essential to alleviating this problem. Numerous population problems and environmental damage, including air and water pollution, are caused by poor management. The municipality of Kusthia is working to manage its municipal trash. To assist with this, they established the Kushtia Municipality to handle trash. Although their management method offers many benefits, there are some drawbacks as well. This study will evaluate the municipality's management system. The second step includes conceptualization. Two methods are used to do this: first, by consulting with specialists working in the waste management system, such as the director of Suchita and the city planner of Kustia municipality. Secondly, by looking at past waste management research. The third step is data collection. The waste management system of the Kushtia Municipality is assessed through the utilization of primary and secondary data sources. Through field study and site visits, primary data are collected. The Kushtia Municipality website (www.kushtiamunicipality.org), the BBS, the Kushtia Development Plan, and other sources are used to collect secondary data. Analysis is the fourth step. SWOT analysis is a popular tool that is used to identify opportunities and challenges in order to accomplish the goal of the study. While difficulties hint at vulnerabilities and risks, opportunities in this study refer to strengths and opportunities. Often known as an activity's strengths, weaknesses, opportunities, and threats, SWOT analysis is a tool for determining both internal and external factors. A comprehensive SWOT analysis is carried out based on the identified study

questions and with feedback from those working with waste management systems. Noise analysis is a method for strategic planning that is an alternative to SWOT analysis. However, after a thorough analysis of the current state of waste management, it allows for the development of a strategic improvement plan. Based on the data collected, descriptive analysis was performed using SPSS with various sets of variables, which helped us determine some baseline scenarios for municipal solid waste
management. The answers to those questions are derived from the analysis of data collected through field observations, Municipality reports, and related literature. The fifth stage is the suggestion phase, which involves suggesting specific policies after analysis. The sixth stage, finalizing, refers to information gathering and formal presentation.

Sampling Method and Sample Size:

We may estimate the sample size using the Taro Yamane (1967) formula since we know the approximate population size of the study area.

Equation 1

$$n = \frac{N}{1 + Ne^2}$$

Where,

n = sample size, N = population size, e = error (0.05) reliability level 95%

Here,

N= 251241, e=0.05

So, calculating by this formula my sample size is 399.05 by rounding it the required sample size, n=400

I can't take this amount of data due time and some other obstacle so I consider my sample size n= 70, it's my limitation in case of sampling.

In this research paper I have followed random and stratified sampling method for sampling.

Data analysis

Data analysis is essential to research since it provides reliable and pertinent information that can be used to construct future strategies with a sustainability perspective. Following the completion of data collection, I began the data analysis phase using the information I had gathered from my seventy respondents. In order to perform this statistical study, I mostly employed two software applications. (SPSS, Microsoft Excel).

RESULTS AND DISCUSSION

Waste Transfer Sector

This graph demonstrates that 40.20% of people collect their waste in a wastebasket. In opposition, 20.70% and 19.50% of people collect their waste with an old bucket and a plastic bag. A few people use cartoons as containers.

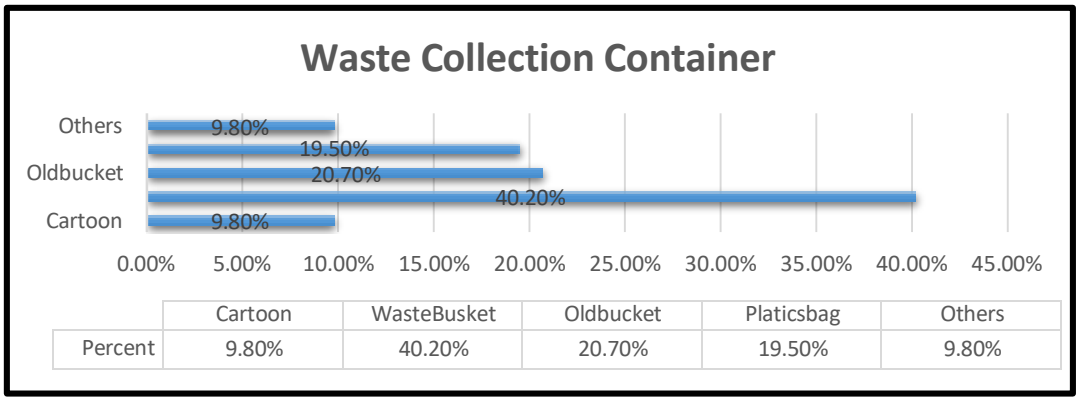


Figure 3 waste collection container

The majority of the people (36%) transfer their waste to the waste van, which is a newly added facility by the authority of waste management in the municipality. A relatively large number of people put their waste into public beans near their houses. 16% and 14% of people throw their trash into bodies of water and open spaces, respectively. About 8% of people transfer their daily waste to the streets.

SWOT analysis in waste management

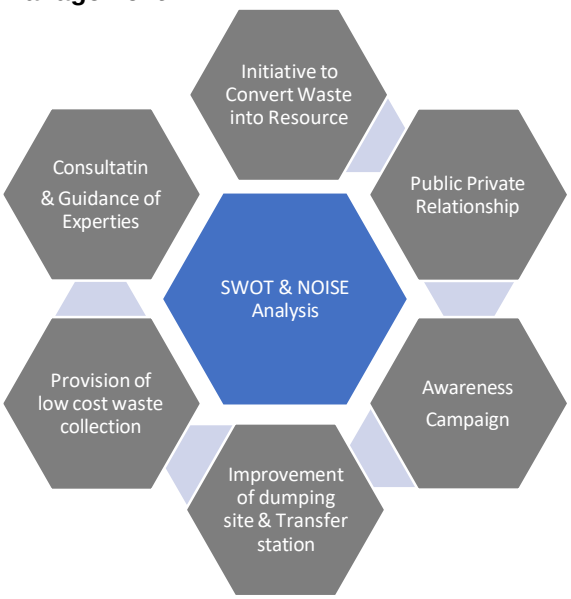


Figure 4 Key elements of SWOT analysis

Municipal Solid waste Activities

8.60% The process of municipal solid waste in kushtia municipality is given below. From the diagram we can understand the flow of solid waste time to time. We can answer the question of research that where does the waste go. What is the procedural method of municipal solid waste in kushtia municipality.

City Planner of Kushtia Municipality stated, “Kushtia Municipality has done remarkably well in solid waste management and faecal sludge management in last few years. We are making little profit instead of giving subsidy. Apart from this, we have outsourced our compost/ treatment plan, which means we do not need to provide salaries to our earlier 7-8 waste labor. So, in total now the municipality can save around 30-35 thousand per month and this is how we are trying to make our waste management system sustainable.

ISBN: 978-984-35-7297-4

Kushtia municipality solid waste management

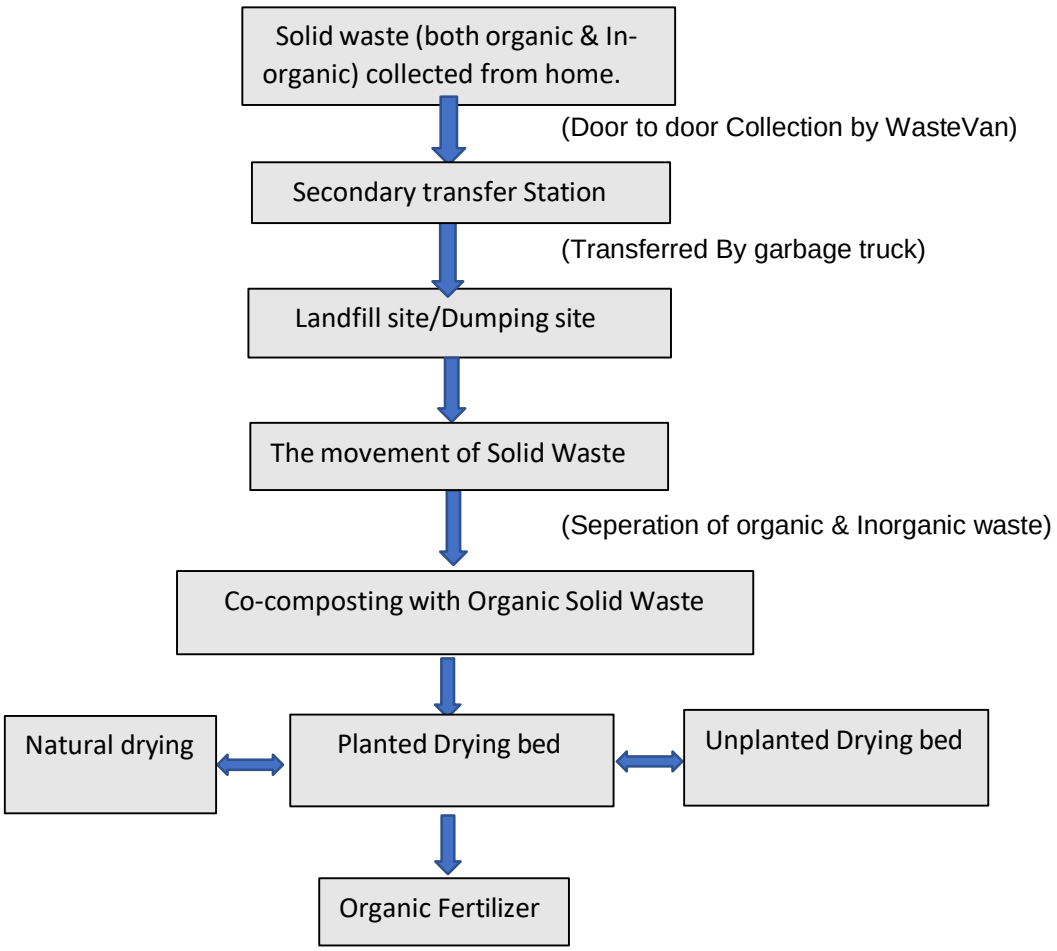
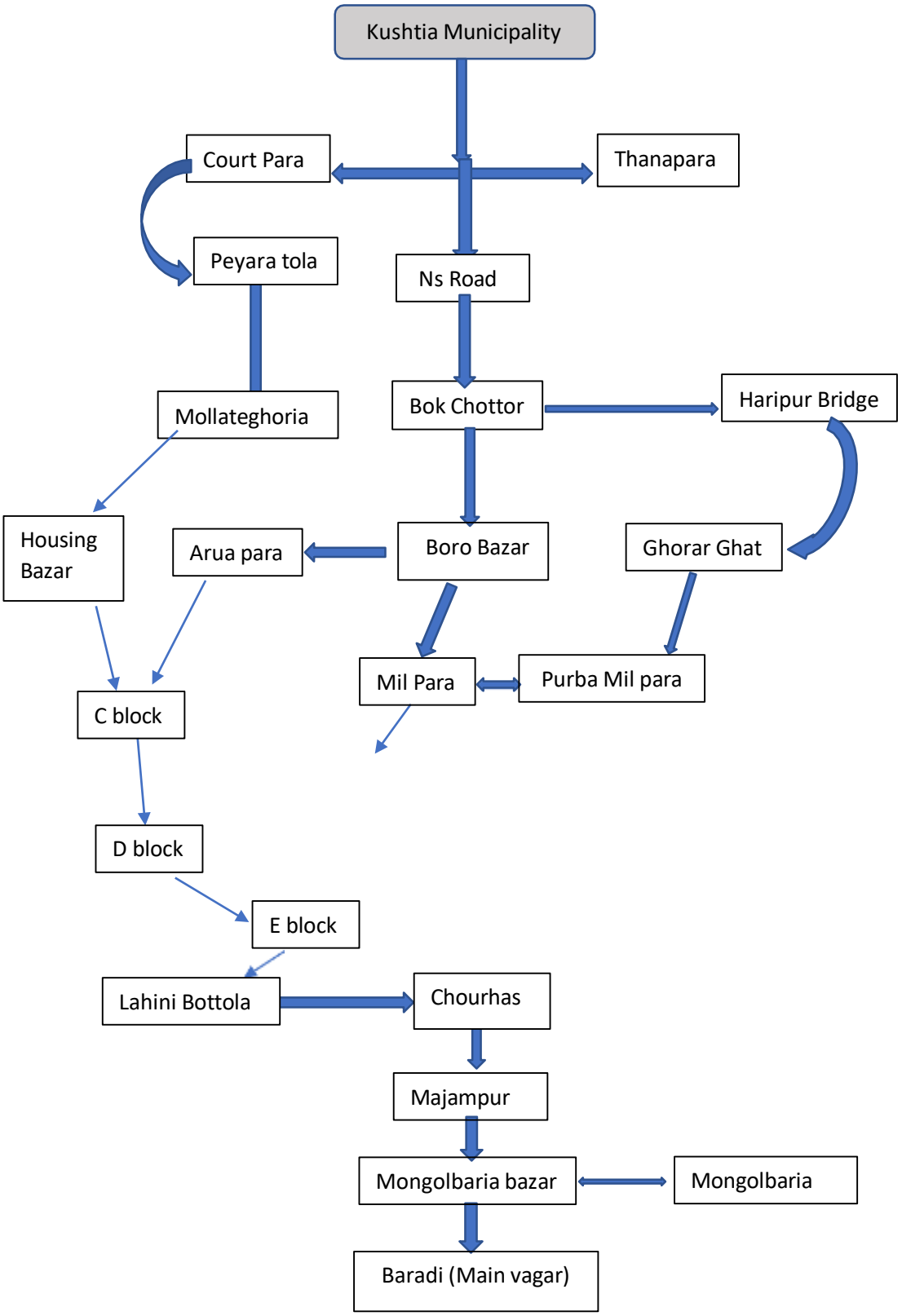


Figure 5: Kushtia Municipality Solid Waste Management

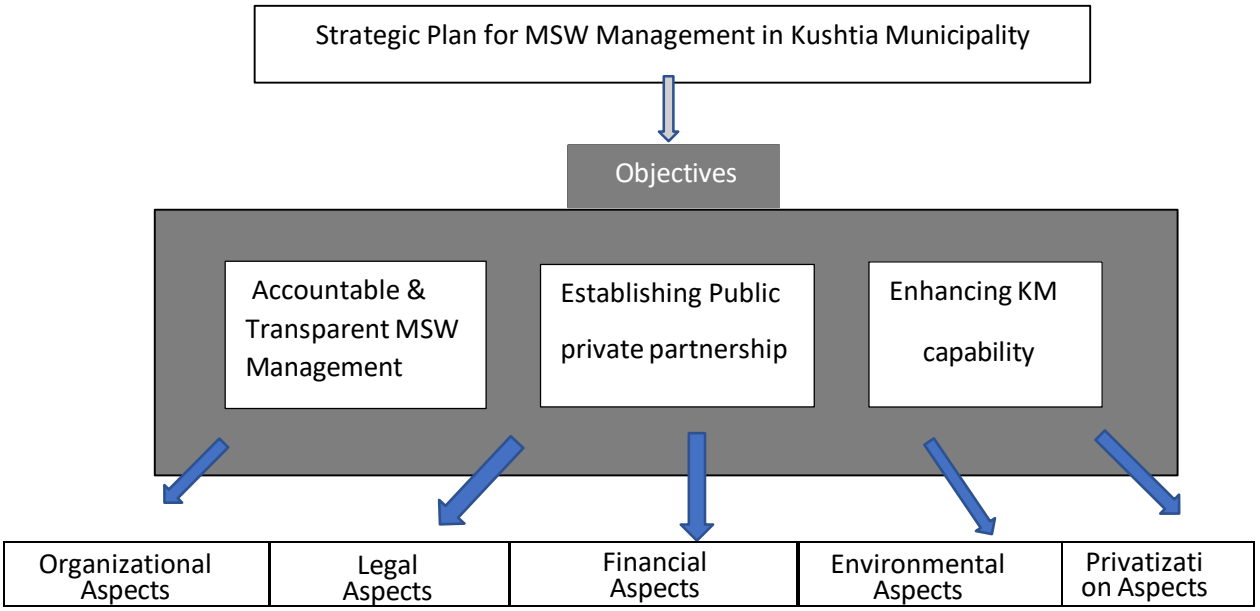
ISBN: 978-984-35-7297-4

Waste Transfer Route of Kushtia municipality



ISBN: 978-984-35-7297-4

Recommended MSW management plan to achieve sustainability



Clear responsibility allocation to different sections of KM involved in MSW management	Clear & Equitable responsibility allocation between KM and waste generators.	Separate budget for different sections of Conservancy wings & their accountability	Plan & program for the environmentally Sensitive areas.	Encourage research on various MSW Management issues
Improve & enhance the capacity of operational organizations	Co-ordination with DoE & law enforcing agencies	Enhance accountability for Budgeting, cost control and preparation of annual reports	Budget for the awareness program to understand Environmental sustainability	Examination of Privatization and community initiation
Strengthening planning, coordination, monitoring And evaluation capability	Compliances of existing laws, rules & regulation	Financing for manpower, Technology and infrastructural Development	Environmental Impact Assessment, Health impact assessment consolidation	Assist and encourage the activities of NGos in MSW Management.
Improve capability for community solid waste management	Formation of new rules and regulation For future aspects of Solid waste management	Enhance income generation through sustainable utilization of MSW	Enhance environment friendly situation for both human & other Species.	Encourage and support the role of private sector in recycling activities
Regularly held awareness campaign about MSW for public participation			Enhance environment friendly situation for both human & other Species.	

CONCLUSIONS

The study concluded that one of the major obstacles to creating right plans for sustainable MSW management is the lack of sufficient and current data regarding the management of MSW in Kushtia Municipality. Furthermore, there hasn't been enough research done in this area to identify the issues and provide solutions. Other significant issues include financial limitations and the appropriate authorities' failure to recognize the significance of this crucial sector. The study's findings and scenarios show that there is much room for improvement in the urban MSW management situation in Kushtia, which is currently far from what is expected. The authors believe that Bangladesh too needs an efficient SWM strategy, with a focus on matters like adequate trash collection and transportation, adoption of scientifically proven, ecologically friendly waste disposal methods, waste reduction, and recycling. As a result, this study suggests a structure that will act as the fundamental basis for creating a sustainable waste management system for the Kushtia municipality. The authors are optimistic as a result of their work because solid waste management conditions in Kushtia Municipality are substantially better now than they were ten years ago. Although there are still many significant issues and difficulties, there are also many chances and occurrences of city administrations and their communities cooperating to find locally relevant and sustainable solutions. The evidence points to the viability of sustainable solid waste and resource management in the future.

ACKNOWLEDGEMENT

All praise is due to Almighty Allah, the Most Merciful. We express profound gratitude to Bipul Roy, Assistant Professor, Islamic University, for his guidance and support. Sincere thanks to Anwar Ali, Mayor, and Ranver Ahmed, Town Planner, Kushtia Municipality, for their assistance. May Allah grant us peace and prosperity.

Ashraful Islam Raju, Most. Khairunnahar Lima, Rafi Islam Suchona

REFERENCES

Ahsan, A., Alamgir, M., El-Sergany, M. M., Shams, S., Rowshon, M. K., & Daud, N. N. (2014). Assessment of municipal solid waste management system in a developing country. Chinese Journal of Engineering, 2014(12a), 1-11.

Alamgir, M., & Ahsan, A. (2007). Municipal solid waste and recovery potential: Bangladesh perspective. Journal of Environmental Health Science & Engineering, 4(2), 67-76.

Wilson, D. C., Velis, C. A., & Rodic, L. (2013, May). Integrated sustainable waste management in developing countries. In Proceedings of the Institution of Civil Engineers-Waste and Resource Management (Vol. 166, No. 2, pp. 52-68). ICE Publishing

Visvanathan, C. (2006). Solid Waste Management in Asian Perspectives. Environmental Management Tools, 131.

Welivita, I., Wattage, P., & Gunawardena, P. (2015). Review of household solid waste charges for developing countries–A focus on quantity-based charge methods. *Waste Management*, *46*, 637-645.

Wilson, D. C., Rodic, L., Scheinberg, A., Velis, C. A., & Alabaster, G. (2012). Comparative analysis of solid waste management in 20 cities. *Waste management & research*, *30*(3), 237-254.

Yasin, N. H. M., Mumtaz, T., & Hassan, M. A. (2013). Food waste and food processing waste for biohydrogen production: a review. *Journal of environmental management*, *130*, 375-385.