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# Analysis of Economic Waste Management in Medan City

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**Abstract**

Waste management is becoming an increasingly important issue in the context of sustainable development. Waste refers to residual material that becomes useless after use. Organic waste originates from living organisms and can naturally decompose, while inorganic waste is unusable and difficult to decompose. Effective waste management is crucial in reducing environmental impacts and improving the quality of life. This study focuses on analyzing the economic aspects of waste management in Medan City using qualitative methods and secondary data. The results indicate that waste management in Medan faces various challenges. Community participation and technological use can be solutions to address waste-related issues.

**Keywords:** Waste Management, Organic Waste, Inorganic Waste.

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## INTRODUCTION

Waste is the residue of products or goods that are no longer used but can still be recycled into valuable items. Organic waste originates from living organisms that can naturally decompose without human intervention, while inorganic waste is difficult to decompose and cannot be reused. Inorganic waste can contaminate the soil and accumulate in it, damaging the soil layers (Yulistia, 2016).

Statistical data on waste in Indonesia includes waste materials from industrial and household production. Waste is the leftovers from animals, humans, or plants that are unused and released into the environment in solid, liquid, or gas form. Organic waste is divided into wet and dry organics.

Waste management in the city of Medan has become an important issue due to the increasing amount of waste each year. Data from the Central Statistics Agency (BPS) of Medan shows a decline in economic growth in 2020, while the information and communication sector grew by 9.03 percent, followed by the Water Supply, Waste Management, Sewerage, and Recycling sector at 6.54 percent.

According to SAHdaR, there are about 1,000 waste accumulation points in Medan, including on main roads such as Sisingamangaraja Street, Letda Sujono Street, Panglima Denai Street, and Jenderal Gatot Soebroto Street.

SWOT analysis indicates that waste management in Medan is in the fourth quadrant, a defensive strategy. Internal and external factors show that weaknesses and threats are more dominant than strengths and opportunities.

According to SumutPos (2023), the Medan City Government stated that the sanitary landfill method is effective and efficient in waste management. A

new landfill with this method was completed in March 2023, marking progress in waste management in Medan.

## RESEARCH METHOD

This research employs a qualitative method to describe the issues and research focus. The qualitative method aims to obtain descriptive data in the form of words and images, aligning with Lexy J. Moleong's perspective that the collected data is descriptive and not in numerical form. The qualitative approach does not rely on statistics but rather on qualitative evidence, including direct field observations and understanding respondents' experiences related to theory.

The survey aims to collect data from various sources using indirect observation techniques, including observation, off-site note-taking, or when events occur. Literature review involves references to books to find theories relevant to the research topic and consulting scientific journals discussing regional changes. Additional secondary data from magazines, the internet, including online journals and news, are used to support the economic analysis of waste management in the city of Medan.

## RESULTS AND DISCUSSION

Factors Affecting Waste Generation in the City of Medan

1. Geographical location significantly influences the quantity and types of solid waste in Medan. Strategic areas without proper disposal facilities in residential areas contribute to waste issues, especially on roadsides and sidewalks. Some districts, such as Medan Tembung, Medan Barat, and Medan Timur, face limitations in waste bins, leading residents to dispose of waste in ditches and rivers.
2. The frequency of waste collection affects the manageable amount of waste. More frequent waste collection services reduce the accumulation of waste in Waste Processing Sites (TPS) or bins.
3. Source activities, such as sorting, recycling, reusing, and composting, have the potential to reduce waste volume. Conversely, dumping organic waste into wastewater channels can increase the load on wastewater treatment.
4. Societal characteristics, including habits and customs, influence the amount of solid waste. For example, traditional ceremonies and consumption patterns that involve plastic, cans, and styrofoam packaging can increase waste generation.

Local or national regulations governing the use and disposal of specific materials impact the production and types of waste generated. For instance, regulations promoting the repeated use of shopping bags aim to reduce plastic waste. Product quality standards also affect a product's lifespan; high-quality products are more durable, less prone to damage, ultimately reducing waste.

Active community participation in waste reduction is achievable when individuals consciously change their habits and lifestyles to conserve natural resources and reduce the burden of waste management. Various diverse settlement conditions need consideration as waste generation sources to facilitate waste management operations.

**Waste Management in Medan**

The growth in Binjai and Deli Serdang has led to migration, increased population, and the creation of new areas on the outskirts, triggering physical growth in Medan. According to the Central Statistics Agency of Medan in 2000, the population reached 2,108,607 with a density of 7,954 people per km2.

Research by Zulfr (2000) stated that the most dominant type of waste in Medan is organic waste, primarily from market areas and settlements. Waste in residential areas has a positive correlation with the economic level of the community. A survey by PD. Kebersihan showed that between 1995-1999, only 75.50% of the total waste generated in Medan was successfully collected.

**Cost of Waste Management**

The rapid population growth in Medan is inseparable from the influence of technological advances, transportation, and other factors. This indicates that Medan is a suitable place for productive activities. The increase in population, changes in consumption patterns, and changes in lifestyle also increase the quantity, types, and characteristics of waste.

With a population nearing 3 million, Medan produces approximately 1,500 tons of waste every day, with 48% organic waste and 52% inorganic waste. This waste volume is expected to continue increasing. This waste, including easily decomposable organic waste, contributes to social environmental degradation. Piles of waste that harm the health and beauty of the environment serve as examples of pollution that can be considered social environmental degradation. Organic waste, generally easily decomposable, constitutes the largest portion of household waste.

This research uses a qualitative descriptive approach. Descriptive research typically does not require hypotheses, so hypothesis formulation is unnecessary in the research steps. The use of qualitative research methods was chosen because this research was conducted in a natural setting, and the collected data tends to have qualitative characteristics.

**Revenue from Waste Management**

Income from recycling waste pickers is approximately IDR 8 million to IDR 12 million every three months, with an average collection of 100 kg of recyclable waste per week. Thus, individual income ranges from IDR 250,000 to IDR 350,000 per month. During 2020, the waste bank successfully recycled 2% of Medan's total waste in a year, producing 2,600 tons of industrial raw materials with an economic value of IDR 6.8 billion. Some individuals can only collect one bucket of plastic waste, weighing a maximum of two kilograms per year, with weekly earnings ranging from IDR 17,000, IDR 15,000, and even as low as IDR 5,000.

**Environmental Impact**

Data from the Ministry of Environment and Forestry (KLHK) noted an increase in waste volume in Indonesia from 68.5 million tons in 2021 to 70 million tons in 2022, with approximately 16 million tons unmanaged. In North Sumatra, the ninth-largest waste volume producer in Indonesia (Mutia, 2023), about 89% of waste remains unmanaged (Alfi, 2020). This emphasizes the importance of waste management at the city or regional level, as effective management can create a healthy urban environment. Its impacts involve environmental aspects, social conditions of the community, and contributions to the local economy. A similar

situation is seen at the Final Processing Site (TPA) for waste in North Sumatra, such as TPA Terjun in Medan.

According to information from a source in this Final Processing Site (TPA), the presence of TPA has a negative impact on its surrounding environment, including well water contamination. This information prompted researchers to investigate the "Influence of the TPA Terjun waste management system in Medan." The goal of this research is to understand the waste management methods used by TPA Terjun and their effects. In its waste management, this TPA applies the open dumping method, where arriving waste is left to pile up and arranged with heavy equipment. This approach has the potential to disrupt the environmental quality around the TPA area.

**Technology Use in Waste Management**

From data obtained from the Environmental Agency, Medan produces around 2000 tons of waste every day. Waste has long been a serious issue in Medan, known as one of the dirtiest cities in Indonesia. To address this, the Medan City Government is making efforts to innovate waste management, including expanding the final disposal area. Besides impacting environmental cleanliness, waste management also has economic dimensions.

Many waste collection points in Medan depend on this process. To contribute to the community, a digital platform has been created for buying and selling waste or used goods in Medan, involving the Sicanang Waste Bank and other relevant parties. This digital platform is expected to help waste managers in managing company operations and increasing the value of the waste itself. The hope is that this will form a more accurate and efficient waste management cycle in Medan. Statistical data on waste in Indonesia refers to information about discarded materials from production processes, both from industry and households. Thus, waste can be described as the residual material from animals, humans, or plants that is not reused.

In Indonesia, community participation in plastic waste handling is still low. To address this issue, an innovative solution in the form of digital technology is one way to combat plastic waste problems in Indonesia. Each individual can participate by categorizing plastic waste by type and sending it to recycling centers through an online application that can be downloaded on their devices. This not only provides a solution to reduce plastic waste volume but also can increase income and create opportunities and job opportunities (Yogiesti et al., 2010).

**Community Involvement**

The increase in population impacts the increase in waste volume. About 80% of the waste generated is disposed of in the Final Processing Site (TPA), while the rest is disposed of by the community into rivers, vacant land, or burned. A solution to this waste problem requires active community involvement in waste management

This research aims to understand community participation in the Medan Perjuangan District in waste management and identify obstacles affecting their participation. Qualitative research was conducted through interviews, observations, and documentation studies in the area. Community participation in waste management is observed in the planning and implementation stages.

In the planning stage, community participation is limited, with the Medan City Sanitation Department fully responsible for the cleanliness program. The community can only provide input through city musrenbang forums. When it comes to the implementation stage, community participation is evident through the availability of personal trash bins and payment of cleanliness fees. The obstacles faced by the community in waste management participation involve willingness, ability, government socialization, and available waste management resources. Community participation in the Medan Perjuangan District is still low and temporary. To increase participation, the Medan City Government is advised to implement region-based waste management, considering population density and local wisdom, and to enhance socialization about waste management and cleanliness services for the community.

**Government Policies**

Waste is a result of human activities that must be properly managed to prevent environmental pollution. Medan produces around 126 m3 of waste per day, with 42% of it transported to the Final Processing Site (TPA). Research shows that organic waste dominates at 70%, while waste from batteries is only 0.02%. Revenue from waste management fees in the Medan Baru Subdistrict continues to increase each year. It is recommended for the Medan Baru Subdistrict Government to promote waste recycling programs to reduce the volume of waste to the TPA and support composting programs.

**Comparison with Other Cities**

Waste management in Medan is improved by providing facilities such as waste trucks and implementing the sanitary landfill method, which has proven to be effective and environmentally friendly. The new landfill using this method was completed in March 2023, marking progress in waste management in Medan. A sanitary landfill is the final disposal site for waste. Previously, waste disposal in cities often occurred in open spaces (open dumping), which had negative impacts such as unpleasant odors, dirt, potential disease spread, and environmental pollution. With the adoption of sanitary landfill technology, these negative impacts can be minimized. In a sanitary landfill, waste is deposited on a surface previously covered with clay and geomembrane. This is done to prevent leachate, or water from the waste decomposition process, from seeping into the ground and contaminating groundwater. Additionally, pipes are installed on the bottom surface to collect leachate and methane gas.

In Surabaya, waste management uses Black Soldier Fly (BSF) technology, a collaboration between KLHK and the Surabaya City Environmental and Green Open Space Agency (DKRTH). This technology utilizes fly larvae to consume organic waste, especially food remnants and household waste. With a population of 10,000 larvae, this technology can recycle 12 kilograms of waste in 12 days. In the Jambangan District, a waste bank has successfully encouraged residents to save by donating waste. The collected waste is sold, and the proceeds can be taken by residents according to their needs, such as during celebrations or the start of a new school year.

**Potential Economic Improvement**

Waste management in urban environments, especially in areas with high population density, is a significant issue with imbalances in quantity and

quality. Therefore, an assistance and community service program was implemented in Gelugur Darat I, Medan, to strengthen family-based waste management economics. This Community Service Program (PKM) aims to provide short-term solutions by changing community mindsets through organic waste processing training. The long-term step is to provide assistance to strengthen training results. This PKM aims for the community to realize that waste issues can be opportunities, motivating them to manage household waste better.

**Public Perception of Waste Management in Medan**

The government, entrepreneurs, and the community play crucial roles in managing domestic solid waste to create a clean and waste-free environment. Waste management in Pajak Sore Pasar 1, Padang Bulan Village, Medan Baru Subdistrict, receives positive support from the community, although there are complaints about the delay in collecting prepared waste by officers. The goal of household solid waste management is to reduce its negative impacts on health and the environment and improve environmental quality through waste processing and utilization for human welfare and environmental preservation. Waste is considered an unwanted and solid substance.

## CONCLUSION

Waste management in the city of Medan faces various significant challenges. Rapid physical growth and an increase in the population have led to a rise in waste production. The primary issue in this city is organic waste originating from markets and residential areas. Despite only a small portion of the waste being successfully collected, the cost of waste management is a crucial concern. Environmental impacts resulting from inadequate waste management, such as environmental degradation and contamination of well water, underscore the need for efforts to enhance waste management in Medan.

Active community participation and the use of technology can serve as potential solutions to address these waste issues. Involving the community in waste reduction efforts and source-based waste management can help decrease the overall waste generated. Additionally, adopting technologies like the Black Soldier Fly (BSF) method, successfully implemented in Surabaya, could be considered in Medan. A comparison with other cities indicates that Medan has effectively utilized the sanitary landfill method. However, there is still room for improvement, particularly concerning the operational efficiency of waste management personnel.

It is crucial to focus on the management of household solid waste as an effort to mitigate the adverse effects of waste on public health and the environment. This includes educating the community on waste separation, recycling practices, and proper disposal.

Overall, public perception of waste management in Medan seems relatively positive, but there are still some issues that need prompt attention. Effective government policies in waste management, involving active community participation, and adopting suitable technologies are necessary steps toward addressing these challenges. Such efforts will significantly contribute to improving environmental quality and the well-being of the community in Medan.

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