

Evaluating the Efficacy of the Waste Bank Centre in Kabupaten Kulon Progo: A Comprehensive Study on Sustainable Waste Management Practices

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Abstrak

Ditengah meningkatnya kekhawatiran global terkait pengelolaan sampah, Kabupaten Kulon Progo di Yogyakarta menunjukkan gambaran mini dari tantangan dan solusi yang melekat di Indonesia. Penelitian ini terutama bertujuan untuk menjelaskan efikasi dan dampak bank sampah, inisiatif utama di daerah tersebut yang mempromosikan pengurangan sampah, daur ulang, dan pembuangan yang tepat. Dengan menggunakan data empiris dari Sistem Informasi Pengelolaan Sampah Nasional (SIPSN) dan tinjauan literatur yang ekstensif, studi ini memberikan wawasan tentang tren, komposisi, dan mekanisme pembuangan sampah khusus untuk Kabupaten Kulon Progo. Selanjutnya, penelitian ini menyoroti efisiensi operasional, jangkauan, dan pengaruh bank sampah dalam kerangka pengelolaan sampah yang lebih luas. Dengan menyoroti baik tantangan maupun peluang yang dihadapi oleh bank sampah, studi ini merumuskan rekomendasi kebijakan yang tepat, dengan tujuan memperkuat upaya pengelolaan sampah di Kabupaten Kulon Progo dan menyajikan pelajaran yang dapat ditingkatkan untuk daerah lain di Indonesia.

Keywords: bank sampah, pengelolaan sampah, Kabupaten Kulon Progo, SIPSN, daur ulang, praktik berkelanjutan,

Abstract

Amidst escalating global concerns regarding waste management, Kabupaten Kulon Progo in Yogyakarta presents a microcosm of the challenges and solutions inherent to Indonesia. This research primarily aims to elucidate the efficacy and impact of the waste bank centre, a pivotal initiative in the district promoting waste reduction, recycling, and proper disposal. Utilizing empirical data from the National Waste Management Information System (SIPSN) and an extensive literature review, the study offers insights into waste trends, composition, and disposal mechanisms specific to Kabupaten Kulon Progo. Further, the research underscores the waste bank center's operational efficiency, outreach, and influence within the broader waste management framework. By highlighting both the challenges and opportunities faced by the waste bank centre, this study crafts informed policy recommendations, aiming to fortify waste management efforts in Kabupaten Kulon Progo and presenting scalable lessons for other Indonesian districts.

Keywords: waste bank centre, waste management, Kabupaten Kulon Progo, SIPSN, recycling, sustainable practices

Introduction

Waste management has emerged as a pivotal concern for countries around the globe (Ferronato & Torretta, 2019; Klemeš et al., 2020), given the escalating volumes of waste produced annually and the environmental implications associated with its mishandling. Indonesia faces mounting challenges in this domain as one of the most populous nations (Kurnia et al., 2023; Kurniawan et al., 2021). The sheer volume of waste generated daily, coupled with factors like urbanization, consumer behavior, and limited recycling infrastructure, exacerbates the waste management problem (Suryawan et al., 2022; Suryawan & Lee, 2023). Notably, Kabupaten Kulon Progo, a district within the Yogyakarta Special

Region, mirrors these national challenges, reflecting both the broader patterns of waste generation and the unique local intricacies of managing it.

The National Waste Management Information System (Sistem Informasi Pengelolaan Sampah Nasional, or SIPSN), managed by the Ministry of Environment and Forestry, is a testament to the country's commitment to addressing this issue (Kementerian Lingkungan Hidup dan Kehutanan, 2021; Qonitan et al., 2021). It offers a comprehensive digital overview of waste management practices across the archipelago. Data extracted from SIPSN suggests a nuanced picture of waste trends, practices, and challenges in

Kabupaten Kulon Progo. As urban and rural landscapes in the region continue to evolve, so does the nature and scale of its waste, necessitating an in-depth investigation.

Despite the increasing attention that waste management has garnered globally and within Indonesia, there remains a distinct lack of comprehensive evaluations of local waste management systems (Latianingsih et al., 2019; Mahyudin, 2017; Suhardono et al., 2023; Suryawan et al., 2023), particularly in regions like Kabupaten Kulon Progo. SIPSN has meticulously compiled data on waste management practices; the depth and nuance of interpretation required to influence policy and practice at the district level are often missing. This is especially pertinent to specialized waste management approaches like the waste bank center. As a unique initiative, the waste bank center focuses on promoting waste reduction, recycling, and proper disposal, serving as a potential model for sustainable waste management. However, despite its pivotal role, few studies have rigorously evaluated its performance, impact, and scalability. There's a conspicuous gap in understanding the efficiencies and challenges of the waste bank center, its alignment with the larger waste management goals of Kabupaten Kulon Progo, and its potential replication in other Indonesian districts.

The primary aim is to conduct an exhaustive assessment of the waste bank center in Kabupaten Kulon Progo. This will encompass its operational efficiency, the volume and types of waste it handles, outreach, and impact on the larger waste management framework. By harnessing the data from SIPSN, the study intends to map out the trends in waste generation, composition, and disposal in Kabupaten Kulon Progo, drawing correlations with the role and impact of the waste bank center. Based on empirical data and literature review, the research aims to spotlight the waste bank center's challenges, the broader waste management system, and the opportunities for enhanced waste management practices. One of the critical objectives is to craft informed policy recommendations for Kabupaten Kulon Progo's administration. By synthesizing the findings from the waste bank center evaluation and broader waste management trends, the study will

propose strategies to bolster waste management efforts.

METHOD

This research's methodology is anchored in two primary approaches: empirical data analysis and literature review. The primary data referenced comes from the National Waste Management Information System (Sistem Informasi Pengelolaan Sampah Nasional, or SIPSN), managed by the Ministry of Environment and Forestry (Kementerian Lingkungan Hidup dan Kehutanan, 2021). This digital platform provides detailed information about waste management across Indonesia, including in Kabupaten Kulon Progo. This platform successfully accessed specific data on the composition, amount, and waste management methods in Kabupaten Kulon Progo.

Once the data was gathered, the subsequent step was to undertake a descriptive analysis. This analytical approach allowed for a deeper understanding of the fundamental characteristics of the waste in Kabupaten Kulon Progo, such as its composition and volume. However, this research adopted a literature study approach to provide a broader context and a more profound understanding of waste management conditions in Indonesia generally. This method used various scientific publications, previous research reports, and relevant policy documents as references. By amalgamating these two approaches, this research delved deep into the trends, challenges, and potential solutions in waste management in Kabupaten Kulon Progo. Furthermore, by considering best practices and findings from other regions, this study aims to offer precise recommendations for waste management in Kabupaten Kulon Progo in particular and Indonesia as a whole.

RESULT AND DISCUSSION

Kabupaten Kulon Progo, like many other regions, has faced a pressing concern about waste management. The quantitative data from Figure 1 underlines a noteworthy trend of rising waste generation over just four years. This growth poses environmental, economic, and health challenges for the district and requires a more profound understanding and strategization.

Waste generation is often directly proportional to a region's economic activities, population growth, and urbanization. In 2019, Kulon Progo registered a waste generation of 61,774 tons annually. Though this might seem substantial, what's more, alarming is the trajectory this figure took in subsequent years. The data showcases an increase of approximately 2,957 tons of waste in four years, amounting to an average annual growth rate of about 1.6%.

Several factors might contribute to this increase. An uptick in the district's population would naturally lead to a rise in waste generation as more people equate to more waste from daily activities. As more areas in the district become urbanized, construction activities, increased consumerism, and higher living standards can all lead to increased waste. Additionally, a shift in consumption patterns, especially with the influx of single-use plastics and packaged goods, plays a significant role. Furthermore, if there's been an increase in industrial activities in the district, they could contribute to the higher waste figures.

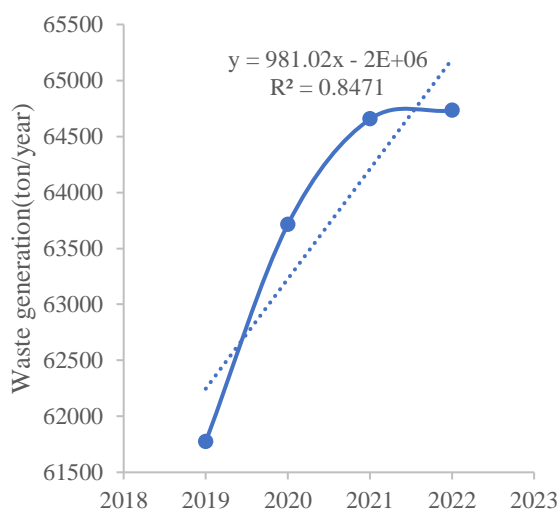


Figure 1. Waste Generation Trends in Kabupaten Kulon Progo (2019-2022) (Kementerian Lingkungan Hidup dan Kehutanan, 2021)

The ecological implications of such a trend are profound. If not appropriately managed, more waste can lead to landfills being filled more rapidly, risking groundwater contamination, air pollution from waste incineration, and the degradation of natural habitats. Increased waste often increases greenhouse gas emissions, especially if organic

waste is left to decay. Managing waste is not just an environmental concern but also an economic one. With the rise in waste, the district would need to allocate more resources for its collection, transport, and disposal, which can strain the local government's budget. Additionally, if waste isn't disposed of appropriately, it can pose significant health risks. Uncollected waste can become breeding grounds for pests and vectors that spread diseases.

Figure 2 provides an insightful breakdown of the waste composition in Kabupaten Kulon Progo. The data gives a detailed account of the types of waste generated and their proportions, enabling a clear understanding of the district's waste management challenges and priorities. From the data, it's evident that food waste dominates the waste composition, accounting for a whopping 67.18% of the total. Such a significant percentage indicates that organic waste is a primary concern for the district. Food waste, if not appropriately managed, can contribute to producing methane – a potent greenhouse gas – as it decomposes in landfills. This necessitates efficient strategies such as composting or biogas production to effectively manage and utilize this organic waste.

Following food waste, plastic and paper cardboard are the next substantial categories, contributing 17.22% and 12.6%, respectively. The prominence of plastic waste is particularly concerning given its non-biodegradable nature, which can lead to long-term environmental issues, such as soil and water pollution. Effective recycling programs, reducing single-use plastics, and raising awareness about the environmental impacts of plastic waste are essential steps toward mitigating these concerns. Paper and cardboard, while biodegradable, can be efficiently recycled to reduce the strain on landfills and save valuable natural resources. Metal and glass waste comprise smaller composition portions, with 1.68% and 1.11%, respectively. Both these materials are highly recyclable. Proper collection and recycling systems can ensure these materials are reused, reducing the need for virgin resources and lessening environmental impacts. Lastly, textile waste stands at a minimal 0.21%. While it's a tiny fraction, textiles can take considerable time to decompose. Establishing effective recycling or upcycling

programs for textiles can aid in reducing its environmental footprint.

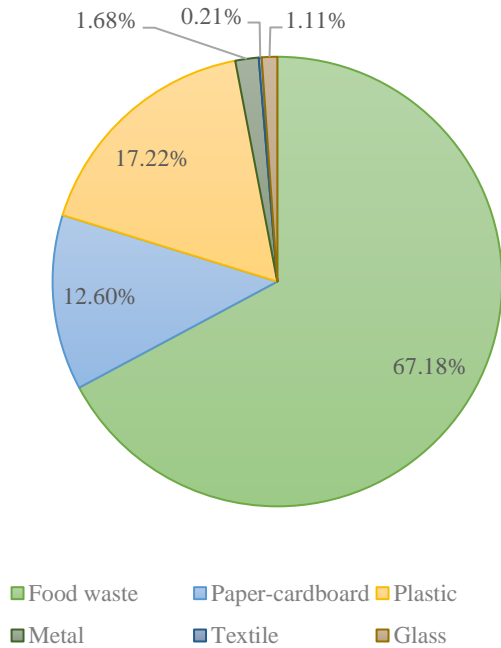


Figure 2. Composition of Waste Types in Kabupaten Kulon Progo (Kementerian Lingkungan Hidup dan Kehutanan, 2021)

Figure 3 provides a crucial insight into the capabilities and performance of the waste bank center in Kabupaten Kulon Progo, located in Yogyakarta. The data specifically sheds light on the amount of waste handled by the center over two consecutive years.

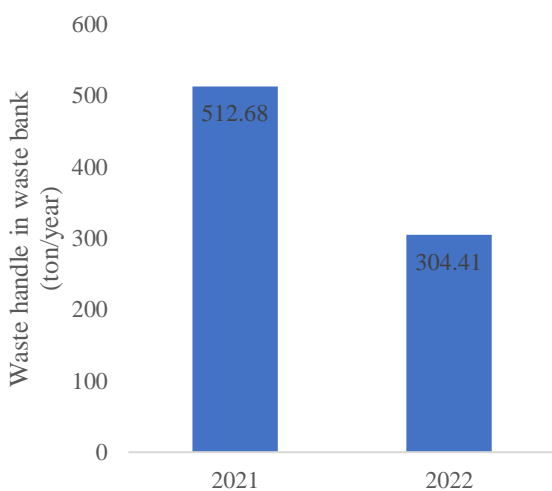


Figure 3. Waste Handled by the Waste Bank Centre in Kabupaten Kulon Progo (2021-2022) (Kementerian Lingkungan Hidup dan Kehutanan, 2021)

In 2021, the waste bank center managed to handle a commendable 512.68 tons of waste over the year. However, a noticeable decline is observed in the following year, 2022, where the figure dropped significantly to 304.41 tons/year. This represents a decrease of over 40% in the capacity to handle waste within just a year.

Table 1 concisely represents the waste reduction achievements in Kabupaten Kulon Progo over two consecutive years, 2021 and 2022. By looking at these percentages, we can better understand the efficiency and effectiveness of waste reduction measures in place during these years. In 2021, waste reduction measures decreased the total waste generated by 0.79%. This indicates that almost 1% of the waste that would have otherwise been discarded was successfully prevented, recycled, or repurposed. Such a reduction could be attributed to community awareness campaigns, efficient waste segregation, recycling efforts, and possibly introducing more sustainable consumption practices within the community.

However, a drop is observed in 2022, where the reduction percentage is 0.47%. This reduction is nearly half of the previous year's achievement. Such a decline is significant and indicates that the waste reduction strategies in 2022 could have been more effective or faced challenges that hindered their performance.

Table 1. Yearly Waste Bank Centre Reduction Percentages in Kabupaten Kulon Progo (2021-2022)

Year	Waste generation (ton/year) ¹	Waste handled in waste bank (ton/year) ¹	Waste reduction (%)
2021	64,654	512.68	0.79%
2022	64,731	304.41	0.47%

¹(Kementerian Lingkungan Hidup dan Kehutanan, 2021)

The Waste Bank Centre in Kabupaten Kulon Progo has seen noteworthy improvements over the years, which have been instrumental in advancing waste management within the region. One of the primary enhancements has been the scaling-up of

infrastructure, encompassing establishing more collection points across the district. This expanded reach has made it easier for residents to deposit their recyclable waste, resulting in higher collection rates. Additionally, introducing advanced sorting and processing equipment has streamlined waste-handling (Rai et al., 2019; Sianipar et al., 2022). These machines can quickly segregate different types of waste, enhancing the efficiency of recycling operations. The center has also strongly emphasized community engagement (Wijayanti & Suryani, 2015), conducting regular workshops and awareness campaigns to educate the public about the benefits of waste segregation and recycling. Such initiatives have bolstered waste collection rates and fostered a culture of environmental consciousness within the community.

Furthermore, collaborations with local businesses and organizations have been fostered to promote the idea of a circular economy (Ghinoi et al., 2020). By partnering with industries that can repurpose recycled materials, the waste bank center has ensured that a significant portion of the collected waste finds a second life in new products, thereby reducing the need for virgin resources. Efforts have also been made to digitize operations. Modern waste management software allows the center to monitor real-time waste collection, sorting, and recycling (Suryawan & Lee, 2023). This digital transition has made it easier to track performance metrics, identify bottlenecks, and devise strategies for continuous improvement.

CONCLUSION

The study provides an in-depth insight into the role and impact of the waste bank in Kabupaten Kulon Progo as an initiative to address waste management concerns. It has been observed that the waste bank in Kabupaten Kulon Progo has demonstrated significant efficacy in reducing the volume of waste being directed to the landfill. However, despite its positive impact, there remains room for operational and outreach improvements. Data from the National Waste Management Information System (SIPSN) highlights increased waste generation in Kabupaten Kulon Progo. Nevertheless, initiatives like the waste bank have increasing potential to mitigate these negative impacts. Policy and strategy refinements

are necessary to maximize the potential of the waste bank and other waste management initiatives. This includes increased funding, training, and public education on the importance of sustainable waste management. The waste bank in Kabupaten Kulon Progo can serve as a model for other regions in Indonesia. Through this evaluation, other regions can understand the challenges and opportunities and apply best practices in their local context. In conclusion, although challenges exist, the waste bank in Kabupaten Kulon Progo has proven to be an effective solution to address waste management issues. With full support from authorities and the community, coupled with strategic improvements, Kabupaten Kulon Progo has the potential to exemplify efficient and sustainable waste management for other regions.

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