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# Policy Analysis of Sustainable Waste Management in DKI Jakarta: Public Health and Environmental Implications

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***ABSTRACT***

*This study aims to analyze the sustainable waste management policy in DKI Jakarta within the framework of the Sustainable Development Goals (SDGs). This study identifies the challenges faced and evaluates the strategies and efforts implemented to improve the effectiveness of waste management in Jakarta. Using a descriptive qualitative approach, it reviews policy documents, government reports, and in-depth interviews with 15 key informants from various agencies in Central Jakarta. Interviews were conducted with cleaners, residents, and scavengers, and field observations were made at waste t\ransfer stations, waste banks, and Integrated waste processing facility (TPST) Bantargebang. Document studies included regional regulations and performance reports from the DKI Jakarta Environmental Service. The results show that although the Jakarta Government has introduced initiatives such as waste sorting at source, recycling programs, and public awareness campaigns, these efforts are hampered by inadequate infrastructure, limited public participation, and insufficient funding. In addition, coordination between government agencies and the private sector is still less than optimal, which affects the overall impact of the policy. The results of this study conclude that Jakarta's waste management policy is still not fully aligned with the SDGs targets, due to several significant obstacles including lack of public awareness and suboptimal implementation of environmentally friendly technologies. The study emphasizes that Jakarta's waste management faces significant challenges, particularly in terms of alignment with SDGs. However, the study offers actionable recommendations to improve cross-sector coordination, encourage the adoption of green technologies, and enhance public engagement. The findings can influence policy decisions by advocating for data-driven policy adjustments and better resource allocation. Future research should explore new technologies and compare Jakarta's practices with leading cities to refine its waste management strategies and achieve more sustainable outcomes.*

**ABSTRAK**

Penelitian ini bertujuan untuk menganalisis kebijakan pengelolaan sampah berkelanjutan di DKI Jakarta dalam kerangka Tujuan Pembangunan Berkelanjutan

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(TPB). Penelitian ini mengidentifikasi tantangan yang dihadapi dan mengevaluasi strategi serta upaya yang dilakukan untuk meningkatkan efektivitas pengelolaan sampah di Jakarta. Dengan menggunakan pendekatan kualitatif deskriptif, penelitian ini mengkaji dokumen kebijakan, laporan pemerintah, dan wawancara mendalam dengan 15 informan kunci dari berbagai instansi di Jakarta Pusat. Wawancara dilakukan dengan petugas kebersihan, warga, dan pemulung, serta observasi lapangan dilakukan di tempat pemindahan sampah, bank sampah, dan Tempat Pengolahan Sampah Terpadu (TPST) Bantargebang. Studi dokumen meliputi peraturan daerah dan laporan kinerja dari Dinas Lingkungan Hidup DKI Jakarta. Hasil penelitian menunjukkan bahwa meskipun Pemerintah Provinsi DKI Jakarta telah memperkenalkan inisiatif seperti pemilahan sampah di sumber, program daur ulang, dan kampanye kesadaran publik, upaya ini terhambat oleh infrastruktur yang tidak memadai, partisipasi publik yang terbatas, dan pendanaan yang tidak mencukupi. Selain itu, koordinasi antara instansi pemerintah dan sektor swasta masih kurang optimal, yang memengaruhi dampak kebijakan secara keseluruhan. Hasil penelitian ini menyimpulkan bahwa kebijakan pengelolaan sampah Jakarta masih belum sepenuhnya selaras dengan target SDGs, karena beberapa kendala signifikan termasuk kurangnya kesadaran publik dan penerapan teknologi ramah lingkungan yang belum optimal. Penelitian ini menekankan bahwa pengelolaan sampah Jakarta menghadapi tantangan yang signifikan, terutama dalam hal keselarasan dengan SDGs. Namun, penelitian ini menawarkan rekomendasi yang dapat ditindaklanjuti untuk meningkatkan koordinasi lintas sektor, mendorong adopsi teknologi hijau, dan meningkatkan keterlibatan publik. Temuan tersebut dapat memengaruhi keputusan kebijakan dengan mengadvokasi penyesuaian kebijakan berbasis data dan alokasi sumber daya yang lebih baik. Penelitian di masa mendatang harus mengeksplorasi teknologi baru dan membandingkan praktik Jakarta dengan kota-kota terkemuka untuk menyempurnakan strategi pengelolaan sampahnya dan mencapai hasil yang lebih berkelanjutan.

## A. INTRODUCTION

Every country faces challenges in managing waste, such as low collection rates, illegal dumping, and uncontrolled landfills (Perkoulidis et al., 2011). These issues highlight the need for a transition to sustainable waste management, which includes not only technological advancements but also collaborative governance approaches. As emphasized by Prameshwari et al. (2024) successful waste management requires the active participation of various stakeholders, such as the government, the private sector, and local communities, to ensure efficient collection, recycling, and composting. This collaboration is critical, especially with rapid economic growth and urbanization exacerbating waste management challenges. Therefore, integrating these governance models can help minimize waste ending up in well-regulated landfills.

Research conducted by Axmalia & Mulasari (2020) revealed that poor landfill management can trigger serious health problems, such as respiratory diseases and skin infections, caused by air and water pollution. In addition, the presence of disease vectors such as mosquitoes and rats around landfills exacerbates the negative impact on public health. This emphasizes the need to improve landfill management, public education, and environmental monitoring to reduce these risks. In addition, WHO data reveals that more than 25% of diseases in developing countries are caused by environmental factors, including inadequate waste management, which pollutes water sources and soil (Harninda, 2023). This shows that the impact of poor waste management is not only limited to environmental damage, but also has a direct impact on public health.

A progressive waste management policy commits the government to establishing a legal framework and taking measures that enable utilization and incentivize large-scale investment in the waste recovery and recycling industry. In this way, waste is not only a problem that must be overcome, but also an opportunity to create a sustainable circular economy, providing economic, social, and environmental benefits for society. As one example, DKI Jakarta, the capital of Indonesia, faces great pressure in terms of waste management. Every day, Jakarta produces around 7,000 tons of waste (Ishak, 2022), most of which ends up at the Bantar Gebang Final Disposal Site (TPA). However, this landfill capacity is almost full, and efforts to reduce, recycle, or manage waste in a more environmentally friendly way are still not optimal. This problem is exacerbated by the low level of community participation in waste management programs and the lack of adequate infrastructure (Ismaya et al., 2023). This waste management challenge not only impacts the environment but also contributes to public health problems and the city's economy.

Waste can be viewed as a resource that if managed properly can generate economic, social, and environmental benefits (Abdussamad et al., 2022). In Indonesia, sustainable waste management is essential to uphold the constitutional right to a clean and healthy environment. By adopting a circular economy model, waste management can not only reduce environmental damage but also create environmentally friendly jobs and contribute to economic growth. A circular economy refers to an economic system that emphasizes waste reduction, material reuse, and recycling, thereby minimizing the extraction of new resources (Nurseha et al., 2024). In line with this, the application of the Zero Waste principle aims to minimize or eliminate waste generation by promoting practices such as source separation, reuse, and recycling (Imansyah, 2021). This approach ensures that waste left for disposal is managed in a clean and safe manner, in line with sustainable development goals.

This research focuses on evaluating the waste management policies in DKI Jakarta from the perspective of public health and environmental protection. By assessing the effectiveness of existing policies and strategies, this study aims to identify the key challenges posed by inadequate waste management on community health, including respiratory diseases and water pollution, as well as the environmental impacts, such as land degradation and air quality deterioration. Additionally, the study seeks to propose practical, sustainable recommendations to improve waste management strategies, emphasizing the need for cross-sector collaboration and increased investment in waste management infrastructure. This research ultimately contributes to the development of more holistic and integrated approaches for waste management, offering valuable insights for policymakers and practitioners in DKI Jakarta, and providing a framework that could be applied to other cities facing similar waste management challenges. By focusing on the interplay between health, environment, and infrastructure, this study not only evaluates current policy effectiveness but also provides strategic pathways for advancing sustainable urban waste management solutions.

## B. LITERATURE REVIEW

Sustainable Waste Management (SDGs)

Sustainable waste management is crucial for achieving the Sustainable Development Goals (SDGs), which seek to balance economic growth, social inclusion, and environmental protection by 2030. Efficient waste management supports various SDGs, particularly those related to health, clean water, sustainable cities, responsible consumption, and climate action.

Effective waste management is not only a fundamental element but also a critical necessity in maintaining public health. Giusti (2009) comprehensively highlighted that poor waste management practices can trigger various diseases and increase exposure to hazardous substances. Research from the past five years, including the study by Kenny & Priyadarshini

(2021) demonstrates a strong link between healthcare waste management and global health. Similarly, Vinti et al., (2021) emphasized that improper management of municipal solid waste directly impacts public health, especially in densely populated urban areas, where waste accumulation poses significant health risks. This underscores that inadequate waste management threatens not only environmental health but also the global public health system.

The COVID-19 pandemic has underscored the importance of safely and effectively handling medical waste to prevent the spread of infection, yet the challenges extend beyond this issue. A study by Domingo et al., (2020) revealed that long-term exposure to hazardous waste can increase the risk of chronic diseases, such as cancer and respiratory disorders. Recent studies, therefore, not only reinforce Giusti's findings but also reveal that the issue is more complex than previously understood. Consequently, a more comprehensive and integrated approach to waste management, involving multiple sectors, is essential to safeguard public health as a whole.

SDG 6 focuses on clean water and sanitation, where waste management plays a key role by preventing water pollution. Kraemer A et al., (2001) demonstrate that effective practices, like leachate collection from landfills, are vital for protecting water resources. Waste management also intersects with SDG 7, which promotes affordable and clean energy. Waste-to-energy technologies convert waste into renewable energy, reducing reliance on fossil fuels. Kothari et al., (2010) discuss how these technologies align with SDG 7 by reducing waste and generating energy. SDG 11 emphasizes sustainable cities, where effective waste management reduces environmental impacts and improves urban living. Taelman et al., (2018) argue that it is essential for sustainable urban development, with examples like Kamikatsu, Japan, showcasing successful zero-waste programs. SDG 12 encourages responsible consumption and production, including waste reduction and recycling. Wilson et al., (2013) highlight integrated waste management systems as key to achieving high recycling rates, with the Netherlands serving as a successful example.

According to Pangestu et al., (2021) sustainable waste management plays a crucial role in achieving the Sustainable Development Goals (SDGs), especially SDG 13 which focuses on climate action, with a priority on reducing greenhouse gas emissions such as methane from landfills. Key findings from the 2014 IPCC report also underline the importance of waste management in mitigating climate change. Effective management can reduce greenhouse gas emissions, especially methane, produced from landfills (IPCC, 2014). A comprehensive approach involving solid waste management, recycling, and organic waste reduction through advanced technology can contribute significantly to reducing global emissions.

De Pryck (2021) added that the preparation of the summary report for policymakers in the 2014 IPCC Synthesis Report involved consensus between countries, which strengthened the legitimacy of evidence-based policies in addressing climate change, including waste management. This finding also emphasizes the importance of international cooperation in implementing more effective waste management strategies to reduce global emissions. The negotiation process in preparing the report created a deeper understanding of the urgency of climate action and the need to implement good waste management systems as the main mitigation measure.

However, several major challenges in implementing sustainable waste management remain, including limited funding, political barriers, and low public acceptance of these waste policies (Hoornweg et al., 2020; Jambeck et al., 2015). In addition, the impact of waste on marine and terrestrial ecosystems is also significant, with around 8 million tons of plastic waste polluting the oceans every year, threatening marine life and human health (Jambeck et al., 2015). Addressing these challenges requires an integrated and collaborative approach between governments, the private sector, and civil society. Germany's success in its recycling program demonstrates the importance of broad public participation. International support is also essential, especially for countries with limited resources, to ensure sustainable and effective waste management.

Waste Management Policy

Policy analysis provides a systematic framework for evaluating the effectiveness and implementation of policies, which is crucial for understanding various challenges and potential solutions. Sustainable waste management policies aim to address high waste volumes, impacts on public health, and environmental damage.

Dye (1992) emphasises that policy analysis involves several key steps: problem identification, policy option assessment, and impact evaluation. This is highly relevant to waste management policies, where problem identification involves recognising the large volume of waste and its adverse environmental impacts. Policy option assessment includes evaluating various management strategies, from infrastructure development to public education programmes, while impact evaluation looks at the outcomes of policy implementation on health and the environment. Lasswell (1956) offers insights into the stages of the policy process, including agenda setting, formulation, implementation, and evaluation. In the context of waste management, understanding the policy cycle helps identify where policies might face challenges, such as in implementation and evaluation, and how policies can be improved to more effectively address waste issues. Bardach & Patashnik (2023) present the theory of power balance, which explains how political and economic power can influence policy decisions.

Although the waste management policy in Jakarta seems ideal, its implementation is often constrained by political, economic support, and coordination factors between related parties. This creates a gap between planning and policy implementation. Another major challenge is the infrastructure problem. The development of facilities such as Intermediate Treatment Facilities (ITF) and Integrated Waste Processing Sites (TPST) is very important to increase the efficiency of waste management and reduce adverse impacts on the environment and public health. A deep understanding of the right type of infrastructure and its application that is tailored to the local context is also very important in achieving effective waste management (Nugroho et al., 2023) .

The implementation of waste management infrastructure must be tailored to local conditions. In urban areas with high waste volumes, technologies such as automated sorting and WtE are very useful for handling large amounts of waste and reducing environmental impacts. While in rural areas, investment in composting systems and community-based collection methods is more relevant and effective (Guan et al., 2015) .

Waste management infrastructure includes several key components. First, an efficient waste collection and transportation system is essential. The use of technologies such as sensor- and GPS-equipped collection vehicles can optimize collection routes and reduce operational costs (Gutierrez et al., 2015) . Second, waste treatment facilities, including automated sorting stations and waste-to-energy (WtE) technologies, play a critical role in reducing the volume of waste ending up in landfills. WtE technologies not only convert waste into renewable energy but also reduce dependence on fossil fuels (Brunner & Rechberger, 2015; Kothari et al., 2010). Third, effective composting facilities, such as compost reactors and aeration systems, enable efficient management of organic waste, reduce the amount of waste going to landfills, and produce high-quality compost for agriculture (Onwosi et al., 2017) .

In addition to infrastructure, education and community outreach also play an important role in waste management. Effective education campaigns can raise public awareness of the importance of reducing waste at source and promoting better recycling practices. Good outreach programs can also encourage community participation in waste management and reduce the amount of waste produced (Ristya, 2020; Sasoko, 2024) . The results of Lestari's study , (2023) highlighted the importance of public knowledge about safe and effective waste management to reduce the use of hazardous materials and minimize negative impacts on health. Effective education can help create better waste management behavior at the individual and community levels.

Strict law enforcement and economic incentives are two key strategies to improve compliance with waste management regulations. Research conducted by Hayamadi et al., (2024) shows that a combination of consistent law enforcement and adequate economic incentives can encourage communities to participate more actively in waste management and improve outcomes. Law enforcement helps ensure compliance, while economic incentives provide additional impetus for public involvement. Information and communication technology (ICT) also plays an important role by enabling real-time system monitoring and evaluation, accelerating problem identification, and increasing transparency and accountability of policies (Rachmad et al., 2024) .

The circular economy approach, which focuses on recycling and waste reduction, supports sustainable waste management by creating value from waste and reducing dependence on natural resources (Febrian & Solihin, 2024) . However, challenges in implementing this strategy need to be considered. Limited funding is often a barrier, limiting the ability of governments and institutions to implement programs effectively. Solutions may involve finding alternative funding sources such as public-private partnerships (F. Lestari, 2021) . Political resistance can also slow policy implementation. Conflicts of interest and disagreement over costs are often the causes. Overcoming this resistance requires an approach that involves all stakeholders and advocacy to build consensus. (Irawan et al., 2023) .

In addition, public opposition to waste management policies, such as additional fees or system changes, can reduce the effectiveness of strategies. Increasing public awareness and engagement through educational campaigns and community-based policy planning can help address these issues (Davis, 2014; Moridu et al., 2023) . Discussing these challenges will provide a more balanced and realistic picture of waste management strategy implementation, as well as offer solutions to improve the effectiveness and sustainability of implemented policies.

## C. METHOD

This study employs a descriptive qualitative approach, chosen for its ability to provide an in-depth understanding of waste management and policy dynamics within a broader context. This method captures nuances that are difficult to quantify, particularly the experiences and perceptions of various stakeholders (Creswell & Poth, 2016). The main advantage of this approach lies in the depth and contextual insights it produces. According to Patton (2014), it allows for a comprehensive exploration of social phenomena, making it highly relevant for understanding the perspectives of different actors involved in waste management in DKI Jakarta.

Furthermore, Flick (2022) emphasized that a qualitative approach effectively explains complex phenomena, such as the interaction between policies, regulations, and community participation. It is also highly suited for exploring unique local contexts. Tahir et al., (2023) argued that a qualitative approach is particularly useful for understanding specific characteristics that influence policies and practices, such as those found in sustainable waste management in DKI Jakarta.

The choice of a descriptive qualitative approach in this study is based on its capacity to provide a comprehensive and detailed view of waste management in DKI Jakarta, particularly in the context of public policy and its alignment with the SDGs. The method's ability to explain complex phenomena and focus on local contexts makes it more suitable than mixed methods or case studies. Through this approach, researchers can delve deeper into the dynamics of policies and practices in the field and offer evidence-based, contextual recommendations for improving waste management policies in Jakarta.

## Theoretical Framework

This theoretical framework consists of three main elements in public policy analysis: policy formulation, implementation process, and measurement of results and impacts. Although this framework has been comprehensively outlined, a more detailed explanation is needed on how public policy theory and the Sustainable Development Goals (SDGs) will guide the analysis of waste management policy in DKI Jakarta. The research provides clear evidence of the practical application of these theories in each policy element.

1. Policy Formulation : In policy formulation, public policy theory emphasizes the importance of identifying problems, setting goals, and developing policy instruments. In the context of waste management in DKI Jakarta, the policy must be closely linked to SDGs indicators, especially SDG 3 (public health), SDG 11 (sustainable cities and communities), and SDG 12 (responsible consumption and production). The determination of policy goals must consider relevant SDG targets, such as improving environmental health through reducing plastic waste and improving recycling facilities.
2. Implementation Process: Public policy theory also emphasizes the importance of coordination in the policy implementation process. In Jakarta, the successful implementation of waste management policies requires collaboration between the government, the private sector, and the community. In this case, the Collaborative Governance approach can be used as a basis for analysis, where each actor is involved in sharing roles and responsibilities. Appropriate resource allocation and mapping of obstacles, such as budget constraints and public resistance, also need to be analyzed comprehensively. Policy implementation should focus on reducing plastic waste and improving waste management facilities with more environmentally friendly technology.
3. Measuring Results and Impact: The measurement of the success of waste management policies in Jakarta can be done using SDGs indicators, especially SDG 14 (marine life) related to reducing plastic waste in the sea, and SDG 3 related to improving the quality of life of the community. The Outcome-Based Policy Evaluation approach will be used to assess the extent to which the policy contributes to sustainability and adaptability, and how the policy is able to adapt to social, political, and economic changes. This evaluation also includes long-term impacts on public health and ecosystem protection.
4. Application of SDGs Theory in Policy Analysis: The SDGs provide a highly relevant framework for assessing waste management policies, particularly in terms of environmental, social, and economic impacts. In the context of waste management in DKI Jakarta, it is important to analyze whether existing policies are aligned with SDG targets. For example, how the policies support efforts to reduce greenhouse gas emissions (SDG 13), reduce marine waste (SDG 14), and manage hazardous waste. This article needs to highlight how waste management policies in Jakarta can be more effective by integrating SDG targets more clearly at every stage of the policy.
5. Recommendations for Waste Management in Jakarta: Based on a more structured analysis, this study provides several recommendations to improve the effectiveness of waste management policies in Jakarta:
    a. Strengthening the SDGs-based policy framework: Integration of SDGs targets must be done more explicitly in every policy stage, from planning to evaluation.
    b. Development of innovative funding mechanisms: Budget constraints can be addressed by involving the private sector and implementing public-private partnership schemes for waste management infrastructure investment.
    c. Improving public education: Public awareness of the importance of sustainable waste management must be increased through more massive and structured campaigns.

This study emphasizes the importance of applying public policy theory and SDGs in the context of waste management in DKI Jakarta. By strengthening the SDGs-based policy framework and explaining the relevance of SDGs indicators at every stage of the policy, from formulation to evaluation,

this article can provide more effective evidence-based recommendations to support sustainable waste management policies in Jakarta.

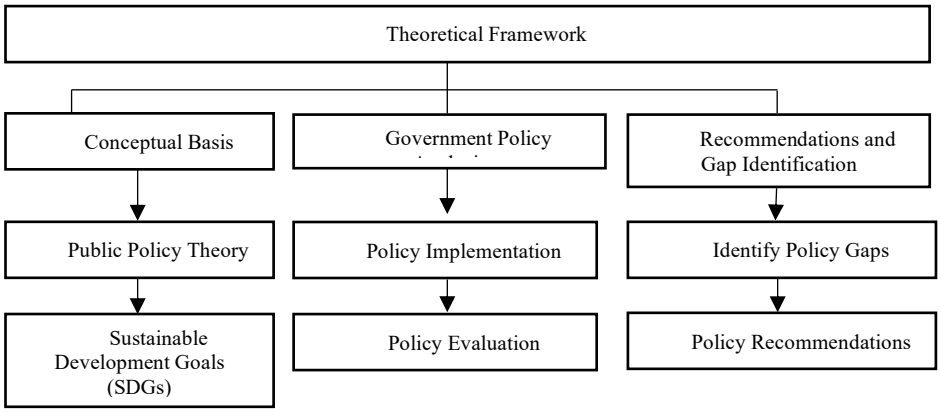


Figure 1. Theoretical Framework

**Data source**

The data used in this research consists of two types, namely primary data and secondary data.

**Primary data:** (1) In-depth Interviews: Interviews will be conducted with various related parties, including government officials, DPRD members, academics, NGOs, and the community. This interview aims to obtain in-depth views and information regarding waste management policies and their implementation; (2) Observation: Direct observations in the field will be carried out to see the real conditions of waste management in various areas of DKI Jakarta.

**Secondary Data:** (1) Policy Documents: Official documents related to waste management policies, such as regional regulations, governor regulations, and strategic plans; (2) Reports and Studies: Reports from various government institutions, NGOs, and academic studies related to waste management in DKI Jakarta; (3) Media Publications: Articles from mass media discussing waste management issues in DKI Jakarta.

**Data collection technique:** (1) Semi-Structured Interview: Using a flexible interview guide to explore topics in depth; (2) Documentation: Collect and analyze policy documents and related reports; (3) Participatory Observation: Directly observing waste management activities in various places in DKI Jakarta.

**Assessment Indicators:** Assessment of sustainable waste management policies will be carried out using indicators relevant to the SDGs objectives: SDG 3: Good Health and Well-being, SDG 11: Sustainable Cities and Human Settlements; SDG 6: Clean Water and Sanitation, SDG 12: Responsible Consumption and Production, SDG 13: Climate Action, SDG 14: Life Below Water, SDG 15: Life on Land, SDG 7: Affordable and Clean Energy.

**Data analysis: (**1) Content Analysis: Data from interviews and documentation will be analyzed using content analysis techniques to identify main themes related to waste management policies; (2) Descriptive Qualitative Analysis: Data will be presented in a descriptive form to describe the waste management situation and relate it to the SDGs goals; (3) Data Triangulation: Using multiple data sources to ensure the validity of research findings.

**Validity and Reliability: (**1) Validity: Maintaining validity by triangulating data, validation by experts, and member checking; (2) Reliability: Maintain reliability with consistency in data collection and analysis techniques.

## D. RESULT AND DISCUSSION

The formulation of waste management policy in DKI Jakarta is a complex and dynamic process, influenced by various factors including unique geographic, social, economic, and

environmental conditions. This process involves various stakeholders, from the government, and community, to business actors. Managing waste in a metropolitan city like Jakarta requires a holistic and integrative approach, considering the large volume of waste produced every day and its impact on public health and the environment.

**Policy Formulation**

The results show that the identification of waste management problems in DKI Jakarta is influenced by the agenda-setting process, where the media and community groups play an active role in voicing concerns about the environmental and health impacts resulting from poor waste management (Cohen, 1964). This problem has complex dimensions, including physical, social, economic, and political aspects, as explained in the conceptual framework of the problem by Rittel & Webber (1973). Waste management problems can be analyzed using a problem conceptual framework that includes physical, social, economic, and political dimensions. The physical dimension is related to environmental impacts, the social dimension is related to justice and community participation, the economic dimension is related to costs and benefits, and the political dimension is related to the interests of various actors (Rittel & Webber, 1973). The waste management problem in DKI Jakarta can be seen as a complex social system. Changes in one component of the system, such as increased public awareness, can trigger changes in other components, such as increased demand for recycling facilities (Katz & Kahn, 2015). The DKI Jakarta government bureaucracy has a central role in implementing waste management policies. Weintraub et al., (1948) provide a theoretical framework for understanding how bureaucracy works and the challenges it faces.

In the context of waste management in DKI Jakarta, Weintraub et al., (1948) provide a strong theoretical basis for analyzing the role of bureaucracy in formulating and implementing policies. Concepts such as specialization, hierarchy, and formal rules are very relevant in understanding the challenges faced in waste management, such as inter-agency coordination and bureaucratic efficiency. The process of identifying waste management problems in DKI Jakarta is the first step in the policy cycle. Once the problem is identified, the next step is to formulate policy objectives that are specific, measurable, achievable, relevant, and have a certain period. The process of formulating waste management policies in DKI Jakarta can be explained through the policy cycle model which consists of the stages of problem identification, policy formulation, implementation, evaluation, and feedback. This model describes how public policy forms and changes over time. The process of formulating waste management policies carried out by the DKI Jakarta Government is in line with the study of policy cycle theory, starting from problem identification to evaluation (Howlett et al., 2021). To formulate effective policy objectives, an in-depth analysis of the roots of the problem, its causes, and its impacts is required. The policy tool development stage is part of a broader policy cycle. Once the problem is identified and objectives are set, the next stage is to design appropriate policy tools to achieve these objectives (Howlett et al., 2021). The process of developing policy tools involves in-depth analysis of various policy alternatives, including cost-benefit analysis, environmental impact analysis, and risk analysis. To achieve better waste management, a combination of various complementary policy tools is needed.

The efforts of the DKI Jakarta Provincial Government in formulating waste management policies have shown significant progress. Various regulations have been drafted, innovative programs have been launched, and community participation has increased. However, the challenge of the complexity of the waste problem in this metropolitan city still requires serious attention.

Despite various initiatives such as Sampah Mandiri and Bank Sampah being implemented, significant challenges in waste management in DKI Jakarta persist, including weak law

enforcement, budget constraints, and lack of inter-agency coordination. Weak law enforcement is often caused by institutional weaknesses and poor coordination among various relevant agencies. The complex institutional structure and fragmentation among agencies hinder effective policy implementation (Geddes, 2023). This fragmentation results in overlapping regulations and difficulties in policy integration.

Resource limitations, both financial and human, exacerbate law enforcement issues (Tombokan & Firmansyah, 2024). Research by Elnanda & others (2024) indicates that insufficient budget and personnel affect the ability to implement and oversee waste management policies optimally. This results in weak supervision and limited policy effectiveness. Corruption also plays a significant role in undermining law enforcement. Mawartina et al., (2024) have shown that collusion between officials and business actors often hinders environmental policy implementation. This corruption can take the form of bribery to avoid sanctions or manipulation in tender processes, which undermines effective law enforcement.

To address these issues, it is crucial to strengthen institutional frameworks and improve coordination among agencies (Ostrom, 1990). Additionally, better resource allocation and reforms in oversight are necessary to reduce potential corruption. By doing so, waste management policies can be implemented more effectively and sustainably.

Looking at the existing challenges, several opportunities can be utilized to improve waste management in DKI Jakarta. First, the use of information and communication technology can make it easier to monitor and evaluate waste management performance. Second, the development of a circular economy can create added value from waste and reduce dependence on natural resources. Third, increasing the capacity of human resources involved in waste management is very important to ensure program sustainability.

The formulation of waste management policies in DKI Jakarta is a dynamic and continuously evolving process. Although much progress has been made, there are still some challenges that need to be overcome. With strong commitment from all parties, waste management in DKI Jakarta can be better and more sustainable. The process of formulating waste management policies in DKI Jakarta involves several important stages, including activities: (1) Identification of Problems and Policy Objectives; (2) Development of Policy Tools; (3) Policy Implementation; (4) and Policy Impact Analysis.

**Identify Problems and Policy Objectives**

Rapid urbanization in DKI Jakarta has driven a significant increase in population, which directly triggers a surge in waste volume. With a daily production of around 7,800 tons, the majority of the city's waste ends up in the Bantar Gebang Final Disposal Site (TPA) which is almost full (Faizah, 2024). High population density also exacerbates waste management problems, especially in residential areas that lack waste management infrastructure, leading to illegal dumping, environmental pollution, and health threats (Rahmawati et al., 2021; Sukwika & Noviana, 2020). The dense economic activities in Jakarta, as Indonesia's largest economic center, have also contributed to the increase in waste volume, especially from the commercial and industrial sectors. Waste from these sectors often requires special handling that is rarely prioritized due to high costs and weak regulations. In addition, the trend of consuming single-use goods also exacerbates the problem of plastic waste in the city.

Several policies such as the development of waste bank programs and the 3R concept (Reduce, Reuse, Recycle) have been implemented to reduce the burden on landfills. However, their implementation is still hampered by low public awareness and weak law enforcement (DPR Legislation Body, 2023). Jakarta does have regional regulations regarding waste management, but weak sanctions for violators and corrupt practices make this policy ineffective. Politically, waste management in Jakarta is often hampered by the dynamics

between the central and regional governments and institutional fragmentation. Overlapping institutions complicate coordination in policy implementation. Projects such as the construction of the Intermediate Treatment Facility (ITF) which aims to address waste problems are often delayed due to bureaucracy and changing political priorities (Mulyadin et al., 2018).

To address these challenges, waste management policies must be more adaptive to Jakarta's socio-economic conditions. Institutional reform, stricter law enforcement, and increased community participation are key to achieving more effective and sustainable waste management. Cross-sector collaboration between government, the private sector, and communities is also essential to creating long-term solutions that can address this issue comprehensively.

Waste management in DKI Jakarta is a major challenge that requires close collaboration between the government, private sector, and the community. This collaboration aims to create sustainable waste management policies that can address environmental and public health impacts. Key stakeholders in sustainable waste management in Jakarta have interrelated roles and responsibilities, but often challenges in coordination and differing interests hinder the effectiveness of policy implementation.

Collaboration between government, private sector, and community is essential to create sustainable solutions. The government plays a role in regulation and infrastructure provision, while the private sector can contribute through technology and investment, especially in waste-to-energy processing. Community participation through waste bank programs is also crucial, although awareness and adequate facilities still need to be improved. The main challenges in waste management in Jakarta are institutional fragmentation, differences in interests between related parties, and low coordination and enforcement of regulations. To overcome this, institutional reform, incentives for the private sector, and ongoing public education are needed. With a collaborative approach, more effective and sustainable waste management can be achieved.

**Policy Tool Development**

Effective waste management requires strong synergy between the government, the private sector, and the community. The government plays a central role in setting regulations, providing infrastructure, and overseeing policy implementation. Meanwhile, the private sector is crucial in developing technological innovations and investments for waste management, supported by appropriate economic incentives to encourage greater involvement. Community participation is also essential, particularly through programs like waste banks that support recycling and waste reduction at the household level.

However, significant challenges persist, including complex bureaucracy, the economic interests of the private sector that sometimes conflict with environmental priorities, and the low public awareness of the importance of sustainable waste management. Additionally, institutional fragmentation and poor coordination among government agencies and other stakeholders hinder effective policy implementation. Therefore, comprehensive institutional reform, stricter law enforcement, increased public education, and more attractive incentives for the private sector are needed to ensure optimal stakeholder participation.

To create a sustainable waste management system, close collaboration among all parties must be strengthened. Each stakeholder must consider shared interests and work together in a more coordinated manner to ensure the success of policies and the achievement of better environmental goals.

The DKI Jakarta Provincial Government has demonstrated a strong commitment to achieving sustainable development goals (SDGs), especially in terms of waste management.

Various efforts have been made to formulate and develop effective policy tools to address increasingly complex waste problems. Based on a study of various policies and programs that have been implemented, it can be concluded that the DKI Jakarta Government has developed some innovative and relevant policy tools. The following is a table that summarizes various innovative and relevant policy tools that have been developed by the DKI Jakarta Government based on a review of various policies and programs that have been implemented:

Table 1. Development of Policy Tools

| No. | Policy Tools | Description |
|---|---|---|
| 1 | Tighter Regulations | The DKI Jakarta government has introduced stricter regulations regarding waste disposal, including sanctions for violators of hygiene rules. |
| 2 | Economic Incentives | Providing economic incentives for communities and business actors involved in waste recycling and composting activities. |
| 3 | Public Education Campaign | Carrying out intensive educational campaigns to increase public awareness about the importance of sustainable waste management. |
| 4 | Inter-Sector Collaboration | Increasing collaboration between the government, private sector, and society in efforts to manage waste more effectively and efficiently. |
| 5 | Strengthening Institutional Capacity | Developing institutional capacity through training and increasing competency for waste management officers. |
| 6 | Waste Management Infrastructure Development | Investment in the development of waste management infrastructure, such as integrated waste processing sites and recycling facilities. |
| 7 | Monitoring and Evaluation System | Implement a regular monitoring and evaluation system to measure the impact of policies and assess the effectiveness of waste management programs. |
| 8 | Society participation | Actively involve the community in waste management programs through community activities and local initiatives. |
| 9 | Waste Management Technology | Use of advanced technology in waste management, such as technology-based organic and inorganic waste processing systems. |
| 10 | Waste Reduction at the Source | Develop programs to reduce the volume of waste from the source through education and changing community behavior. |

Source: Created by Author,2024

The development of waste management policy tools in DKI Jakarta has shown positive results. However, more sustainable efforts are still needed to overcome the waste problem as a whole. By continuing to evaluate, innovate, and involve various stakeholders, it is hoped that waste management in DKI Jakarta can become better and more sustainable.

**Policy Implementation**

The DKI Jakarta Provincial Government has made various efforts to manage waste sustainably, in line with the sustainable development goals (SDGs). The policies that have been implemented aim to reduce the negative impact of waste on the environment and public health, as well as increase the added value of waste. Based on an evaluation of the implementation of waste management policies in DKI Jakarta, the following findings are shown:

Table 2. Analysis of Findings on Implementation of DKI Jakarta Government Policy

| Aspect | Description | Findings |
|---|---|---|
| 1. Policy Objectives | DKI Jakarta has set ambitious targets for sustainable waste | The government has set a waste management target to achieve |

| | | | |
|---|---|---|---|
| | | management. By 2025, the goal is to achieve 30% waste reduction through initiatives such as reducing waste at the source, recycling, and reusing materials. The remaining 70% of the waste will be handled through waste treatment facilities like the Integrated Waste Processing Sites (TPST), where it will be converted into useful resources, such as energy or compost | 100% proper and effective waste management by 2025 (Indonesia Waste-Free). This target is measured by reducing waste by 30% and managing 70% of the waste. |
| 2. | Implementation | The DKI Jakarta Provincial Government has made various efforts such as outreach, infrastructure development, regulatory development, and involving various stakeholders. | The DKI Jakarta Provincial Government has achieved outstanding success by winning the Adipura Award for its waste management at the source. Several programs implemented by the DKI Jakarta Environmental Agency include Governor Regulation No. 142 of 2019 on the Control of Single-Use Plastics, Governor Regulation No. 77 of 2020 for Waste Management at the RW Scale, the operation of 7 TPS 3R (Reduce, Reuse, Recycle) facilities within the city, advanced waste screening systems at TB Simatupang for handling waste in water bodies, and the largest RDF (Refuse-Derived Fuel) facility in Indonesia. |
| 3. | Challenging and Inhibiting Factors | Sustainable waste management is a complex and continually evolving global issue. | Waste production continues to rise due to population growth, urbanization, and consumer lifestyles, while public awareness of waste management remains low, and existing facilities can't handle the volume. Weak law enforcement, insufficient funding, and the complexity of the waste problem, compounded by climate change, make effective solutions difficult to achieve. |
| 4. | Supporting factors | | Government commitment, support from various parties, and clear regulations. |
| 5. | Correlation with SDGs: | | SDG 3, 6, 7,11, 12, 13, 14 |

Source : Created by Aunthor, 2024

**Policy Evaluation and Adaptation**

Regular evaluation of implemented policies is essential to assess their effectiveness and make adjustments if necessary. This evaluation process involves measuring the impact of policies on reducing waste volume, increasing recycling rates, and improving environmental quality and public health. Based on the evaluation that has been carried out on waste management policies in DKI Jakarta, several important findings can be concluded. The following table summarizes successes, challenges, and policy adaptations in waste management in DKI Jakarta:

Table 3. Policy Evaluation and Adaptation

| Aspect | Description |
|---|---|
| **Success:** | |
| 1. Increasing Public Awareness | Through various outreach and education programs, public awareness of the importance of waste management has increased significantly. |
| 2. Infrastructure Development | The construction of waste processing facilities such as TPST and ITF has increased waste management capacity. |
| 3. Increased Stakeholder Participation | The involvement of various parties, including the community, private sector, and academic institutions, in waste management is getting stronger. |
| 4. Regulatory Development | Existing regulations have provided a fairly strong legal framework for waste management. |
| **Challenge:** | |
| 5. Waste Generation Continues to Increase | Despite various efforts, waste generation in DKI Jakarta continues to increase along with population growth and economic activity. |
| 6. Weak Law Enforcement | Law enforcement against violations of waste management regulations is still not optimal. |
| 7. Budget Limitations | The budget allocated for waste management is often insufficient to meet needs. |
| 8. Lack of Coordination Between Agencies | Coordination between various agencies involved in waste management still needs to be improved. |
| **Policy Adaptation** | |
| 1. Strengthening Law Enforcement | Increase supervision and law enforcement against violations of waste management regulations. |
| 2. Increasing Community Participation | Through more innovative and inclusive programs, as well as providing attractive incentives. |
| 3. Optimizing the Use of Technology | Wider application of information and communication technology in waste management, such as a real-time waste monitoring system. |
| 4. Circular Economy Development | Encourage the development of the recycling and waste reuse industry. |
| 5. Periodic Evaluation | Conduct regular evaluations of policies that have been implemented to identify deficiencies and make improvements. |

Source: Created by Author,2024

Evaluation of waste management policies in DKI Jakarta shows that there has been significant progress. However, there are still some challenges that need to be overcome. To achieve more sustainable waste management, more comprehensive and sustainable efforts are needed, as well as policy adaptations that are responsive to the dynamics that occur.

**Policy Impact Analysis**

Poor waste management can increase the risk of infectious and chronic diseases in society. Improper handling can cause the spread of diseases such as dengue fever and malaria due to mosquito habitat in rubbish piles. In addition, exposure to pollutants from burning waste can cause respiratory and cardiovascular diseases. The environmental impacts of poor waste management include water and soil pollution and greenhouse gas emissions. Poorly managed landfills can cause leachate which pollutes groundwater, while burning waste produces greenhouse gas emissions that contribute to climate change.

The DKI Jakarta government has made great efforts to overcome this problem with various policies and programs. However, how effective these policies are in protecting public health and the environment and achieving SDG targets needs to be analyzed in depth. This analysis aims to evaluate the impact of waste management policies that have been implemented in DKI Jakarta on achieving SDG targets, especially those related to health (SDG 3), quality education (SDG 6), clean and affordable energy (SDG 7), cities and settlements. sustainability (SDG 11), responsible consumption and production (SDG 12), climate action (SDG 13), and life below water (SDG 14). The following is a table that summarizes the positive and negative impacts of waste management policies, correlation with SDGs, and recommendations:

Table 4. Impact Analysis of DKI Jakarta's Sustainable Waste Management Policy (SDGs).

| Category | Description |
|---|---|
| **Positive impact :** | |
| 1.Improved quality of life | Better waste management policies have contributed to improving the quality of life of the people of DKI Jakarta by reducing the risk of diseases related to waste, such as diarrhea, respiratory infections, and skin diseases. |
| 2.Environmental Conservation | Sustainable waste management efforts have helped preserve the environment, reduce land, water, and air pollution, and protect biodiversity. |
| 3.Increasing public awareness | Through various outreach and education programs, public awareness of the importance of waste management has increased significantly. |
| 4.Economic empowerment | The waste management sector has opened up new business opportunities and created jobs. |
| **Negative impact :** | |
| 1.Law enforcement is not yet optimal | Law enforcement regarding violations of waste management regulations is still not optimal, so many parties do not comply with the rules. |
| 2.Infrastructure limitations | Existing waste processing facilities are still limited and inadequate to accommodate the volume of waste produced. |
| 3.Lack of coordination between agencies | Coordination between various agencies involved in waste management still needs to be improved. |
| 4.Unequal levels of community participation | Community participation in waste management programs is still not evenly distributed in all regions. |

Source: Created by Author,2024

**SDGs Achievement Indicators:**

The following table presents an in-depth evaluation of the effectiveness of DKI Jakarta's waste management policies in supporting the achievement of the Sustainable Development Goals (SDGs). The table identifies contributions, shortcomings, and recommendations for each relevant SDG.

Table 5. SDGs Achievement Indicators

| SDG | Policy Contribution | Lack | Policy Recommendations |
|---|---|---|---|
| SDG 3: Healthy and Well-Being Lives | • Reducing waste-related diseases such as diarrhea and dengue fever.<br>• Improvement of clean health facilities. | • Inconsistent law enforcement and policy monitoring.<br>• Limitations in public education about long-term health risks. | • Tighten law enforcement and policy monitoring.<br>• Enhance more comprehensive and sustainable health education programs. |
| SDG 6: Clean Water and Adequate Sanitation | • Raising awareness about hygiene and sanitation through educational programs.<br>• Reducing disease due to water pollution. | • Water and waste processing infrastructure are still separate.<br>• Educational programs have not reached all levels of society. | • Improving the integration of water and waste management infrastructure.<br>• Expanding and targeting education programs to all levels of society. |
| SDG 7: Affordable and Clean Energy | • Reducing greenhouse gas emissions from landfills.<br>• Supporting waste to energy conversion projects. | • Limitations in the development of clean energy projects from waste.<br>• Evaluation of the effectiveness of energy conversion projects is not yet optimal. | • Promote the expansion and development of clean energy projects.<br>• Conduct more intensive evaluation and monitoring of energy conversion projects. |
| SDG 11: Sustainable Cities and Human Settlements | • Creating a cleaner and healthier city.<br>• Reducing the risk of environmental disasters such as floods. | • Coordination between institutions is not yet optimal.<br>• Risk management and sustainable urban planning are still underdeveloped. | • Improve coordination between agencies and optimize resource use.<br>• Developing risk management and sustainable urban planning. |
| SDG 12: Responsible Consumption and Production | • Reduce waste and increase recycling.<br>• Supporting more responsible consumption and production. | • The impact of policies on reducing household and commercial waste has not been well measured.<br>• The addition of policies to support responsible consumption is not yet optimal. | • Conduct a more in-depth assessment of the impact of policies on waste reduction.<br>• Develop additional policies to support more responsible consumption and production. |
| SDG 13: Addressing Climate Change | • Reducing greenhouse gas emissions from waste.<br>• Supporting climate change efforts. | • Lack of specific projects and policies targeting climate change.<br>• Public awareness of the impact of waste management on the climate is still low. | • Implement more projects and policies that focus on climate change.<br>• Raising public awareness about the relationship between waste management and climate change. |
| SDG 14: Life Below Water | • Reducing marine pollution and protecting marine life.<br>• Support river and beach cleanup programs. | • River and beach cleaning programs are not yet intensive.<br>• The policy of protecting marine life from pollution is still not clear enough. | • Increase the intensity of river and beach cleaning programs.<br>• Strengthening policies to protect marine life from pollution. |

Source: Created by Author,2024

This table provides an overview of the effectiveness of waste management policies in supporting the achievement of SDGs as well as areas that need improvement and recommendations to improve the performance of these policies. With the right improvements,

waste management policies in DKI Jakarta can be more effective in achieving SDGs goals and provide a more significant impact on public health and the environment.

The Jakarta government has launched various policies to address waste management issues, but still faces major challenges. Evaluation results show that current policies still have several major shortcomings. First, law enforcement related to waste management is ineffective, many violations are not followed up, and regulations are often not applied consistently. Second, existing waste management infrastructure is inadequate to handle the increasing volume of waste, requiring additional investment in facilities. Third, coordination between waste management agencies is still less than optimal, hampering program effectiveness and causing waste of resources. Fourth, community participation in waste management programs is still low and uneven across regions, indicating the need for improved education programs and community involvement.

To improve the effectiveness of waste management policies, innovative approaches need to be considered. For example, the zero waste approach implemented in San Francisco and Kamikatsu, Japan, can reduce waste volume by prioritizing waste reduction at source and increasing recycling (Sullivan, 2011; Zaman, 2022) . The application of advanced technologies, such as smart sensors to monitor waste bin capacity and data-driven management systems, has been shown to improve waste management efficiency in several European cities (Bassi et al., 2017; Taelman et al., 2018) . In addition, public-private partnerships, such as those seen in Singapore and Seoul, South Korea, can accelerate the development of waste management infrastructure. Intensive community education and engagement programs, such as those successfully implemented in Australia, can increase community participation in waste management (Tobin & Zaman, 2022) .

Comparison with best practices in other cities shows that there are various strategies that can be adopted to improve waste management policies in DKI Jakarta. By evaluating and adopting innovative approaches that have proven effective in other cities, DKI Jakarta is expected to improve its waste management and better achieve the Sustainable Development Goals (SDGs) targets.

**Policy Recommendations**

Sustainable waste management is a crucial element in achieving environmental sustainability and improving the quality of life in DKI Jakarta. Considering the major challenges facing this city, such as high waste volumes, limited infrastructure, and significant environmental impacts, comprehensive and integrated policies are needed. The following are policy recommendations for sustainable waste management that support the achievement of Sustainable Development Goals (SDGs), with a focus on protecting public health and the environment in DKI Jakarta:

Table 6. Recommendations for Sustainable Waste Management Policy (SDGs)

| Drivers | Sustainable Development Goals (SDG) | Specific Target | | Policy Recommendations |
|---|---|---|---|---|
| **Public health protection** | SDG 11: Sustainable cities | 11.1 | Guarantee access for everyone to adequate, safe, and affordable basic services; improve slum areas | Policies should prioritize developing infrastructure for clean water, sanitation, and transportation in underserved areas, with subsidies to make basic services affordable for low-income groups. Additionally, efficient waste management systems, waste reduction initiatives, public |
| | | 11.6 | Reducing the negative impact of cities on the | |

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| | | | environment; special attention to waste management | education, strict regulations, and collaboration with the private sector and communities are essential. |
| | SDG 3: Good health and well-being | 3.2<br><br>3.3<br><br>3.9 | preventable deaths of children under 5 years of age<br><br>End malaria and combat waterborne diseases<br><br>Reducing diseases caused by dangerous chemicals and air, water, and land pollution, as well as contamination | Policies should enhance children's health services and public health education to lower under-5 mortality rates, implement mosquito control and improve access to clean water and sanitation to combat malaria and waterborne diseases, and enforce strict regulations on hazardous chemicals and pollution to mitigate health impacts. |
| **Environmental protection** | SDG 12: Responsible consumption and production | 12.4 | Management of chemicals and all waste in an environmentally sound manner to minimize the negative impact on human health and the environment | Policies should strengthen environmental regulations to meet international standards, improve monitoring and enforcement, build waste management infrastructure, and provide education and training on safe waste management. They should also promote circular economy practices and encourage international collaboration. |
| | SDG 6: Clean water and sanitation | 6.3 | Improve water quality by reducing pollution, eliminating waste discharge, and minimizing the release of hazardous materials | Policies should enhance water and waste management regulations, build efficient wastewater treatment facilities, implement pollution control programs, and boost public education on water quality. They should also apply circular economy principles and foster collaboration among stakeholders. |
| | SDG 15: Life on land | 15.1 | Ensure the conservation of terrestrial and terrestrial freshwater ecosystems and their services | Policies should strengthen ecosystem protection regulations, develop conservation infrastructure, restore and rehabilitate ecosystems, educate the public, empower local communities, foster stakeholder collaboration, and ensure ongoing monitoring and evaluation. |
| | SDG 7: Affordable and clean energy | 7.2 | Increase the share of renewable energy in the global energy mix | Policies must include strengthening regulations and economic incentives, building renewable energy infrastructure, investing in research and development, education and public awareness, empowering local communities, international cooperation, and ongoing monitoring and evaluation. |

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|---|---|---|---|---|
| | SDG 13: Climate action | 13 | Take immediate action to combat climate change and its impacts | Policies must be holistic and integrated, combining mitigation and adaptation aspects by involving various stakeholders. Effective monitoring and evaluation, as well as adequate funding. |
| | SDG 14: Life below water | 14.1 | Prevent all types of marine pollution, especially from activities on land, including marine debris | Policies must include strict regulations, public education, infrastructure improvements, and broad collaboration between various stakeholders. Effective monitoring and evaluation, along with support for innovation and technology. |

Source: Created by Author,2024

To effectively drive sustainable development across various SDGs, policies should focus on improving infrastructure, public health, environmental protection, and renewable energy. For SDG 11, enhancing access to basic services and rehabilitating slum areas are critical. SDG 3 emphasizes the need for better child health services and pollution control. SDG 12 and SDG 6 highlight the importance of waste and water management, while SDG 15 and SDG 7 focus on ecosystem conservation and renewable energy expansion. Lastly, SDG 13 and SDG 14 call for climate action and marine pollution prevention through integrated, collaborative approaches and strict regulations.

**Conclusion**

This study shows that waste management in DKI Jakarta reflects the characteristics of a "wicked problem" a complex problem involving various physical, social, economic, and political dimensions (Rittel & Webber, 1973) . This complexity demands solutions that take into account the dynamic interactions between elements in the social system, in accordance with the complex social systems approach (Katz & Kahn, 2015) . One important factor in driving solutions is the agenda-setting process involving the role of the media and the community to raise awareness of the negative impacts of ineffective waste management (Cohen, 1964) . However, challenges such as weak bureaucratic coordination and law enforcement are major obstacles to the effectiveness of waste management policies (Cohen, 1964; Geddes, 2023) .

This finding also underlines that the complex social systems approach states that changes in one aspect can impact the entire system (Katz & Kahn, 2015) . Therefore, comprehensive institutional reforms and stronger law enforcement are needed to overcome existing barriers. Closer synergy between government, private sector, and communities is essential to ensure better sustainability of waste management (Ostrom, 1990) . In addition, the use of information technology and the implementation of a circular economy can provide more strategic solutions, supporting the principles of sustainability and efficiency in waste management (Geissdoerfer et al., 2017) .

Policy evaluations have shown that despite progress through programs such as waste banks and the implementation of the 3R concept (Reduce, Reuse, Recycle), major challenges remain, particularly related to weak law enforcement, low public awareness, and inadequate waste management infrastructure. Thus, strengthening law enforcement, developing better infrastructure, and increasing public education are needed to improve the effectiveness of existing policies (Howlett et al., 2021; Sachs, 2015) .

In addition, cross-sector collaboration involving government, private sector, and community, as well as the implementation of innovative technology-based approaches and circular economy concepts, are expected to support Jakarta in achieving the Sustainable Development Goals (SDGs). These steps will not only help manage waste more effectively, but will also contribute to improving public health, environmental protection, and overall community welfare (Hall, 2006) .

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## Contributorship

This article was written by a single author as a result of in-depth research and comprehensive analysis of the DKI Jakarta Government's policy on sustainable waste management. All information, analysis, and conclusions contained in this article are the result of individual efforts and research conducted independently.

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