International Journal of Kybernology *ISSN: 2087-3107*
Volume 6, Number 1, 2025: 18-29
DOI: https://doi.org/10.33701/ijok.v6i1.5638

Evaluation Of Waste Management Policy in Semarang City, Central Java Province, Indonesia

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Article Info
Article history:
Submitted: Mar 10, 2025
Accepted: Jul 25, 2025
Published: Jul 30, 2025
Keywords:
Policy Evaluation;
Waste Management;
Community Participation;
Socialization and Education.

ABSTRACT
Background: Waste management remains a persistent issue in Indonesia, including in Semarang City. Improperly managed garbage not only causes foul odors and diminishes urban aesthetics but also poses risks to environmental sustainability and public health. Despite existing waste management policies, their implementation has not been optimal, particularly due to limited dissemination of knowledge and a lack of behavioral change among the community. The problem is compounded when local governments are unable to effectively engage citizens in waste reduction efforts. **Purpose:** This study aims to evaluate the effectiveness of waste management policies in Semarang City by examining six key dimensions of policy implementation and identifying the challenges and initiatives undertaken to support sustainable waste practices. **Method:** A descriptive qualitative research method was employed, with data collected through interviews, observations, and document analysis. **Result:** Based on the six dimensions of policy evaluation by Dunn, the research findings indicate the following: Effectiveness of the policy has been moderately achieved at the government level, but a lack of public awareness hinders optimal outcomes; Efficiency has not been fully realized due to budget limitations and dependence on community waste collection fees; Adequacy remains insufficient as active community participation is still low; Responsiveness among the public varies and does not yet reflect significant engagement with the implemented policies; Appropriateness of the policy has been directed through education and outreach by the Environmental Agency (DLH), but its implementation at the community level remains weak; and Only in the equity dimension can the policy be considered relatively effective, as access to waste management facilities has been fairly distributed. **Conclusion:** Waste management policy implementation in Semarang City has shown partial effectiveness. While some structural efforts have been made, greater coordination between stakeholders and more impactful community engagement strategies are needed to ensure the sustainability and success of waste management initiatives.

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I. INTRODUCTION

1.1 Background

One of the most important topics in sustainable development is waste management because their production rises with the constantly growing population. Incorrectly disposed waste may have several adverse consequences, including the pollution of the environment, human health issues, and even the collapse of an entire town or region in the form of floods and fires (Santosa, 2024; Irmawati et al., 2022). Thus, garbage collection is a major feature to have a healthy environment. Broadly, all waste can be classified into two, including organic waste in the form of organic/food remains and fruit peels and inorganic waste in the form of plastics and cans (Meyrena & Amelia, 2020). Indonesia has also been noted as among the highest waste-generating nations globally as indicated by a report by The Atlas of sustainable development goals 2023 to be at position five. It means that the system of collecting and disposing of waste should become more efficient in terms of government control, technology, and community involvement (Setyono & Sinaga, 2021). Some of the past researches point out that community empowerment and use of the latest technology are important cards in sustainable waste management. According to Ufnia and Hendrayanti (2023), community empowerment is a major stakeholder to be involved in the local-level waste management process. On the other hand, the utilization of the concept of a smart city in Bogor City, including the digital security of waste management, has also demonstrated good results in the effectiveness of work and the involvement of the population (Saâsystemritz stops articlesmc Franco dan Kalonji, Saâ Udiawac Sasamaza citarc I, Bojonegoro: The Republic of Indonesia, 2020). Moreover, creation of ecoliteracy and stringent waste management laws are also key elements that promote the success of sustainable waste management system (Purnomo & Sa'diyah, 2020).

In turn, Zhang et al. (2023) in their research stress that to a considerable degree, waste separation policies may be confirmed by the impact of solid political will, and the implementable strategy is to maintain the involvement of the population. Their study in Shanghai shows that activation of the community in the source separation of waste can be effective with the assistance of incentives, a constant maintenance of outreach activities with the community and the evaluation mechanisms put in place to be strict. This gives a significant indication that even waste management may not depend purely on availability of waste policies or infrastructure, but must also be coupled with strategies which are able to induce actual behavioural change. Central Java is one of the provinces in Indonesia with the highest amount of waste recording 5.37 million tons of waste in 2023. Of this, semarang city contributed to the highest percentage of 431, 534.65 tons (SIPSN.go.id, 2024). Households are the main source of waste in Central Java that make up 37.06 percent of the total amount (SIPSN.go.id, 2024). This implies that household waste management is the key in minimizing the pile of waste. Being the capital city of the province of Central Java and one of the metropolitan areas in Indonesia, Semarang has immense problems in the management of wastes. The Semarang City Government has carried out waste policies and strategies related to the regulation of its management by Mayor Regulation Number 79 of 2018. Such policies include waste minimization at the source according to the 3R principles (Reduce, Reuse, Recycle), the planning alternating systems of waste management, and setting up of waste managements systems infrastructures and technologies. The amount of waste is increasing even though these policies have been in existence over a period of five years. In addition, such critical situations like the fire at Jatibarang Landfill that occurred on September 18, 2023, became actual evidence of a poor waste management

system. Causing the fire was the methane gas located in the decomposing wastes that caused the accumulation of flammable gases, which directly affected the nearby communities.

Moreover, the above situation has also predisposed accumulated wastes in different parts of Semarang City that hamper efficient drainage as floodwaters are congested. This problem means that there are still barriers in the execution of waste management policies, such as the low rate of participation by the population and the ineffective monitoring-evaluation of the policies (Damanhuri & Padmi, 2006; Hasibuan, 2016). That being the case, some evaluation of the policy on waste management in Semarang City is needed to determine the effectiveness of this policy and the aspects that stall the enforcement of these policies. This paper will give an overview of policy implementation, challenges that were faced and initiatives taken by the Environmental Agency to overcome the challenges.

1.2 Problem Statement

There exists and has been carried out a lot of research on the waste management conducted on the national and local level. Analysis of past research has shown that they mainly dwell on the technical side of waste management i.e. how to process organic waste and the involvement of technology in general waste management as well as community involvement in minimizing domestic waste. As an example, Damanhuri and Padmi (2006) pointed out that technology and source separation of wastes are very crucial in enhancing waste management efficiencies. Meanwhile, Hasibuan (2016) attached weight in the process of program denizenship and community engagement in the process of community-based waste management as far as the 3R (Reduce, Reuse, Recycle) principle in question is concerned. There is however few research studies that specifically analyze implementation of waste management policies at the city level especially in the Semarang City. There has been wider focus on community behavior or waste management strategies by informal sector in most studies, and little but in comprehensive terms has the effectiveness of local policies, the hindrances to implementation been explored and the role of government institutions, like the Environmental Agency, come to play as regards the challenges facing urban waste management. The Government of Semarang City has stipulated that within an official regural (Mayor Regulation Number 79 of 2018) Regional Policies and Strategies polices and strategies were provided on the issue of Household Waste and Similar Household Waste Management. Yet, even after five years of its implementation, there is the lack of a detailed analysis that might help understand to which extent the policy can be applied depending on the set goals, as well as whether the adopted strategies are effective in terms of reducing the waste generation to a considerable degree. It is also shown in the fact that the research gap is driven by the environmental setbacks caused by waste management sub-optima such as the fire in the Jatibarang landfill in 2023 and floods caused by blockages in drainage systems because of the waste deposits. Such phenomena reflect the necessity to examine how well-established policies could help deal with the actual environmental issues.

Therefore, this research gap will be addressed, as the aim of the current study will be to evaluate the waste management policy of Semarang City. The primary interest is to investigate how the policy is being implemented, what barriers are encountered during the implementation, and what efforts do the local government undertake to increase the level of management of the wastes. It is hoped that this study can make contributions through its more contextual and applicable policy solutions relative to exigent conditions in the field as well as in serving as a model to other areas in addressing their waste management problems in more integrated and sustainable ways.

1.3 Previous Studies

Previous Studied has shown some of the methods that can be used in assessing waste management policy in different parts of Indonesia. A study conducted by Salsabila et al. (2024) focused on the waste management policy in the South Tangerang City and concluded that community involvement and human resources availability were the key gaps that could lead to improvement beside some major progress seen in communication, resources, disposition, and bureaucratic structure. In this research, Bryan and White (1987) policy evaluation theory has been used. Elsewhere, Ramadanti (2023) studied Kendari City, identifying both supporting and inhibiting factors of policy implementation, which should be addressed by more budgetary allocation, in-cities infrastructure and education of the population. She used the concept of Knill & Tosun

(2020). Rahmawati et al. (2024) examined the waste management policy implemented according to the 3R approach in the Central Java Province, stating that the program was successfully implemented, but the government had to be more active in terms of implementing outreach among the population. On the contrary of what the others did, normative juridical approach was employed in the study. In his work, Zakirin (2022) examines a specific policy known as the Family Hope Program (PKH) through the theory of policy evaluation developed by Dunn, and his findings allowed filling the picture of the whole picture of evaluating the impact of the existence of a particular policy.

In a master thesis on the same topic by Ilhami (2024), his obstacles were poor public awareness and less infrastructure and the recommended solutions were better education and better facilities. Both the studies were based on policy evaluation theory by Dunn (2003). A research by Mokodompis et al. (2019) in Manado City identified the barriers to policy implementation present in the city in terms of community awareness, inadequate infrastructure and ineffective law enforcement applying the implementation theory by Edwards III (1980). Despite the target of considering assessment in financial apps, the study by Yusniyar et al. (2016) is not outdated as the authors utilize an assessment theory, even though it is not the same approach followed by the study by Ilya Avianty (2003). The research done by Sholehatin & Lituhayu (2025) is directly connected to the setting of Semarang City and found that there are several problems related to the implementation of the policy and those issues were associated with resources and community participation. They identified remedies including the provision of more human resources, budgetary allocations and contacting the private organizations and community organizations. The implementation theory published by Knill & Tosun (2020) was used in this research work. Last but not least, Harjanti and Anggraini (2020) paid attention to waste management at the landfill of Jatibarang in the city of Semarang, stating that such facilities were rather satisfactory in most aspects; however, the study concentrated on the system of landfill management and its implications on society.

Overall, existing literature has been useful and provided clues on implementation, evaluation, and challenges/issues to waste management in different areas. Nevertheless, a further detailed review of the waste management policies in Semarang City, and its focus on the efficiency of the policies, obstacles to implementation, and the reactions of both the population and the implementing authorities should be conducted.

1.4 State of the Art

This paper has carried out scientific novelty by using an evaluative approach toward waste management strategies in the City of Semarang based on William N. Dunn (2003), policy evaluation framework. This framework highlights six dimensions, viz., effectiveness, efficiency, adequacy, equity, responsiveness and appropriateness, through which the failings and success of policy implementation may be examined better and more comprehensively without being restricted to only a one-sided perspective. The innovative aspect of the given research is that it can be observed in terms of location focus, theoretical approach, and depth of the analysis. Unlike Sholehatin and Lituhayu (2025), who considered the case of Semarang along with Knill and Tosun (2020) implementation theory focusing on administrative obstructions and solutions, this paper reviews policy effectiveness with an analysis of all the six dimensions suggested by Dunn. Similarly, Harjanti and Anggraini (2020) studied the waste management of Semarang but focused on technical factors at Jatibarang landfill only without considering larger policy assessment. Other works, including that of Salsabila et al. (2024) and Ramadanti (2023) used other theoretical models (Bryan and White, and Knill and Tosun) and were not conducted in Semarang where the overall effectiveness of policies across Dunn dimensions was not examined, and only aspects such as communication, resources, and administrative barriers were discussed in their implementation. Alternatively, another normative juridical approach, namely, the focus on a legal framework was used by Rahmawati et al. (2024) who did not focus on evaluating the policy empirically. Therefore, the study will bring a new element to the literature because it provides a detailed review of the planned waste management policies in Semarang utilizing Dunn evaluation framework, which is scarcely used in local settings in Indonesia and most importantly in Semarang. The findings are anticipated to bring a broader picture of policies working efficiency and come up with practical suggestions to the enhancement of sustainable waste governance.

The studies of Ilhami (2024) also focused on the Dunn evaluation theory, but in a different context: it took place in Palu City and Banyumas Regency, and could hardly be generalized to the context of Semarang City, which has its own unique bureaucratic, social, and environmental features. Likewise, Dunn (2022) considered the model he used to assess the Family Hope Program (PKH), instead of being applied to waste management. Those by Mokodompis et al. (2019) and Yusniyar et al. (2016) differed in their focus as they considered policy implementation in Manado City and financial application evaluation respectively, which are not directly related to the substantive issues of the study.

Therefore, not a single study has ever been conducted specifically and comprehensively on waste management policies in Semarang City based on these six areas of evaluation put forward by Dunn. This paper also continues to add originality in that it has incorporated analysis of both the barriers to the implementation of the policies, as well as the strategies enacted by the implementing agency (the Environmental Office/ DLH) and the communities in response to the policies that are in place. In addition to analyzing the successes of the program, it also explores the underlying factors behind the problems in program implementation and makes recommendations based on empirical testing, which is hoped to become a valid reference in helping local policy makers to improve the system of waste management in their jurisdiction.

1.5 Purpose

The objective of this study is to examine and analyze the implementation of waste management policy evaluation in Semarang City, Central Java Province.

II. METHOD

In this study a descriptive qualitative approach has been used as it allows one to understand the social phenomena in great detail, especially where there is a need to comprehend the implementation process of a waste management policy in a city such as Semarang. This is deemed as the best method to use when examining the success of policies which are intricate and multidimensional because the researcher can examine the experience, perceptions and dynamics at a first hand basis of both the policymakers and those benefiting the policy. The research involves both/and primary and secondary information. Primary information is gathered via in-depth interviews and field notes whereas secondary one is drawn on the basis of official reports such as regional regulations, reports provided by the Environmental Agency, academic literature, and so forth. Specific methods of data collection will be the non-participatory observation, structured and semi structured interviews and documentation.

The subjects of research were chosen through purposive sampling of people who were deemed to have knowledge, experience, and direct involvement in the policy of waste management in Semarang City. The method above was followed by snowballing sampling where the network of informants was extended on the basis of the suggestion of the previous participants. In this study, the most relevant informants are officials and staff of the Environmental Agency (DLH) of Semarang City because they are the main actors in enforcing waste management policies. The selection of these key informants has been based on their presence at the heart of the implementation system in terms of policy information, current implementation strategies, areas of conflict and dynamics involved. Besides DLH, other interviewees were waste bank administrators, community chiefs and residents enrolled in waste management initiatives, as the perspectives of the individuals who received the policy and those who directly carried it out in the fields were gathered. The research tool on this study included interview guides, stationery, field notebooks, and audio recorders. The data analysis has been done as per a three-step process of data reduction, display and conclusion drawing/verification followed by Miles and Huberman in their interactive analysis model.

This study was carried out in the Semarang City, and included specific areas that produce large amounts of wastes, notably the Jatibarang Final Disposal Site (TPA), as well as the office of the Semarang City Environmental Agency. The researcher conducted data collection between August 2024 and April 2025 to enable him to collect adequate data that indicates the current states of affairs. This period has also allowed giving comparison on how policies have advanced in the duration, not only on the issues they faced but also on the efforts they have evolved.

III. RESULTS AND DISCUSSION

The author reveals the observation of policy evaluation practice in terms of waste management in Semarang City, West Java Province. In the analysis, we will use the evaluation theory of Dunn (2003) in the policies of waste management in Semarang City that includes six dimensions (1) Effectiveness, (2) Efficiency, (3) Adequacy, (4) Equity, (5) Responsiveness, and (6) Accuracy. The consideration of the mentioned aspects is offered in the next subsections.

3.1 Effectiveness

Presents the findings associated with the first research indicator, supported by relevant data and analysis. This subsection addresses the degree to which the waste management policy in City of Semarang has succeeded. According to the interviews conducted with the people living near the Jatibarang landfill and the Kalipancur Village, the policy could be deemed as pretty effective since its gains have already started paying off, like the development of the waste managing system through a more sophisticated approach rather than open dumping. Nevertheless, problems have existed, specifically the unavailability of communities in assisting the implementation of the policy. The policy objectives of the Mararang Mayor Regulation No. 4 of 2024 are to increase the efficiency in waste management, environmental protection, and resource use of waste.

Table 1.
Data of Facilities Owned by DLH Semarang City

No	Name	Total	Condition	
			Viable	Unviable
1	Arm Roll Truck	111	62	49
2	Dump Truck	31	17	14
3	Patrol Vehicle	1	1	-
4	Waste Collection Truck	2	2	-
5	Three-Wheeled Waste Collection Vehicle	13	13	-
6	Road Sweeper Vehicle	2	2	-
7	Road Sweeper Vehicle	3	3	-
8	Mobile Urinal Truck	2	2	-
9	Excavator	4	2	2
10	Bulldozer	2	1	1
11	Whelloader	1	1	-

Source : DLH Semarang City (2024)

According to the data provided by the Environmental Agency (DLH) of Semarang City, the government has been willing to invest in a number of facilities and infrastructures, which is indicative of the commitment toward implementing the policy. Nevertheless, this policy cannot be successful on its own but must operate with the active participation of the community. This concurs with the view of Wilson et al. (2006), which advocates a multi-dimensional approach between the community and the government to create a sustainable waste management systems.

3.2 Efficiency

The efficiency dimension looks at how the waste management policy at the Semarang City has been executed in a very efficient manner in terms of the absolute utilization of resources (budget, workforce, and infrastructure) to deliver sustained goals on waste management. Efficiency is important attribute of policy assessment since it is associated with the balance of inputs and outputs. In this regard, such inputs as budget and other resources apply, whereas such outputs as the diminishment of the amount of waste, the expansion of

recycling and the activation of the population are expressed. Interviews with the Head of the Waste Management Division at the Environmental Agency (DLH) of Semarang City have shown that the expenditure to finance the waste management activities continues to be funded by the Regional Revenue and Expenditure Budget (APBD), especially in the means of procurement of the transport fleet, the operation of Jatibarang landfill and educational and outreach programs. Nonetheless, stringent budgetary allocations as stipulated in the APBD continue to be a major challenge, given that this cannot support the entire process of waste management in a downstream to upstream manner. Also, there is a dependence on local retributions, particularly that of transportation of goods to the source to temporary disposal sites (TPS) as well as to the land fill. The number of fees or retributions collected varies a lot according to the policies of some neighborhood administrators (RT/RW) or managers of waste banks or cooperatives (interview of inhabitants and actors in the field of the enterprise). Lack of uniformity and equal tariff criteria has resulted in inequitable financing and can prove to be a future challenge to the lending of public confidence in waste management.

There are also schemes like waste banks and community based waste management which have actually helped remove the burden on the governments budget. Funding and training support has been minimal to drive their effectiveness and efficiency, therefore, they cannot be counted on as first line remedies. Some of the waste banks are dormant as they lack facilities, facilitators and incentives to operate. In policy efficiency context, this case scenario depicts that despite the various resources deployed towards waste management, the resources have not been optimally (budget, manpower, and infrastructural) utilized. Communal reliance without precise tariff regulations and assured access to service are risky both in terms of efficiency and equity. To enhance effectiveness, there is a need to have more measurable, needs-based budget planning; come up with alternative financing mechanisms like partnership with the private sector and performance-based budgetary models; improve institutions and governance to ensure equitable service delivery throughout the Semarang City. The local government also should develop minimum service costs as the foundation to set up reasonable and fair retribution charges. Therefore, the efficiency aspect of waste management policy in Semarang City continues to encounter certain structural and operational barriers that are needed to be resolved right at this moment to guarantee its sustainability and equity in the delivery of the services to the people.

3.3 Adequacy

The adequacy aspect of policy evaluation is used to determine how well the adopted waste management policy in Semarang City corrects the issues affecting the community and satisfies their needs and expectations. In this regard, adequacy involves not only attainment of formal targets under planning; also the level to which the effects of the policy are felt physically by the people. According to the information provided in the Semarang City Environmental Agency (DLH) in 2024, the waste management policy has somewhat met or even surpassed its expectations. Waste reduction was at 27.67% against target of 28%, whereas waste handling was at 71.34 against target of 71. These successes mean that the waste management program has performed adequately in all administrative aspects.

Table 2.
Persentase Between Target and DLH Achievement

No	Field	Target	Achievement
1	Waste Reduction	28%	27.67%
2	Waste Handling	71%	71.34%

Source : DLH Semarang City (2024)

Nevertheless, these statistics are not the full picture of solving the issues within the sphere. Thousands of complaints continue to pour in by the community especially on the issue of waste dumping at the Jatibarang landfill which makes up to 900-1000 tons of rubbish on daily basis. This huge amount leads to long queues of collection vehicles, traffic in the area of landfill, nuisance of odor pollution, seasonal fires, and flooding during the rainy season. These concerns show that although the administrative performance indicators are very high, there is still an existing gap between policy results and real conditions in the community. Among the motivating

factors are the lack of awareness among citizens on managing waste at source, including separating organic waste and inorganic waste, composting or waste banks, etc.

Alam and Ahmade (2013) find that effective waste management relies much on the active role of the people in domestic waste reduction and sorting. In order to sufficiently take care of the problem, even the best structured system is not enough without the direct involvement of the community. Also, the absence of supporting facilities, i.e. TPS and waste-sorting drop boxes and waste processing facilities at sub-district level presents another obstacle in ensuring adequacy. Waste management education has not been adequately introduced to all areas and thus community participation occurs sporadically and inconsistently. Even though policy targets have been quantitatively met, qualitatively, there is still a lack of direction and comprehensiveness as the policy is unable to meet all the needs of the community. The policy still needs more push, such as more education and strengthening of waste management institutions at the community level, the provision of supporting infrastructure to make sure the policy produces real and enduring effects.

3.4 Equity

This section compares the main findings with previous studies, theoretical frameworks, and relevant literature. It highlights the contribution of the current research—whether through the novelty of the object, analytical approach, or applied methodology.

The equity aspect in the waste management policy will be used as the factor that will ensure that all the urban dwellers in the City of Semarang should be able to gain access to the policy being effected. The equity is measured in not only portions of facilities but more so in how a community actively and sustainably use these facilities. The Semarang City Government through the Environmental Agency (DLH) has undertaken the attempt in providing a variety of supporting facilities in different areas, i.e. 19 Reduce-Reuse-Recycle Waste Processing Sites (TPS 3R), 5 Integrated Waste Processing Sites (TPST), and 664 Waste Banks. Through observations and interviews, it has been established that out of the 19 TPS 3R sites, only one is functional and two are active to some extent whereas the remaining is not operational. The inactivity of the TPS 3R lies in the absence of community participation in running and the use of the TPS 3R. Whereas, all TPST facilities of institutional actors (universities UNDIP, UNNES), elite residential areas (BSB and Gemah), as well as other actors, like Rumah Kompos Pool Timur, are active and in good condition. This points out the differences in management and environmental aware ness between regions. Those areas which represent the greater access to education and the higher level of environmental awareness also represent the better possibility of operating such facilities as other areas have not yet been able to show similar capabilities.

Table 3.
Semarang City TPST Facility Data

No	TPS 3R	Status
1	TPST Undip	Active
2	TPST Unnes	Active
3	TPST BSB	Active
4	TPST Gemah	Active
5	Rumah Kompos Pool Timur	Active

Source : DLH Semarang City (2024)

This is consistent with the idea of Sudibyo (2016) that simply having facilities without community integration will not succeed in the success of a program. Thus, collaboration between the government and the society is paramount in guaranteeing that the fruits of the policy are achieved at large and in equal measure. A more high-powered community empowerment strategy is required, including education and training, local institutional help, in order that all localities of Semarang City are comparable in their waste management capabilities. In the absence of these efforts, equity will simply be symbolic and will not achieve much with regard to the meaning of social justice in environmental management.

3.5 Responsiveness

A responsiveness dimension in the evaluation of waste management policy determines how much the government of Semarang City can recognize, react and adapt to the requirements and dynamics within society. One of the policies that illustrate the high degree of responsiveness is the signing of the Mayor of Semarang Instruction No. 1 of 2024 on the Restriction of Single-Use Plastic that addressed the issue raised by the public and environmental activists regarding the amount of non-decomposable plastic waste. The execution of this policy was appreciated by the society since the use of alternative containers like tumblers, tote bags, and personal containers of food has increased. This measure was also boosted by the government through installation free drinking water dispensers in various facilities that people used in the country i.e. city parks and offices that benefit the people who use them. Such waste management programs did not respond in the same way across the board. The neighborhood-level waste banks that have been grafted with household waste sorting program have not produced optimal outcomes. According to what was observed and due to interviews conducted, it was revealed that many of the residents were hesitant to separate waste as it was viewed as bothersome, and there was a lack of knowledge regarding economic and environmental advantages of waste separation, even though the program possesses substantial potential to decrease the weight of waste falling into the landfill.

This situation shows that although the government being responsive has been high, it has not been as well met on the part of the population in terms of awareness and participation. As such, a more holistic approach should be adopted, such as education, sustained campaigning and awards to active participants. Firdaus (2020) states that it is not possible to achieve behavioral change in community-based environmental management only by putting instructions or by socializing but one has to employ a combination of intensive outreach, existence of supporting infrastructure, and relevant, appealing incentives. In such a way, the policy will be more responsive and effective in the long term.

3.6. Accuracy

The dimension of appropriateness in policy evaluation refers to the alignment between policy objectives and the methods used to achieve them, as well as the effectiveness of resource utilization to obtain optimal results. In the context of waste management in Semarang City, the appropriateness of policy can be observed from the extent to which the implemented programs are able to address the main issues, namely the high volume of waste entering the Jatibarang landfill and the low level of waste sorting and management at the source. Based on an interview with the Head of the Environmental Agency (DLH) of Semarang City, it was revealed that the policy on reducing waste volume at the Jatibarang landfill has not been running optimally. One of the main obstacles is the low level of community participation in sorting waste at the source, even though the government has conducted regular socialization and education. This indicates a gap between policy planning and its implementation in the field.

The Head of the Waste Management Division also pointed out that waste management cannot succeed merely on the DLH but through synergy with different stakeholders including the community, the business sector, schools, and environmental associations. Nevertheless, not all these stakeholders have already entered into close and equitable interactions. Policy incorrectness is also present in the inability to integrate the education process with incentives paths, and the absence of capacity building at the neighborhood (RT/RW) level to manage its waste in an independent manner. Even though there have been a number of efforts like waste banks and TPS 3R put in place, the major issues have not been able to be solved adequately by its presence. Sembiring and Nitivattananon (2010) opine that unless community members are involved in the policy of waste management, the policy may not succeed. Hence, a community-based effort should be strengthened. Government also needs to change its strategies of implementation to reach the sources of problems better, as they are individual behavior and neighborhood social control systems. With these, the policies of waste management in Semarang City will result in a more suitable and right direction that should reflect on the prospective changes directly.

3.7. Discussion Research Findings

According to the assessment of the six dimensions of public policy evaluation of waste management in Semarang City, this study makes some crucial findings that indicate the complexity of policy, social dynamics, and project implementation issues at the local level. Waste management policies in Semarang City tend to show improvement in the area of provision of infrastructures and regulatory frameworks; nevertheless, the administration manages to achieve more than the realities in the field. Based on the dimension of effectiveness, government effort on waste management is a positive indicator owing to success in collection of more than 71% of the targeted waste management. This success has however not been matched by success in reducing source waste. The main thing that discourages the decrease in the amount of waste dumped at the landfill is low awareness among the population in sorting and processing waste products at the household level. According to Purnomo and Sa'diyah (2020), ecoliteracy of the Indonesian society is relatively low, implying the lack of awareness regarding the strategic position in waste-reduction operations to begin with the households. This poses a fundamental dilemma on the achievement of a participatory based waste management regime. Regarding efficiency, the facilities of TPS 3R, TPST, and waste banks have, in fact, been built and located in many different areas, but not all are used optimally. Some of the TPS 3R facilities are actually non-operational since they do not have the volunteers or lack in the institutional management. This shows that resource allocation has not been maximally useful in creation of reality benefits. According to Saadiya, Purnomo, and Kasiwi (2020), a view of the technological-institutional governance-citizen cooperation in the framework of a smart city depends heavily on its policy effectiveness level. Inefficiency will then be an administrative measure without the combination of the three components.

In the adequacy dimension, quantitative targets are close to being met, but there still exist major challenges like accumulation of wastes up to 1,000 tons a day at Jatibarang landfill, long trucks queues, bad odors, fire risks, and flood risks. This shows that the fundamental issues are not addressed. Administrative targets cannot be enough as long as they are not accompanied by structural solutions and behavioral changes in society. In addition, the equity aspect indicates high differences. Though the facilities are scattered sternly in different locations, most of the active TPS 3R units could be found in areas with stronger socio-economic capacity in places like in the university communities and the affluent residential estates. Other areas still fail to utilize the maximum available facilities because of poor community empowerment. According to Ufnia and Hendrayanti (2023), participatory and empowerment approach to waste management is more successful in waste management than just physical infrastructure development. Regarding responsiveness, the City Government of Semarang has shown a quick reaction to the problem of using plastics by publishing a Mayor Instruction on restricting single-use plastics. This policy was responded favorably, which was evident in the behavioral changes through the use of tumblers and water dispensers publicly. This responsiveness however, is mixed faced with the fact that other programs like wast banks at the neighborhood level have not been able to successfully engage the masses. Xiao et al. (2023) shows that Improving community satisfaction by improving waste management infrastructure can offset the adverse effects of an increased number of waste categories.

Lastly, on precision, the waste management policies have not been perfectly specific, since they do not touch upon the cause of the problem: the absence of popular awareness and involvement. The socialization attempts have not yet been successful in inculcating long term behavioural change. Thus, there must be a grassroots style and improve multi-stakeholder cooperation. On the whole, the most significant findings of the research are reinstating the idea that community participatory waste management policies in Semarang City require active involvement of local community, well-propped local institutions, and sustainable communication and empowerment policies. In the absence of these ingredients, policies may not translate into structural reforms necessitating an effective, efficient, equitable and sustainable waste management system.

IV. CONCLUSION

According to the assessment of the waste management policies of Semarang City based on the William N. Dunn (2003) six-dimensional framework, it can be said that the policy has been implemented and it has not yet been optimized. The equity dimension is the only effective dimension among the six dimensions since waste management facilities have been distributed relatively well to different places. In the interim, other

dimensions continue to host a few challenges. The government has played its role effectively; nevertheless, the policy ineffectiveness due to the unavailability of community engagement in implementing the policy has led to its cross-checking. There has also been a lack of efficiency in waste management owing to budgetary limitations and dependence on the public user fees. In terms of adequacy, the policy has not completely catered to the needs of the society since community engagement is not very active. The positive reception of the plastic reduction programs by the massage public is also an indication that more effort should be implemented to make the programs more responsive. Finally, in terms of accuracy, although there has been an attempt by government to engage in socialization and education, there has been no change in behaviour among the community, therefore, eliminating the policy producing any tangible effects. Consequently, it is vital to refine synergy between the government and the community so that policies concerning waste management would be adopted more efficiently and sustainably.

This research has limitation to the fact that internal stakeholders within the Environmental Agency in Semarang City were carried out through interviews, which implies that the community grouping of stakeholders is not well reflected. The concentration on one area limits the applicability of the results as well. Additionally, the qualitative method will not allow measuring the effectiveness of the policy qualitatively.

It is advised that future researches be carried out in other parts to enable comparison of implementation of waste management policies. Moreover, the quantitative approaches will be also needed to define the effectiveness and impact of such policies more objectively and thoroughly.

V. ACKNOWLEDGMENTS

The author would like to express sincere gratitude to the Environmental Agency (DLH) of Semarang City and its entire staff for their support and the opportunity provided in the implementation of this research. Appreciation is also extended to all parties who contributed, both directly and indirectly, to the preparation of this research report, enabling its successful completion.

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