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Implementation of the 3R-Waste Disposal (TPS-3R) program in Tanah Sareal District, Bogor City

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ABSTRACT

Rapid population growth has generated significant environmental challenges, particularly in waste management, which remains a national strategic issue in Indonesia. Waste management is regulated under Law No. 18 of 2008 on Waste Management and strengthened through Presidential Regulation No. 97 of 2017, which outlines the National Policy and Strategy for Household Waste and Similar Waste Management. One approach to reducing household waste is the TPS-3R (Reduce, Reuse, Recycle) program, which emphasizes minimizing waste volumes and improving waste characteristics prior to disposal at final landfill sites (TPA). This study aims to evaluate the performance of the TPS-3R program in Bogor City in terms of its effectiveness in reducing household waste. The evaluation applied the CIPP model (Context, Input, Process, and Product). The findings show that the Context aspect is strong, as the program aligns with national regulations, has a clear legal foundation, and meets the objective of reducing waste at its source through community participation. The Input aspect is adequate but requires improvement: TPS-3R facilities generally meet basic standards; however, human resources are still limited, with managerial and technical roles often carried out concurrently, and maintenance funding remains insufficient. The Process aspect is also rated adequate: available facilities are only utilized at 50–70%, while training and capacity building for TPS-3R managers are conducted more than three times annually. Funding primarily relies on community contributions, government allocations, and revenues from recyclable products. The Product aspect shows partial success: TPS-3R facilities contribute to waste reduction and generate by-products that provide supplementary income, yet overall waste reduction targets outlined in the Regional Waste Management Strategy (Jakstrada) have not been fully met. In conclusion, optimizing both input and process components is crucial to enhance TPS-3R performance and achieve the national target of reducing waste by 30% by 2025.

Keywords: *Bogor City, CIPP, TPS-3R, waste reduction*

INTRODUCTION

The current rapid population growth has had a significant impact on the environment, both positive and negative in all fields, one of which is the endless problem, namely the waste problem (Fauziah et al., 2023), which until now has become a national strategic issue. Garbage is a remnant of human daily activities and/or natural processes in the form of a solid (Indonesia, 2008), in this sense we can understand that every human being will certainly produce waste, where the amount of waste generation in an area will be proportional to the number of people who use it. inhabit an area. There have been many studies and theories which state that the average amount of waste generated per person per day can describe the estimated volume of waste generation in an area at that time, as well as predictions for waste generation in the future or in the future.

The Ministry of Environment and Forestry (KLHK) stated that the amount of waste generated nationally in 2019 was 175,000 tons/day or equivalent to 64 million tons/year, if using the assumption that the waste generated per person/day is 0.7 kg. the director general of waste management, waste and Toxic and Hazardous Materials (PSLB3), KLHK explained that the average daily waste generation in metropolitan cities (population more than 1 million) and big cities (with a population of 500-1,000,000 people) is are 1,300 tonnes and 480 tonnes respectively.

Waste management in Indonesia is regulated in Law number 18 of 2008 concerning waste management and Government Regulation no 81 of 2012 concerning Management of household waste and household-like waste. Household waste management in Indonesia includes waste reduction and handling activities. Waste handling activities consist of activities that include sorting, collecting, transporting, processing and final processing of waste. Garbage transportation activities are generally carried out by district/city governments, namely waste that has been collected at Temporary Waste Collection Sites (TPS) and then transported to Integrated Waste Treatment Sites (TPST) and Final Processing Sites (TPA). Regency/city governments can also provide Inter-regency Transition Stations (SPA) for waste transportation across districts/cities and waste processing in Indonesia is still not running optimally because waste is only handled by a

collect-transport-waste system. If processing is not carried out beforehand, the waste that has been collected is another problem. Waste that is sent to the TPA without processing and not according to a predetermined plan causes the TPA's service life to be low because the waste received has exceeded the TPA's capacity.

Like other cities, the city of Bogor also faces many challenges in its waste management. The problems of waste management in the city of Bogor arise from various aspects, namely technical operational, financial, management and socio-cultural aspects. Waste management is a system that is related to many parties, ranging from waste producers (such as households, markets, institutions, industry, etc.), managers (contractors), regulators, the informal sector, and communities affected by the waste management. so that the solution also requires a comprehensive approach and the involvement of all relevant parties.

METHODS

Research Participants and Time

This research was carried out in four TPS-3R locations in Tanah Sareal District, Bogor City, including: TPS-3R BCC Kelurahan Cibadak, TPS-3R Kencana BKP Kencana Village, TPS-3R Kayumanis 3 Kelurahan Kayumanis, TPS-3R Mekarwangi Kelurahan Mekarwangi as presented in Table 1. The research was conducted in the period of January-May 2023.

Table 1. Research location at TPS-3R in Bogor City.

No	Name TPS-3R	Ward	District
1	TPS-3R Block X BCC	Cibadak	Tanah Sareal
2	TPS-3R Kencana BKP	Kencana	Tanah Sareal
3	TPS-3R Kayumanis 3	Kayumanis	Tanah Sareal
4	TPS-3R Mekarwangi	Cibadak	Tanah Sareal

Data Collection

According to Sugiyono (2012), data collection techniques are a strategic step in research, since the primary goal of research is to obtain accurate and reliable data. Without appropriate data collection techniques, researchers will not be able to obtain valid and reliable data. In this study, three complementary methods were employed: observation, interviews, and document analysis. Observation was conducted to examine the implementation and operational practices of TPS 3R directly in the field. Semi-structured interviews were used to gather in-depth information from TPS 3R managers, local government officers, and community members. Document analysis was carried out by reviewing policy documents, program reports, and related archives to triangulate field data.

To guide the preparation of research instruments, an instrument grid was developed. As stated by Arikunto and Jabar (2008) and Arikunto (2010), an instrument grid serves as a table that demonstrates the relationship between research variables, data collection methods, and the items of instruments. The arrangement of this grid ensures systematic alignment between the objectives of the study, the variables being measured, and the tools applied.

Data Analysis

This study employed a qualitative descriptive analysis approach. Qualitative data analysis, according to Bogdan and Biklen (1997), involves working systematically with data, organizing them into categories, synthesizing findings, identifying patterns, and determining what is meaningful and significant. Sugiyono (2012) further emphasizes that analysis begins from the moment the research problem is formulated, continues throughout data collection in the field, and extends until the final reporting of results.

Specifically, data analysis followed the Flow Model of Miles and Huberman (2012), which consists of three interrelated steps: (1) data reduction, where raw data are selected, focused, and simplified; (2) data display, where information is organized in narrative, tabular, or visual form to facilitate interpretation; and (3) conclusion drawing and verification, where emerging patterns are interpreted and validated against the evidence.

Evaluation Model

To strengthen the evaluation framework, this study applied the CIPP model (Context, Input, Process, Product), developed by Stufflebeam. The model provides a comprehensive approach to evaluating programs by focusing on four key dimensions: (1) Context evaluation, which assesses the relevance of program goals and their alignment with needs and regulations; (2) Input evaluation, which examines resources, strategies, and action plans; (3) Process evaluation, which monitors the implementation of activities; and (4) Product evaluation, which measures the outcomes and impacts of the program (Stufflebeam & Coryn, 2014). The integration of the CIPP model enabled a structured assessment of the TPS 3R program in Bogor City, ensuring that the evaluation captured not only the outputs but also the processes and contextual factors influencing program success.

RESULTS AND DISCUSSION

Evaluation Results

Context Program

Context evaluation is good, because it meets the program background suitability criteria with applicable laws and regulations regarding waste management and

TPS-3R, there is a legal basis relevant to waste reduction and TPS-3R in program implementation, and the program objectives are in accordance with the hope to reduce waste from its source by involving the participation of the community. Previous studies also emphasize that community-based waste management programs are more effective when supported by clear legal frameworks and strong participation from local residents (Afiandra, 2009; Raharjo et al., 2017). This highlights that TPS-3R initiatives in Indonesia are not only technically feasible but also socially acceptable when communities are actively engaged in decision-making and operational activities.

Input Program

The input evaluation was considered sufficient, because the infrastructure and facilities available at TPS-3R were included in option 2 which consisted of standard waste processing facilities and increased waste processing facilities consisting of compost sifters, organic enumerators, bamboo/takakura stacking/hollow brick aerators/drum composter/biodigester and plastic press machine. In most TPS-3R, human resources (HR) who manage TPS-3R still double as managerial HR and technical HR, and maintenance costs are still not met even though operational costs in implementing TPS-3R have been met, so that it will affect TPS-3R operations. Previous studies also emphasize that the success of community-based waste management systems depends not only on the availability of infrastructure but also on adequate financial support and specialized human resources (Zurbrügg, Gfrerer, Ashadi, Brenner, & Kühr, 2012). Moreover, insufficient funding for maintenance often leads to underperformance of TPS-3R facilities, thereby reducing their long-term sustainability (Aprilia, Tezuka, & Spaargaren, 2012).

Process Program

The process evaluation was considered sufficient, because in most TPS-3R the use of infrastructure and facilities was only around 50%–70% of what was available, although the guidance carried out by internal and external parties to increase the human resource capacity of TPS-3R managers was categorized as good, namely more than three times a year. Meanwhile, the main and side funding sources still come from community contributions, allocation of government funds, and proceeds from the sale of waste and/or waste processing products. Previous studies have shown that underutilization of facilities is a common challenge in community-based waste management due to limited operational skills and lack of systematic monitoring (Sasaki & Araki, 2013). Furthermore, strong institutional support and continuous training are critical to ensure that TPS-3R facilities can operate at optimal capacity and achieve long-term sustainability (Zurbrügg et al., 2012).

Product Program

Product evaluation is considered sufficient, even though the percentage of waste reduction from the entire TPS-3R has met the city-scale target of 22% in 2020 and 36% in 2021, the city-scale waste reduction target according to Jakstrada has not been achieved, so optimization is still needed in TPS-3R operations. The products produced from TPS-3R are very varied and able to provide side income for the sustainability of TPS-3R, even though the amount is still minimal and constrained by raw materials. Meanwhile, accountability in the management of TPS-3R is still in the sufficient category because the financial reports are not presented properly and neatly, so that training on basic bookkeeping concepts is still needed in financial reporting. This situation is consistent with previous findings that highlight how product diversification and market linkages are essential for increasing the economic viability of community-based waste management initiatives (Wilson et al., 2012). Moreover, strengthening financial transparency and accountability through capacity building is a crucial factor for enhancing trust and ensuring long-term sustainability of waste management programs (Sasaki, 2019).

CONCLUSION

The evaluation of the TPS-3R program in Bogor City using the CIPP model shows that overall implementation is sufficient but still requires significant optimization. From the **context aspect**, the program aligns well with applicable regulations and its objectives are in line with the city's waste reduction goals by promoting community participation. The **input aspect** indicates that infrastructure and facilities are generally available, but human resources remain limited as managers often carry out both managerial and technical roles. In addition, maintenance costs are unmet, potentially hindering operations. The **process aspect** shows that infrastructure utilization remains low (50–70%) despite adequate guidance and training being provided several times a year, with funding still largely dependent on community contributions, government allocations, and product sales. From the **product aspect**, TPS-3R has contributed to city-scale waste reduction (22% in 2020 and 36% in 2021) and generated diverse products that provide additional income. However, these contributions remain below Jakstrada targets, and financial accountability is still weak due to the absence of systematic reporting. Overall, the program has achieved moderate results, but further optimization of input and process components is needed to enhance the outcomes.

RECOMMENDATIONS

To improve TPS-3R performance in Bogor City, several strategies are recommended. First, the **context aspect** should be strengthened by internalizing waste reduction targets into TPS-3R management and periodically reviewing program objectives to achieve more optimal results. Second, regarding **inputs**, inactive community self-help groups (KSM) should be reactivated, management decrees renewed, and operational support staff assigned by the Environmental Service. In addition, regular budget allocations from the city's APBD should be secured to cover infrastructure maintenance. Third, in terms of **processes**, the utilization of available facilities must be improved through technical training for managers and operators, while collaboration with the private sector and CSR initiatives should be expanded to diversify funding sources. Finally, for the **product aspect**, TPS-3R should work towards meeting Jakstrada targets by encouraging household-level waste sorting, expanding the market for recycled products, and providing training in administration and basic accounting to strengthen financial accountability. Regular internal evaluations are also necessary to ensure continuous program improvement.

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