



The Paradox of Waste Management Policy in Surakarta City

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Abstract. The problem of waste is increasing from time to time in the city of Surakarta. Moreover, the condition of the Putri Cempo Final Disposal Site (TPA) is already overloaded. To overcome this, the Surakarta city government is building a Waste Power Plant (PLTSa). The purpose of this article is to examine the implementation of the PLTSa policy and how it is integrated with the existing waste bank policy. The method used in this study is qualitative with case studies. This study found that the waste management policy with the construction of PLTSa in the city of Surakarta has not been implemented properly; even giving rise to a paradox. The Surakarta city government has a policy of establishing waste banks to deal with waste in the upstream section. While in the downstream section with the construction of PLTSa. However, this integration is not easy to do because the purpose of the waste bank is to reduce the amount of waste. While PLTSa actually requires a lot of waste for its operations. In addition, the presence of PLTSa is feared to interfere with the education that has been carried out so far. This is because the community assumes that the waste problem will be solved with the presence of PLTSa; without the need for changes in mindset and behavior from each individual.

Keywords: Policy Paradox, Policy Implementation, Waste Management , Integration

1 Introduction

The problem of waste continues to increase over time. The cause is the increase in population [1]. In addition, changing lifestyles and consumption patterns of society also contribute to the increase in the amount of waste, as shown by research by Kahfi [2]. Meanwhile, the ability to manage waste has not increased. Such as the limited capacity of waste disposal sites; both TPA and Temporary Shelters (TPS). Added to this, there are still minimal standards in waste management that have been implemented.

According to data from the Ministry of Environment and Forestry, waste generation from 312 districts/cities in Indonesia in 2022 reached 36 million tons/year; a significant increase compared to the previous year. This means that there is still 36.16% (13 tons/year) that is not managed [3]. Meanwhile, based on its composition; the highest type of waste is food waste at 40%. Followed by plastic at 18%, wood/twigs at 13%, and paper/cardboard at 11.3%. This means that organic waste is the largest type of waste. The composition of waste based on waste sources shows that the largest comes from households at 38.8%. Next, traditional markets at 27.7%, and business centers at 14.4%. This means that households are the largest source of waste [4]

The increasing amount of waste that has not been managed properly has caused various impacts; both in terms of health, and the environment such as water, land, and air pollution. This condition also hinders the achievement of sustainable development goals (SDGs); especially goal 11, namely realizing sustainable cities and communities; with one of the indicators being the percentage of managed waste.

One of the cities experiencing this waste problem is Surakarta City. The volume of waste in Surakarta City reaches 300 tons/day; most of which comes from households [5]. If calculated per year, the amount of waste generated reaches 127 million tons. Meanwhile, the capacity to handle waste has only reached 107,873 tons/year (84.94%) [6]. Meanwhile, the Putri TPA has been overloaded since 2010.

To address the waste problem, Surakarta City has issued several policies; which refer to Regional Regulation Number 4 of 2022 to replace Regional Regulation Number 3 of 2010. The waste management policy is carried out by handling waste upstream and downstream. The upstream policy is carried out by involving the community in waste management. The method is by establishing a waste bank at the RT, RW and sub-district levels. A waste bank is a place used to collect waste that has been sorted. The results of collecting the sorted waste will be deposited at a place for making crafts from waste or at a waste collection point. Waste management with this waste bank system is expected to be able to help the government in handling waste and improving the community's economy. Based on data from the Environmental Service, there are 75 waste banks in Surakarta City [7].

Meanwhile, the downstream policy is carried out by building the PLTSa project; which was previously called PSEL (Waste Processing into Electrical Energy). The location is at the Putri Cempo TPA in Mojosongo Village, Jebres District, Surakarta, Central Java Province. PLTSa Solo is one of the National Strategic Projects (PSN); which is part of the national policy. This is in line with Presidential Regulation Number 35 of 2018 concerning the Acceleration of the Development of Waste Management Installations into Electrical Energy Based on Environmentally Friendly Technology. The presence of PLTSa Putri Cempo is the last means for the complete integrated waste management system at this waste processing site. The construction of this PLTSa is expected to significantly reduce the negative impact of garbage piles [8].

PLTSa Putri Cempo Solo received the Certificate of Operational Eligibility (SLO) and started operating on October 30, 2023 after seven years of waiting, from the construction process to licensing. This PLTSa is capable of converting 545 tons of dry waste into 8 megawatts of electrical energy per day. This amount of power is estimated to be able to meet the electricity needs of 5000 households. If PLTSa Putri Cempo can already operate optimally, the daily waste raw material from Solo City is not sufficient; because the daily waste produced in Solo City is around 380 tons, while the maximum capacity of PLTSa is able to process 545 tons [9].

This paper will examine how the implementation of the PLTSa policy in waste management efforts in the city of Surakarta in the downstream section. And how it is integrated with the waste bank policy for waste management in the upstream section; which was already present first.

2 Methodology

The method used in the research is qualitative. Qualitative research is a means to explore and understand individuals or groups that are considered to be the source of social problems. The research process involves important efforts, such as asking questions and procedures, data collected specifically from participants, analyzing data inductively, starting from specific to general themes, and interpreting the meaning of the data. By using an inductive style, focusing on individual meaning, and translating the complexity of the problem, the final results of the research have a flexible structure [10].

In the study, two types of data sources were used: primary and secondary. Primary data by interviewing relevant informants: the head of the Surakarta city environmental service, several waste bank managers and the Surakarta city community, and environmental NGOs in Surakarta city; namely Gita Pertiwi. While secondary data was obtained from documents related to the research; in the form of writings, pictures, or monumental works from someone. After the data was collected, data analysis was carried out which was divided into three simultaneous work flows according to Miles and Huberman [11]. These three routes are data display, data reduction, and drawing conclusions [12].

In this study, data on the implementation of waste management policies in the city of Surakarta that have been obtained, either through interviews or documentation are presented in their entirety, then the necessary data are selected and grouped into the information groups that have been compiled. If insufficient data is obtained, data refinement is carried out by searching again either through interviews or existing documents, and after that the presentation and analysis of the existing data are carried out. The last is to conclude the final results of the study.

3 Results and Discussion

Policy implementation can be defined as an action taken by a particular group with the aim of solving problems that occur in public spaces. Basically, policy implementation is an action initiated by the government by utilizing various available resources to achieve predetermined goals. This study uses the policy implementation theory of Christopher Hood [13]. To examine how the Surakarta city waste management policy is implemented. Hood's policy instruments consist of nodality (information), authority (authority), treasure (resources), and organization (organization); often abbreviated as NATO.

3.1 Implementation of PLTSa Policy to overcome waste problems in Surakarta City

The Surakarta city government has made several policies to address the waste problem. The policy refers to Regional Regulation Number 4 of 2022 concerning Waste Management. The waste management policy is carried out by handling waste upstream and downstream. The upstream policy is carried out by involving the community in waste management. This is done by establishing a waste bank at the RT, RW and sub-district levels. Meanwhile, the downstream policy is carried out by building the PLTSa project; which was previously called PSEL. PSEL is expected to be able to decompose the waste that has accumulated at the Putri Cempo TPA within the next 5-6 years.

The results of the study show that the implementation of the PLTSa policy in order to overcome the waste problem in the city of Surakarta has not been carried out properly. Of the four Hood policy instruments, the authority instrument, and organization is indeed quite good. However, for the nodality instrument (information), and treasure (resources) still need to be improved and enhanced.

From the aspect of nodality /information, the city government has indeed conducted socialization regarding PLTSa to the community. PLTSa is one of the latest breakthroughs in waste management, both in Surakarta City and even at the national level. Therefore, socialization is needed so that the wider community can get to know more deeply about PLTSa. The socialization was carried out to the community around the TPA at the beginning of the PLTSa construction. In addition to direct socialization, the Surakarta City government also conducted publications through the mass media, both print media and social media. The goal is so that the development of PSEL can be known by the wider community. The community welcomed the development of PSEL positively, which is a good innovation from the government to overcome the waste problem. Moreover, the waste can produce electrical energy that can be beneficial for people's lives.

However, in subsequent developments, the community living around the Putri Cempo TPA, which is the location of the PLTSa, complained about the existence of the PLTSa. The community felt that what had been socialized was different from what the community currently felt. During the initial socialization of the PLTSa construction, the government explained that the construction of the PLTSa would use environmentally friendly technology so that it would not harm the community. However, the community then felt negative effects; in the form of noise & vibrations felt when the PLTSa was operating, as well as the emergence of an unpleasant odor from burning waste. Moreover, the PLTSa operation was carried out until nighttime, thus disrupting the community's rest time.

The negative impact is also felt by scavengers who collect waste at the Putri Cempo TPA. The scavengers' working hours are reduced because they have to be divided into 3 shifts or groups to enter the Putri Cempo TPA area. Likewise, the scope of the area that can be accessed by scavengers is becoming narrower and more limited because some land is used for the PLTSa building. This results in a decrease in scavengers' income.

In terms of authority, the existence of PLTSa has an impact on changes in overall waste management in Surakarta City. The party authorized and responsible for implementing PLTSa is the private sector, namely PT SCMPP. Meanwhile, the Surakarta City Government through the DLH has the authority to continue to support and ensure that PLTSa can operate. The Surakarta City Government also has an obligation to provide waste to be processed in PLTSa and provide land for the PLTSa building. Meanwhile, the central government has the authority to supervise and monitor the operational activities of PLTSa Putri Cempo. The division of authority between the central government, local governments and the private sector has been carried out quite clearly. However, in its implementation, it must always be controlled so that the division of authority runs well.

For the next aspect, namely treasure/resources have not been fully prepared. All facilities in the form of equipment and infrastructure to operate the Putri Cempo PLTSa have been completed. The process of processing waste into electrical energy requires long stages. In the initial process, waste is sorted, chopped, then dried until it is ready to be used as raw material or what is commonly called RDF. The RDF is then put into a gasification furnace to be processed to produce gas. The gas produced is then purified to be used to drive a generator so that it can produce electricity.

However, PT SCMPP has not prepared facilities and tools to filter the residue produced from the operation of PLTSa Putri Cempo. The residue is divided into 2 types, namely solid residue and liquid residue and is claimed to be environmentally friendly. Solid residue comes from combustion residue and can be reused for paving block materials, bricks, or as asphalt. While liquid residue comes from condensation residue from the gas produced which contains liquid material. The liquid residue has been studied and can be used as bio-solar.

The unbuilt facility is a tool to capture or filter substances from combustion in the PLTSa. Methane gas produced from the PLTSa operation can spread anywhere because the methane gas capture pipe has been closed. This can be detrimental to the community living around the PLTSa Putri Cempo because methane gas is a gas that is harmful to human health. In addition, the Surakarta City Government has not been able to guarantee that the PLTSa Putri Cempo is environmentally friendly, because the Surakarta City Government does not have the equipment to detect particles or hazardous substances produced from the PLTSa operation such as dioxins and furans.

For human resources or workers who operate PLTSa Putri Cempo, all come from PT SCMPP as a private party. The number of workers is quite ideal. There is no excessive workload or overwork from workers at PLTSa Putri Cempo.

In addition to human resources, PT SCMPP also provides all the budget for the PLTSa. The government does not spend any money; either from the Surakarta City Budget or the central government's State Budget. Although in Presidential Regulation No. 35 of 2018 in articles 14 and 15 it is explained that the regional government must provide waste processing service fees (BLPS) as service fees to the private sector or what is commonly known as a tipping fee. These costs come from the local Regional Revenue and Expenditure Budget (APBD) and can be assisted by the State Revenue and

Expenditure Budget (APBN). However, this is not done in Surakarta City because the private sector will bear all the costs of implementing the Putri Cempo PLTSa. This condition is certainly not in accordance with existing regulations. If all the budget comes from the private sector, how will the profits be shared?

According to the cooperation contract agreement, the result or output of PLTSa Putri Cempo is electrical energy, which will be sold to PLN and become income for PT SCMPP. The electrical energy that can be produced by PLTSa Putri Cempo is 8 megawatts per day. However, only 5 megawatts are sold to State Power Company (PLN). If the electricity production at PLTSa Putri Cempo exceeds 5 megawatts per day, the remaining electrical energy will be used for PSEL operations.

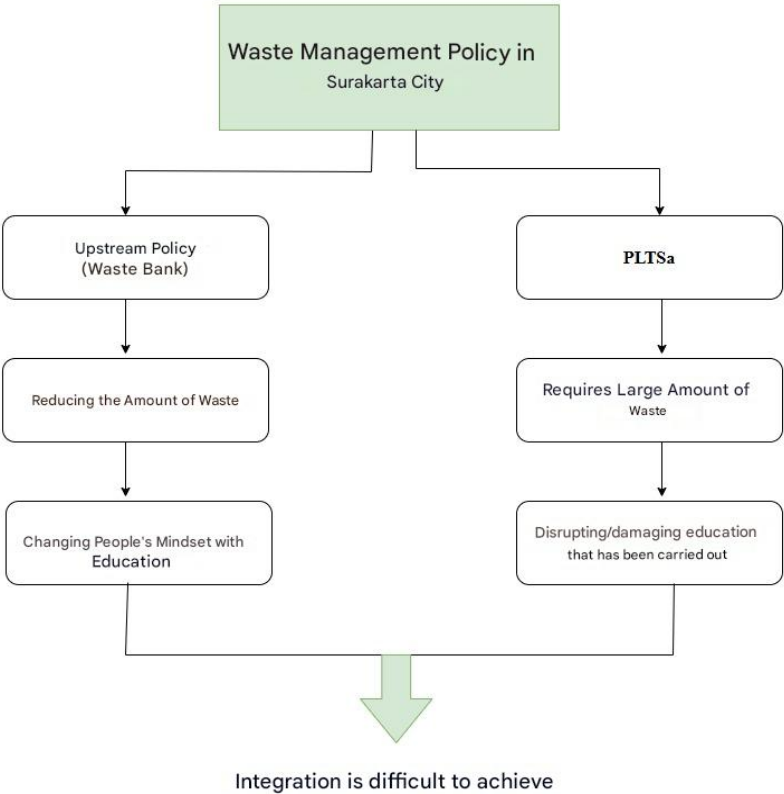
Meanwhile, from the organizational aspect, the construction of PLTSa in Surakarta City involves many actors or organizations. The central government, local government and private parties have their respective duties and responsibilities; which must always be implemented properly. As the developer and implementer of the PLTSa Putri Cempo project is PT SCMPP; through a cooperation agreement contract with the Surakarta City Government for a period of 20 years from the date the Certificate of Operational Eligibility was issued. PT SCMPP is tasked and responsible for building and running the operation of PLTSa Putri Cempo. Including being tasked with designing, building, financing, and operating PLTSa Putri Cempo with environmentally friendly technology. In addition, PT SCMPP is also obliged to take care of the permits required in the implementation of PLTSa Putri Cempo

Meanwhile, the duties and responsibilities of the Surakarta City Government through the Surakarta City Environmental Service (DLH) are obliged to fulfill the supply of waste to be processed at the PLTSa. The Surakarta City Government is obliged to provide waste at the TPA of 545 tons per day (250 tons of new waste and 295 tons of old waste from the pile of waste at the TPA) to be processed into 5 megawatts of electricity. The Surakarta City Government is also obliged to provide land at the Putri Cempo TPA up to a maximum of 8 hectares.

The task of the central government is to ensure that the Putri Cempo PLTSa as one of the National Strategic Projects (PSN) can run well. Among them is by overseeing and ensuring that the Putri Cempo PLTSa receives an Operational Eligibility Certificate (SLO) as a mandatory requirement for electrical power installations to be able to operate. In addition, the central government is tasked with requiring PLN to purchase electricity generated from the PLTSa; as regulated in Presidential Regulation No. 35 of 2018 in articles 10, 11, and 13.

3.2 Paradoks Kebijakan Pengelolaan Sampah di Kota Surakarta

Integration between the PLTSa policy and the waste bank policy is difficult to implement; it even creates a paradox; as seen in the chart below:



This is because the existence of the waste bank aims to reduce the waste entering the Putri Cempo TPA. The method is by sorting the waste; which is then sold or reused. While PLTSa, on the contrary, requires a large amount of waste for its operations. Although the Surakarta City DLH said that the two policies can be combined and collaborated. If the waste bank runs well, then the waste entering the TPA will be less. Therefore, the mountain of waste at the Putri Cempo TPA will run out quickly. So that PLTSa can help other areas process their waste more quickly. By collaborating with areas around Surakarta to bring in waste to meet the operational needs of PLTSa.

However, there are still concerns that the existence of PLTSa could cause the waste bank in Surakarta City to be unsold. Moreover, in its operation, PLTSa requires large amounts of waste. The need for PLTSa is 545 tons per day. While the average daily waste in Surakarta City is only around 380 tons/day. Thus, PLTSa experiences a deficit in the supply of waste stock to be processed. Therefore, the city government's efforts to build PLTSa are an instant solution to overcome the waste problem because they do not want to bother educating the public to manage their own waste.

4 Conclusion

PLTSa Policy in terms of waste management in the city of Surakarta has not been implemented well enough. From the aspect of nodality (information), the community feels that they have received less socialization and information regarding the construction of the PLTSa. Especially regarding its impacts such as noise, odor pollution, etc. Community concerns are also related to the lack of equipment to filter chemicals as a result of waste combustion in the PLTSa; which will have an impact on health. Meanwhile, for the aspect of authority, the institution that has the authority to ensure the implementation of the PLTSa policy is the Environmental Service. The authority of the central government is to supervise and monitor it because this is part of the national policy, namely the PSN. However, its implementation is entirely the responsibility of the private sector; in this case PT SCMPP. In practice, the implementation of this policy has been delayed several times. Meanwhile, the aspect of treasure (resources) is fully provided by the private sector; both in the form of human resources, budget, and equipment. The task of the Surakarta city government is only to provide 8 hectares of land and raw materials (waste). This raises questions; because the regulations state that the government should also bear part of the costs. If everything is provided by the private sector, then what is the responsibility of the city government. Including how the profits are shared. For the organizational aspect, conceptually there is coordination and division of tasks between the Surakarta city government, the central government, and the private sector. However, in its implementation it is still a question mark; because it requires supervision and control from all parties.

Meanwhile, the integration of the PLTSa policy with the waste bank formation policy is difficult to realize. In fact, a policy paradox occurs. This occurs because the waste bank is formed to reduce waste in the upstream section. The community is educated to sort and reduce waste to overcome the overload at the Putri Cempo TPA. Meanwhile, PLTSa aims to manage waste in the downstream section; where in its operation it actually requires a lot of waste. With the existence of PLTSa, the community assumes that it is okay to continue 'wasting'; it doesn't matter because it will be handled by PLTSa. As a result, it is difficult to change *the mindset* and behavior of the community to reduce and manage their waste.

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