

Article Review: The Policy Implementation of Waste to Energy Power Plant – Pilot Project in Surabaya, Indonesia

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Abstract. Indonesia government has nominated Surabaya city as one of the Indonesia pilot projects of waste to energy power plants (WEPP). The WEPP in Surabaya will start to operate in November 2019. However, to ensure this facility operates according to the regulation, the WEPP should be supported by good policy from the stakeholder. This research aims to review the policy implementation of WEPP in Surabaya pilot project based on Van Meter and Van Horn theory. The theory has several indicators that indicate good policy implementation. This research used a descriptive qualitative approach by interviewing fifteen respondents who involved in WEPP pilot project. The results suggest that the policy implementation of WEPP needs further regulation from local government about the management procedure of waste material, which converts to the tipping fee. The solution suggested from this issue is the contract refinement and the fundamental improvement of the communication system to the better WEPP.

Keywords: Management procedure, tipping fee, policy implementation, renewable energy, Van Meter and Van Horn,

1 Introduction

In 2016, the Indonesia government had announced its vision about environmental sustainability. They target, in 2020, Indonesia produces the zero-waste environment. One

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way to conduct this vision is to manage the waste material and transform it into something useful, such as electricity. The waste to energy power plants (WEPP) has been in service since 1975 in Saugus, Massachusetts, United States [1]. Thus, the Indonesia government initiative to build a waste to energy by issued the president regulation number thirty-five about the project acceleration of waste to energy power plant. Indonesia government selects twelve cities as a pilot project. However, only four cities are ready to start this regulation. One of them is Surabaya city. Surabaya as the second big city in Indonesia produces 3 982.25 m³ of solid waste each day, 64 % of them are dominated by food waste [2]. WEPP Surabaya is located in Benowo sub-district, and it is expected to produce 11 MW electricity from 1 500 t of waste material per day [3]. Comparing with other projects in other cities, such as in Pekanbaru, the WEPP of Surabaya has higher target production by 11 MW. While Pekanbaru WEPP is currently targeting a 9 MW [4]. Thus, it indicates that the capacity for reduction of waste material in Surabaya WEPP is higher than other pilot projects. Surabaya is expected to reduce many waste material and become a clean and green city. Surabaya local government plan to operate this WEPP in November 2019.

The current situation of WEPP is still on testing commissioning progress. Therefore, to ensure this facility is steadily operated according to the regulation, The WEPP should be supported by good environment from the stakeholder. Surabaya local government, as one stakeholder, should propose the regulation to ensure that WEPP fulfill the standard of good policy theory. According to “Van Meter and Van Horn theory,” there are several indicators for good policy. First, the indicator includes standard and purpose. The second indicators are the resource and disposition of the practitioner. The third is the characteristic of organization and communication, and the last is the social, economic, and political environment aspects. This paper aims to review the public policy aspect of WEPP in Surabaya based on Van Meter and Van Horn theory. Furthermore, 25 respondents who involve in this WEPP public policy were interviewed and analyzed the result by the qualitative method. Afterward, this research suggests a recommendation to ensure this facility can be a successful pilot project of WEPP in Indonesia.

2 Method

The first step of this research is collecting data based on the twenty-five respondent who in charge of the WEPP project operation. Afterward, the local community that might get impact due to WEPP project was interviewed. The 15 questions were conducted based on Van Meter and Van Horn theory and modified the question based on the research purpose. The respondent selection is based on their expertise and knowledge of the WEPP pilot project. The selected respondent was involved into WEPP project from the beginning. After the interview completed, the data were analyze based on Miles, Huberman, and Saldana [5] interactive analysis. Data were interpreted, and the decision was taken. The data validity then proceeded by the respondent validation technique.

3 Result and discussion

Table 1. suggests the result of the qualitative result of WEPP Implementations in Surabaya. The result indicates from the several indicators from Van Meter and Van Horn, the pilot project of WEPP has gap between the theory and implementation. For the standard and the purpose of the public policy this research can suggest that WEPP has stagnantly produced

the electricity at 2 MW by using landfill gas technology. In other words, the target of WEPP Surabaya that produces 11 MW is not achieved yet. The WEPP is managed by a public-private partnership contract scheme. The expense of WEPP is allocated based on Local government budget and tipping fee.

The ambiguity of the contract between the government and the private sector further increases the gap between the good policy theory and WEPP implementation. Hence, the communication and organization between the local government and the private sector need to be improved due to the distance between the two sectors. WEPP face several problems, the environmental location is nasty, and the exhaust gas from the production process causes high pollution. In addition, the financial allocation is restricted by the political issue.

Due to many issues which affected the pilot project of WEPP in Indonesia, the stakeholder of WEPP in Surabaya need to simultaneously discuss and take action to achieve the success of WEPP pilot project. The stockholder of WEPP might learn from other countries who start the WEPP from along ago, Such as United States, United Kingdom, and also Malaysia.

Table 1. The Qualitative result of WEPP Implementations in Surabaya.

Policy Aspect	Qualitative Result
Standard and public policy purpose	The standard and the purpose of the public policy of WEPP in Surabaya is to produce electricity by 11 MW. However, in the current situation, WEPP stagnantly produces electricity at 2 MW by using landfill gas technology. The shortage of electricity production will be equipped by gasification technology.
Resource	Sanitary and park office in Surabaya as representative of Surabaya local government possesses public-private partnerships to manage WEPP. The partnership contract of system build operate transfer (BOT) will finish in 2039. The revenue of WEPP is from the tipping fee of Surabaya local government. However, the WEPP is currently funded by local government budget and the tipping fee which is IDR 178 000 (12.46 USD) t ⁻¹ .
Disposition of the practitioner	The private partnership of the Surabaya local government to manage WEPP accepted the agreement thoroughly. However, there is the ambiguity of the contract that can increase the tipping fee from IDR 178 000 t ⁻¹ to IDR 260 000 t ⁻¹ .
The characteristic of the organization	Unlikely, there is no guidelines procedure from Surabaya local government to manage the waste material. The management was only guided by the standard operational procedure (SOP) which is arranged by their management to transport the waste material to WEPP location. The sanitary and park office of Surabaya allows the private partnership to manage and distribute the electricity entirely.
The communication of organization	There is a lack of understanding between sanitary and park office of Surabaya and the private partnership. Unclear information is often found due to the manager stay at the sanitary and park office more than in WEPP. The distance between the two offices might cause a problem. If WEPP site office found the emergency problem, the private partner has to meet the manager in the sanitary and park office.

Table 1. continue to the next page.

Table 1. continued

Policy Aspect	Qualitative Result
	Therefore, the emergency problem cannot be solved immediately which cause time gap communication and the document might be delayed to arrive in the destined location
The social, economic, and political environment	The environmental of WEPP looks nasty. The exhaust of production might induce pollution. On the other hand, many plastic wastes that cannot be processed by WEPP, it can increase the earning of the scavengers at WEPP neighborhood by collecting the plastic waste to be recycled. The WEPP policy and financial budget are restricted by the political issue. Therefore, sanitary and park office of Surabaya need to get involved when they propose the budget allocation in Regional House of Representatives

Comparing with other countries in southeast ASEAN, Indonesia is still left behind. Malaysia has commissioned WEPP in 2008 produced 8.9 MW of electricity and reduced the waste material until 700 t d⁻¹ [6]. This fact indicates that Indonesia might learn to the success of Malaysian WETPP. From Table 1, The pilot project of WEPP Surabaya, Indonesia faces several issues. To minimize the problem, some recommendations based on literature study can be shown in Table 2.

Table 2. The suggestion of the WEPP pilot project issue based on a literature study.

Policy Aspect	Issues	Suggestion
1. Standard and the purpose of the public policy	Policy implementation of WEPP needs further regulation from the local government regarding the management procedure of waste material, which converts to the tipping fee.	Make a revised comparative contract
2. Resource		
3. Disposition of the practitioner	There is the ambiguity of the contract that can increase the tipping fee from IDR 178 000 t ⁻¹ to IDR 260 000 t ⁻¹ .	The precise price of electricity from WEPP to Surabaya society need to be decided by regional Regulation
4. The characteristic of the organization		
5. The Communication of organization	There is a lack of understanding between the sanitary and park office of Surabaya and the private partnership.	Assign the manager at the site location to make communication accessible
6. The social, economic, and political environment	The exhaust of production might induce pollution.	decision support tool will help local government evaluate the characteristic associated with the different waste management system

The policy implementation of WEPP needs further regulation from the local government about the management procedure of waste material, which converts to the tipping fee. The lack of the contract is due to no insurance in the contract, which states that the private sector must pay on time at the end of the financial year. This risk increases the distrust and causes the private sector to insist on increasing the tipping fee. This

uncertainty suggests that relational contracts are resistant to opportunism [7]. This effect has to be solved by both sectors, and comparative contracts need to be revised.

Moreover, the precise price of electricity from WEPP to Surabaya society should be decided by regional regulation and comparing with the tipping fee. The price should be recalculated based on the current situation to decrease the risk of economic losses in the future. In the United Kingdom, some research suggests the management should meet the target of the European Union green paper on Energy that to avoid the economic losses of WEPP, [8]. Furthermore, the communication between Surabaya government and the private partnership should be improved. The Surabaya local government should assign the manager at the site location to make communication accessible [9, 10]. Thus it can make communication more efficient and accessible.

Besides, the local government should pay attention to solve the environmental issue. The WEPP which initially becomes the green energy solution, in fact it causes more pollution [10] It might cause a bad reputation to the society. The environmental protection agency (EPA's) municipal solid waste decision support tool might help local government to evaluate the characteristic associated with the different waste management systems and allow them to decide by themselves [11]. Moreover, Indonesia's government vision about environmental sustainability by initiating WEPP in Surabaya as pilot project is not entirely successful. Hence, the stakeholder of the WEPP should take action for many aspect issues.

4 Conclusion

The initiation of waste to energy power plants (WEPP) by Indonesia government should be appreciated. However, the energy policy implementation of WEPP should be reviewed for the success of this pilot project. By using the qualitative method and comparing to Van Meter and Van Horn's theory about good policy. Several issues were found that need to be solved. This research discussed the WEPP issue by literature review and suggested some solutions. The main issue is about the tipping fee contract and the communication of organization. The policymaker should pay attention due to this situation. For future research the WEPP need to be compare with some countries and take the advantages to apply in this project.

References

1. C.S. Psomopoulos, A. Bourka, N.J. Themelis, Waste Management, **29**,5:1718–1724(2009). <https://www.sciencedirect.com/science/article/pii/S0956053X08004066>
2. Y. Dhokhikah, Y. Trihadiningrum, S. Sunaryo, Resour. Conserv. Recycl. **102**: 153–162(2015). <https://www.sciencedirect.com/science/article/pii/S092134491530032X>
3. M.L.A. Kurniawan, W. Rosdiana, Publika, **4**,9:1–11(2016). [in Bahasa Indonesia]. <https://jurnalmahasiswa.unesa.ac.id/index.php/publika/article/download/16499/14991>
4. Monice, Syafii, Jurnal Teknik Elektro, **2**,3:35–39(2013). [in Bahasa Indonesia]. <https://ejournal.itp.ac.id/index.php/tektro/article/download/126/124>
5. M.B. Miles, A.M. Huberman, J. Saldana, *Qualitative data analysis*. New York: SAGE Publications (2018). p. 408.

6. https://books.google.co.id/books/about/Qualitative_Data_Analysis.html?hl=id&id=fjh2DwAAQBAJ&redir_esc=y
7. S.A.S.A. Kadir, C.-Y. Yin, M.R. Sulaiman, X. Chen, M. El-Harbawi, *Renew. Sust. Energ. Rev.*, **24**:181–186(2013).
<https://www.sciencedirect.com/science/article/pii/S1364032113002001>
8. S.J. Carson, A. Madhok, T. Wu, *AMJ*, **49**,5:1058–1077(2006).
<https://www.jstor.org/stable/20159816>
9. T. Jamasb, R. Nepal, *Resour. Conserv. Recycl.*, **54**,12:1341–1352(2010).
<https://www.sciencedirect.com/science/article/pii/S0921344910001151>
10. J.E. Grunig, *Excellence in public relations and communication management*. New York: Routledge (2013). p. 680.
<https://www.taylorfrancis.com/books/9780203812303>
11. S. Jo, S.W. Shim, *Public Relat. Rev.*, **31**,2:277–280(2005).
<https://www.sciencedirect.com/science/article/pii/S0363811105000494>
12. T. Michael, 2-Environmental and social impacts of waste to energy (WTE) conversion plants. In: *Waste to energy conversion technology*, N.B. Klinghoffer, M.J. Castaldi (Eds). Cambridge: Woodhead Publishing (2013).
<https://www.sciencedirect.com/science/article/pii/B9780857090119500028>