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Institutional Innovation and Co-production as Domestic Waste Handling in Bandung Regency

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ABSTRACT

This article discusses the handling of domestic waste through institutional innovation and co-production as an alternative in reducing and utilizing organic and inorganic waste. Waste in Bandung Regency is a very serious problem, almost all sub-Regencys experience problems in managing waste, even though the local government has created many waste management programs but the waste problem still continues. Therefore, a new concept is needed with reference to the concept of co-production. Co-production is a concept of joint production that exists between the government and the community to produce innovations in waste management through the Thematic Waste Bank. This writing refers to one variable, namely the role of the government, this article is finding various waste handling innovations designed and managed by the local government with a qualitative analysis approach using interviews with informants from the Bandung Regency Environmental Agency. The result of this study is that the local government has carried out various innovations that prioritize broad public participation and community commitment in dealing with the challenges of solid waste issues in Bandung Regency, but these innovations have not been able to significantly reduce waste generation in Bandung Regency. This Thematic Waste Bank Program does not cover all sub-Regencys in Bandung Regency. The result of this study is that the local government has carried out various innovations that prioritize broad public participation and community commitment in dealing with the challenges of solid waste issues in Bandung Regency, but these innovations have not been able to significantly reduce waste generation in Bandung Regency. This Thematic Waste Bank Program does not cover all sub-Regencys in Bandung Regency. The result of this study is that the local government has carried out various innovations that prioritize broad public participation and community commitment in dealing with the challenges of solid waste issues in Bandung Regency, but these innovations have not been able to significantly reduce waste generation in Bandung Regency. This Thematic Waste Bank Program does not cover all sub-Regencys in Bandung Regency.

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1. Introduction

Until now, waste management is still an important issue in various cities in other parts of the world and in the global context of the waste problem, including the framework for achieving the Sustainable Development Goals (SDGs) by the United Nations.(Johnston, 2016). Especially in developing countries including Indonesia, the challenges related to waste management still big and complex (Pires et al., 2011; Wilson et al., 2012). In the context of Indonesia, this is because it has the 4th largest population in the world, namely 271,066,400 million people, which is directly proportional to the amount of waste generated by 67,766,000 million tons. Here's the data:

Figure 1. Projected of Indonesia Population and Projection Waste Generation in Indonesia
Source: (Statistic Indonesia, 2013. Edited by the author, 2020)

With such a large amount of waste generation, if the waste is not handled and managed properly simultaneously from upstream to downstream, it will have an impact on environmental pollution that can threaten human health. Data from the Ministry of Environment and Forestry in 2020 shows that of the 67.8 million tons of waste, including.

Total of Waste Generation in Indonesia	59 percent is food waste, twigs and or organic waste
	41 percent of the waste is inorganic waste which consists of: a. Plastic (15 percent) b. Paper (11 percent) c. Fabrics/Textiles (3 percent) d. Metals (2 percent) e. Rubber (2 percent) and other waste 8 (percent)

Figure 2. Total Waste Generation in Indonesia
Source: (Ministry of Environment and Forestry, 2020)

Of this amount, 60 percent is simply thrown into a landfill, 10 percent is managed and recycled, and the other 30 percent is not managed and pollutes the environment. This is because most of the Indonesian people in managing waste have not yet implemented environmentally sound waste management such as: the 3R concept (Reduce, Reuse, and Recycle).

According to data from the Central Statistics Agency (BPS) in 2019, around 69 percent of urban/urban area waste in Indonesia is still handled by transporting it to a waste landfill. From this phenomenon, it means that the pattern of waste management that has been going on so far is still using

the traditional paradigm, namely the concept of "Gather> Transport > Dispose". So in 2020, national waste management has only reached 49.18 percent, so there is still a gap of around 50.82 percent towards 100 percent of waste that is well managed in 2025 (Directorate General of Waste and B3 Waste Management, Ministry of Environment and Forestry, 2020).

Another problem in waste management in Indonesia is the segregation of waste from sources that should be controlled by the local government, but the capacity of The local government's fiscal capacity is limited so that handling is needed not only from the Regency/city government, but also from the involvement of the entire community because there is a missing link in waste management institutions, from the source of the waste to the Temporary Waste Disposal Site (TPS), waste is managed by the community temporarily. The new local government intervened at the TPS level to the Final Disposal Site (TPA). Referring to the data on the composition of national waste based on waste sources according to the Ministry of Environment and Forestry in 2020 the largest producer of waste is generated by the household sector at 37.39 percent so that the community's opportunity to be able to manage household waste from sources independently is very large. Here's the data:

Figure 3. Composition of National Waste Based on Waste Sources in 2020
Source: (Ministry of Environment and Forestry, 2020

Based on the data above, basically to overcome these challenges, the waste management mechanism in the context in Indonesia so far requires community participation, so the right concept is to adopt a co-production concept approach so that waste management is a systematic, sustainable activity, and comprehensive. The concept of co-production in public services is not only carried out professionally and managerially by the government but is also produced jointly by the community because the active role of the community is needed to shape public services.(Brandsen & Honingh, 2016).

Co-production occur in various fields of policy and the public service sector, one of which is in the environmental field (Li, 2020). Therefore, this paper focuses on the role of government agencies in implementing the concept of co-production as was done by the Bandung Regency Environmental Service through the Jelekong Waste Management and Utilization UPTD (PPS). With a population of 3.7 million people (Bandung Regency Central Statistics Agency, 2019). Waste production in Bandung Regency is quite high, but only a small part can be transported to the Final Waste Disposal Site (TPAS).

In 2020, the waste service carried out by the Bandung Regency Environmental Service is only41.12 percent and waste that is not served 58.88 percent (Monev on ISWMP Waste Conditions at the Bandung Regency Environmental Service by the Environmental Sub-Directorate of the SUPD I Directorate of the Directorate General of Regional Development, Ministry of Home Affairs, 2020). The potential for community participation is one of the important things in supporting the success of waste management with an "individual basic" approach. However, in reality, not all of the 272 Thematic Waste Banks in the area are running.

On the other hand, the challenge in the context of handling waste in Bandung Regency in applying the concept of co-production is the behavior of the community in sorting their waste, Based on the document Welcoming the SDGs-Readiness Regency/City in West Java Province in 2018, Bandung

Regency is included in the household behavior index in managing its waste, which is low at 6.8 percent, with a large population in 2019 reaching 3,775,279 people and an increase potential waste generation reaches 482,291 tons/year (Bandung Regency Central Statistics Agency 2017-2019 and Bandung Regency Environmental Service 2019).

So if the waste is not managed properly, it will affect the environmental conditions in Bandung Regency. While the potential for population and waste generation is increasing every year, the following data are as follows:

Table 1

Baseline Study Results of Household Indicators with Waste Sorting Behavior (Percent) in West Java in 2018

No	Regency/City	Result (%)	No	Regency/City	Result (%)
1	Kab. Bogor	11,45	14	Kab. Purwakarta	19,99
2	Kab. Sukabumi	16,85	15	Kab. Karawang	7,98
3	Kab. Cianjur	16,36	16	Kab. Bekasi	6,75
4	Kab. Bandung	6,8	17	Kab. Bandung Barat	10,74
5	Kab. Garut	19,70	18	Kota Bogor	4,93
6	Kab. Tasikmalaya	18,66	19	Kota Sukabumi	6,88
7	Kab. Ciamis	15,34	20	Kota Bandung	7,31
8	Kab. Kuningan	9,78	21	Kota Cirebon	4,1
9	Kab. Cirebon	10,42	22	Kota Bekasi	4,94
10	Kab. Majalengka	5,75	23	Kota Depok	9,39
11	Kab. Sumedang	18,66	24	Kota Cimahi	8,02
12	Kab. Indramayu	6,42	25	Kota Tasikmalaya	13,42
13	Kab. Subang	13,59	26	Kota Banjar	14,78

Source: (SDGs Center UNPAD, 2018)

Referring to the data above,The low behavior and participation of the community in managing waste is a challenge for every Regency/city in West Java, especially Bandung Regency which has an urgency in handling waste so that the issue of solid waste is still a serious problem for the Bandung Regency Government. The cause of the high ignorance of the community in managing waste is because until now waste still has a stigma in society. Also, the public has not fully prepared to play a role as a development subject in waste management(Sulistyani & Wulandari, 2017).

The interesting thing in this writing is that there are still few scientific articles that discuss the concept of co-production in waste management, not comparable to the concept of co-production in the delivery of other public services, such as: education, health, child care and others. (Alford, 2009; Howlett et al., 2017). This is because, so far, waste management has been considered a public service that must be provided by the government(Guerrero et al., 2013). Meanwhile, the capacity of local governments in managing waste has limitations, especially in terms of budget because it is not proportional to the increase in the amount of waste generation which continues to increase every year.(Tacoli, 2012). Whereas waste management is a comprehensive, systematic, and sustainable activity that must be carried out by everyone, including the reduction and handling of waste by prioritizing the principles of responsibility, sustainability, benefits and economic value.

2. Research Method

This research was conducted using a descriptive qualitative approach so that it only consisted of one unit of analysis (Creswell, 2014). The method used is to conduct in-depth interviews with informants who I believe have understanding, knowledge and data related to institutional innovation

and co-production in waste management in Bandung Regency, namely the Head of the Jelekong Waste Management and Utilization UPTD (PPS) and field officers at UPTD Waste Management and Utilization (PPS) Jelekong as an important process of obtaining information for research purposes. Qualitative research begins with an assumption and the use of theoretical concepts from a social phenomenon, and at the data collection stage the authors conduct observations, interviews, and documentation.

In the process of data analysis, the authors conducted an analysis of the variables and dimensions of these variables in order to examine the role of the Bandung Regency government, especially the Bandung Regency Environmental Service as a *leading sector*from the implementation of the Thematic Waste Bank program in Bandung Regency. Furthermore, to test the validity of the data, the source triangulation method and data analysis techniques were carried out by means, including: reducing data, presenting data and explaining conclusions.

3. Results and Discussion

Of the main topics in the current study of public administration and public management (Brandsen et al., 2018). There are several studies that explain that co-production as a concept in providing public services(Alford, 2016; Brandsen et al., 2018; Brandsen & Honingh, 2016; Brudney & England, 1983; Parks et al., 1981).

This concept is important for public management(Fledderus et al., 2014). Because co-production can affect several aspects of public services, namely as a way to increase community involvement, a way to increase the efficiency and effectiveness of service delivery and an opportunity to stimulate institutional innovation in the public sector.(Fledderus et al., 2014; Nabatchi et al., 2017; Voorberg et al., 2015). Co-production in waste management relies heavily on broad public participation, community commitment and institutional innovation so that instead of being a direct service provider, the government needs to take a step back and act as a facilitator. (Klijn et al., 2010). There is one relevant approach as a starting point to be used as a reference, this approach is based on the slow development of top-down regulation, so a bottom-up joint production approach can provide a reasonable solution in reduce and manage waste.

Handling waste is actually a responsibility that must be done by all parties. Making public service innovations in waste management carried out by the UPTD Waste Management and Utilization (PPS) of the Bandung Regency Environmental Service so that organic and inorganic waste can be an opportunity to improve the local economy. So the role of government (government role) is an important variable of a service process that is produced together. The government acts as a facilitator and has sufficient discretion to be able to produce public policies that can encourage co-production services in different ways, aiming to give the public more control over the design of the services they receive personally.(Brandsen & Honingh, 2016). The following indicators are contained in the government role variable in the co-production concept, including:

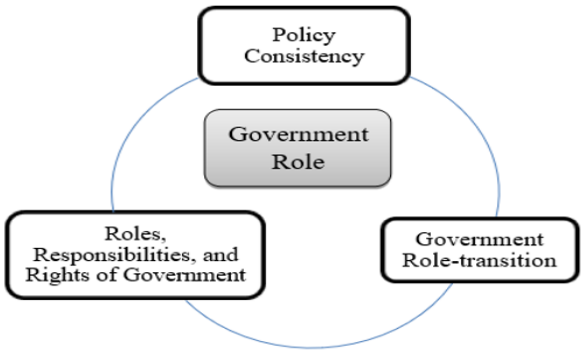


Figure 4. Variable of Government Role

Source:(Lu & Sidortsov, 2019; Steen & Brandsen, 2020)\

Institutional innovation and co-production through the Thematic Waste Bank can be a driver of local economic growth in Bandung Regency. This is also a manifestation of one of the principles of sustainable waste management, namely waste to resource, which results in a circular economy. The following are the efforts made by the Bandung Regency Environmental Service, referring to these variable indicators:(Lu & Sidortsov, 2019; Steen & Brandsen, 2020):

3.1 Policy Consistency

This indicator is good to use in the early stages of policy implementation because it facilitates the formation of habits of residents whose waste collection rates are still low so that it can encourage public participation. In co-production, local policies produced by the Bandung Regency government must be consistent in reducing and utilizing waste by referring to several regulations, including:

Table 2
Regulation of Institutional Innovation in Domestic
Waste Management in Bandung Regency

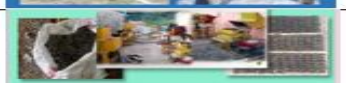
No	The Waste Handling Regulation in Bandung Regency
1	Bandung Regency Regent Regulation No. 68/2018 concerning Bandung Regency Policies and Strategies in the Management of Household Waste and Similar Household Waste.
2	Establishment of UPTD Waste Management and Utilization based on Bandung Regency Regulation No. 40/2018 concerning the Establishment of a Regional Technical Implementation Unit in the Bandung Regency.
3	Bandung Regent Regulation No. 26/2020 concerning Guidelines for the Implementation of the Village Financial Assistance Program in Bandung Regency for 2020.

(Source: Author, 2021)

Strengthening community involvement in waste management is needed in accordance with the mandate of the policy which emphasizes that reducing waste from source is the responsibility of all parties, both the government and the community. Referring to the policy, institutional strengthening by creating various programs at the Jelekong Waste Management Education Center. In it there are various innovations that have been running in reducing and utilizing organic and inorganic waste.

Through the Thematic Waste Bank which is managed by the UPTD for Waste Handling and Utilization (PPS), community leaders, and Community Self-Help Groups (KSM), it aims as a means of education for household-based waste management in a certain area/communal scale to encourage strengthening of understanding andthe active role of the community in reduce and handle organic and inorganic waste so as to create a circular economy, here are various innovations found in the Thematic Waste Bank at the Jelekong Waste Management Education Center

Table 3
Institutional Innovation and Co-Production as Domestic Waste Handling at the Jelekong Waste Management Education Center

No	Thematic Waste Bank in Waste Management and Utilization Education Center at Jelekong, Bandung Regency	Evidence
Organic Waste Innovations		
1.	Maggot bioconversion for turkey, cub, catfish and bird feed with oven and pellet process.	
2.	Ngopi Kancing: Cultivating Lumbricus Rubellus worms as raw materials for the animal feed, pharmaceutical and cosmetic industries.	
3.	Green House: There are various ornamental and woody plants, as well as fertilizer for growing these plants is the result of utilizing organic waste through the bioconversion of Maggot.	
Inorganic Waste Innovations		
1.	Recycling Center.	
2.	The Main Waste Bank to support and foster Garbage Bank Units in Bandung Regency as many as 272 in every village in Bandung Regency.	
3.	Local Waste Processing Sites (TOSS) is a fermentation process to convert waste and other energy materials into renewable energy materials.	

Source: (UPTD Waste Management and Utilization (PPS) Jelekong, 2020)

Strengthening the capacity of facilities and infrastructure for various waste management innovations is an effort to change the mindset of the community that waste is not a source of problems but rather an environmental resource if managed properly and correctly. Not all waste has no value, there is waste that has economic value both organic and inorganic waste so that it can produce a circular economy for the community. This is done as an effort to reduce waste because the issue of waste is still a fairly complex problem for the Bandung Regency Government, especially organic waste.

Currently, Bandung Regency only has a fleet of 109 waste transporters, the coverage of the transportation service area only covers 24 sub-Regencys out of a total of 31 sub-Regencys in Bandung Regency (LKIP Bandung Regency Environmental Service, 2019). With 109 fleets, the Bandung Regency Government can only transport 300-350 tons/day of waste to the landfill, so there is a difference of around 1,000 tons per day that cannot be transported to the TPA. From these conditions, institutional innovation and co-production in handling waste from sources by involving the community is very necessary.

3.2 Government Role-transition

Institutional innovation and co-production in waste management must be supported by government action that directly intervenes and acts as a facilitator to encourage community groups in the grassroots order to overcome waste problems, especially at the waste sorting stage. Efforts to manage organic and inorganic waste can make a real contribution to local economic growth. This program can build community participation through sorting waste from home as an effort to provide waste raw materials that have economic value.

The Thematic Waste Bank can build on the role of the industry in making waste as raw material for the recycling industry. The waste raw materials used are:

Inorganic waste (undegradable) is waste that is difficult to decompose and cannot be decomposed, and is in solid form. Such as, used cans, used paper, plastic bottles, cardboard, and others. On the other hand, organic waste management such as maggot bioconversion can be used to reduce organic waste and decompose drum droppings of several types of ruminants and poultry, as well as the use of dry BSF Maggot which can be sold as alternative feed ingredients for poultry, fish and birds. The success of this program is highly dependent on commitment.

The target of the Thematic Waste Bank program is the establishment of a model of a communal-based waste management system managed by Non-Governmental Organizations, including:

Table 4
Thematic Waste Banks in Bandung Regency

No	The Thematic Waste Bank in Bandung Regency	Status	
		Active	Non Active
1.	Waste Management with BSF Flies (Maggot)	21 units (located in 15 sub-districts in Bandung Regency)	Zero
2.	TPS 3 R	127 units (in 31 sub-districts)	Zero
3.	Local Waste Processing Site	3 Units	2 Unit
4.	Waste Bank	318 units	38 unit

Source: (UPTD Waste Management and Utilization (PPS) Jelekong, 2020)

From the data above, the handling of organic waste using BSF Maggot flies does not cover all sub-Regencys, there are only 15 sub-Regencys out of a total of 31 sub-Regencys in Bandung Regency, including: Baleendah, Banjaran, Bojongsoang, Cangkuang, Cicalengka, Cileunyi, Cimaung, Ciparay, Ciwidey sub-Regencys. , Katapang, Margaasih, Pacet, Pasir Jambu, Rancaekek, and Soreang. As well as Local Waste Processing Places (TOSS) whose status is still active, there are three sub-Regencys, namely: Kutawaringin, Soreang, and Ciparay Regencys.

3.3 Responsibilities of Government

A form of responsibility UPTD Waste Management and Utilization (PPS) Dinas Environment The Regency coordinates with four 3R TPS to be integrated with the Thematic Waste Bank, including;

TPS 3R Jalakharupat, TPS 3R Citaliktik, TPS 3R Arjasari, and TPS 3R Regional Government Complex Bandung Regency. The economically valuable inorganic waste transportation scheme is to be managed at the Thematic Waste Bank. The following is the economical inorganic waste transportation scheme managed by the Main Waste Bank at the Jelekong Waste Management Education Center:

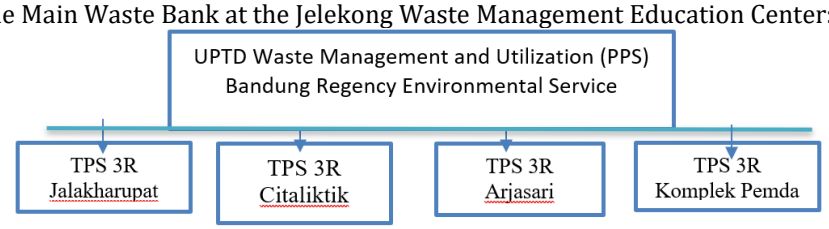


Figure 6. Schematic of Inorganic Waste Transportation of Main Waste Bank
Source: (UPT PPS Bandung Regency Environmental Service, 2020

This scheme is a strategy for strengthening TPS based on 3R (Reuse, Reuse, Recycle), the results of which have encouraged the establishment of circular economy principles in the management and utilization of waste in an integrated and integrated manner based on households and areas which are only owned by Bandung Regency and the establishment of the Main Waste Bank. This is to support the Citarum Harum program. If the Waste Bank program is managed optimally, it can support waste management from the source, and can gradually reduce the potential for waste generation to be disposed of in Temporary Disposal Sites (TPS).

The total economical inorganic waste that has been sold in the period
October 2020 to February 2021 is 3,412 kg, with total sales of Rp. 8.167.800,- (UPT Waste Management and Utilization of the Bandung Regency Environmental Service, 2021). There are obstacles in

implementing the Main Waste Bank facility in Bandung Regency, there are 38 Unit Waste Banks in Bandung Regency that have not been integrated (UPTD Waste Management and Utilization (PPS) Bandung Regency Environmental Service, 2021). This is due to community participation in resolving the issue of solid waste using traditional methods, such as burning. And there are still many Unit Waste Banks that have not been integrated with the Main Waste Bank at the Jelekong Waste Management Education Center.

4. Conclusions

Institutional innovation and co-production in waste management in Bandung Regency through the Thematic Waste Bank is one of the alternative waste management models to reduce waste problems and improve the local economy in Bandung Regency. The Thematic Waste Bank is a waste management model that emphasizes the active role of the community in processing organic waste and inorganic and encourage the community in improving the regional economy. This innovation is very beneficial for the community from an economic perspective in processing organic and inorganic waste, although it is not too big, but the impact is felt for the community to change habits and mindsets in managing waste properly and correctly. Although the results of the Thematic Waste Bank have not been able to significantly reduce the amount of waste generated every day in Bandung Regency because not all regions have implemented the Thematic Waste Bank program as found in the Jelekong Waste Management Education Center, the efforts of local governments and communities in several areas have run the Thematic Waste Bank program.

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