

**Chapter 7**  
**Waste management in the cooperation prospective**  
**between local governments in Indonesia**  
**Case of regional cooperation in West Java Province, Indonesia**

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**Abstract:**

*Cooperation between districts/cities as part of regional autonomy in Indonesia aims to accelerate the realization of people's welfare through services improvement and community empowerment. Some of the common problems related to public services are low quality of services, unclear service standards, and low service accountability. Regional autonomy in Indonesia was born after the social upheaval in 1998, which was preceded by the economic crisis that hit Indonesia around 1997. After this crisis, there were problems related to the constitutional system and regional demands. Subsequently, the discourse of regional autonomy was rolled out as an alternative answer to the sociopolitical problems. The principle of regional autonomy was initially applied in Indonesia based on Law No. 22/1999 concerning Regional Government; it was replaced by Law No. 23/2014. Regional autonomy provides an opportunity to regions to empower their respective regions for the welfare of the people and be given the authority to regulate their own regions. In the context of municipal solid waste management, the Law No. 18/2008 encourages collaboration between regional governments for addressing waste problems, especially, in the construction and operation of joint facilities that may function as regional final disposal facilities. The Sarbagita Regional Cooperation was the first successfully developed regional facility in early 2001 to manage the Suwung landfill site; it was jointly initiated and managed by four local governments that have a common*

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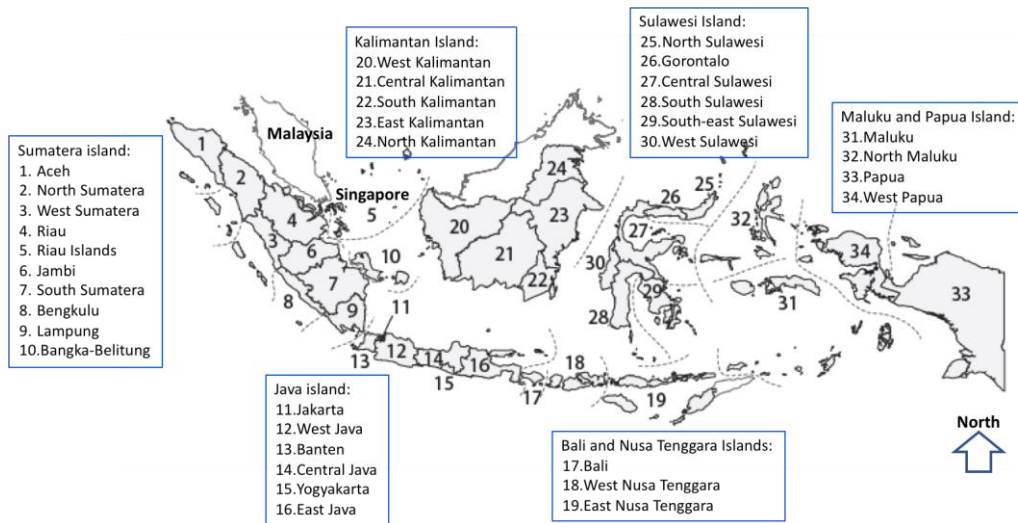
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*interest in the provision of final disposal facilities. Similar collaborative efforts were carried out by four local governments (Kartamantul Regional Cooperation) in the Yogyakarta Province to manage the Piyungan landfill. Wider cooperation has been demonstrated in the province of West Java since 2007. The form of cooperation in this province is somewhat different. The collaboration is carried out by the provincial government, which acts as a coordinator and prepares a subsidy fund. This collaboration is not only related to the management of a shared facility but also related to planning, constructing, and operating a waste treatment facility. Currently, there are two regional facilities that are being prepared by the province of West Java, namely in the Greater Bandung area (five local governments) and in the Bogor Raya area (three local governments). These two regional facilities have been developing waste-to-energy technology to handle the municipal solid waste generated from these areas. Against this background, this study aims to explore the issues regarding regional cooperation for municipal solid waste management in Indonesia.*

**Keywords:** regional autonomy, municipal solid waste, Sarbagita, Kartamantul, West Java Province

## **1. Geography and Population of Indonesia**

Indonesia is an archipelagic country with a territory (land and sea) of about 5 million km<sup>2</sup>, consisting of more than 17,500 islands (Figure 7-1). Indonesia's total land area is about 1,9 million km<sup>2</sup>. In 2012, the population of Indonesia was 245 million, with about 50% of the population living in urban areas, and the estimated population was 260 million in 2018. It has been predicted that the population will increase to 285 million in 2025, and the urban population will be 67.5% of the total population. The annual national population growth rate is 1.49%. Approximately, 58.7% of the total population inhabits Java, an island with an area covering only 6.95% of the total land area of the country.



**Figure 7-1.** Maps of Indonesia and its provinces [Ref. 20]

The volume of waste generation in Indonesia has increased with the rapid growth of the country and an improvement in the living standards of its population. With the application of Law No. 23/2014 on the *regional governance* and government regulation (GR) No. 38/2007 on the *allocation of governmental affairs to national, provincial and district/city governments*, the responsibility for handling municipal solid waste (MSW) has shifted from the central (national) government to local governments (city/district).

As Indonesia grows rapidly and standards of living improve, waste is generated in ever higher quantities. With the existence of Law No. 23/2014 on the *regional governance*, and GR No. 38/2007 on the *allocation of governmental affairs to national, provincial and district/city governments*, the responsibility for handling MSW has shifted from the central (national) government to local governments (city/district).

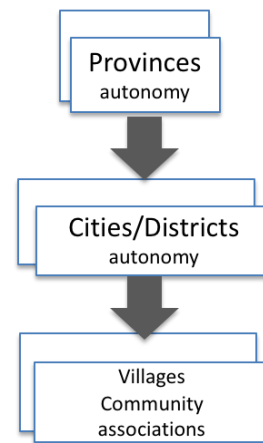
Administratively, the country is comprised of:

- 34 provinces,

- 502 cities/districts (93 of the cities are autonomy status),
- 6,543 sub-districts,
- 75,244 villages.

The criteria of the city according to its population are as follows:

- small city: up to 100,000;
- medium city: > 100,000 up 500,000;
- big city: > 500,000 to 1,000,000;
- metropolitan city: > 1,000,000;
- megapolitan Jakarta consists of four cities and one district



## 2. Regional Autonomy in Indonesia

Regional autonomy in Indonesia was born after the social upheaval in 1998, which was preceded by an economic crisis that hit Indonesia around 1997. Subsequently, this social turmoil gave rise to a political turmoil, marked by the end of what we called the “*new-order*” government, which had been in power for approximately 32 years in Indonesia. The collapse of the new-order government in 1998 was followed by the emergence of several problems related to the constitutional system and the regional demands. The regional autonomy discourse provides an alternative answer to these issues related to the social and constitutional systems in Indonesia, which are considered “obsolete” and should be changed.

Regional autonomy was put into effect in Indonesia based on the law of decentralization, namely Law No. 22/1999 concerning the *regional government*;

subsequently, it was replaced by Law No. 32/2004 and finally was replaced again by Law No. 23/2014.

Regional autonomy provides an opportunity for the regions to empower their respective regions for the welfare of the people and are given the authority to regulate their own regions. However, this autonomy is not granted for the following five sectors: (a) defense-security, (b) monetary and fiscal, (c) justice, (d) foreign policy, and (e) religion. These five sectors are managed by the central government, and concurrent government affairs are jointly managed between the regional governments (provinces and districts/cities).

The era of autonomy in 1998 in Indonesia gave an opportunity to each region to prioritize its interests. Consequently, several negative symptoms emerged such as the development of primordial sentiments, inter-regional conflicts, conflicts between residents, excessive exploitation of natural resources, and a surge in “regional ego,” regardless of the interests of other nearby areas of interest. The same situation arose for MSW management, especially, regarding the existence of a final facility in a city located in a different area, such as a final disposal facility of Jakarta in the city of Bekasi, Bandung in the city of Cimahi. At that time, often MSW trucks from the city were prohibited from entering a facility’s location without paying a certain fee.

### **3. Law concerning Local Government**

Concerns about the weakening of regional unity prompted the central government to create a regulation to ensure that the negative impacts did not have a counter-productive effect on the ideals of regional autonomy. Hence, the central government implemented inter-regional cooperation arrangements regulated in No. 23/2014 as mentioned above.

Regarding MSW management, the idea of the importance of a shared facility in the form of a regional landfill facility was discussed intensively. In this regard, the components of the collaborative arrangements that were regulated by law are as follows:

- regions can establish cooperation with other regions based on the consideration of efficiency and effectiveness of public services and the occurrence of mutually beneficial synergies;
- in the provision of public services, regions can collaborate with third parties, with the approval of the community through parliament from each of the region involved;
- the collaboration must be based on the existence of a common need among members. Identification of common issues and problems among members is crucial;
- the handling of agreed issues is carried out with the principle of prioritizing shared interests when compared to the interests of each region; the principle of mutual benefit for all parties is a point of concern;
- cooperation is not intended to create uniformity between regions but aims to develop each region in accordance with the potential and conditions of each region;
- the central government and the provincial government are committed to providing support; it can be in the form of funding assistance and providing legislation as a legal basis for cooperation between regions.

Law No. 23/2014 directs that regional governments must cooperate together based on consideration of the efficiency and effectiveness of public services, which can be carried out between local governments with third parties or institutions/local governments abroad. The cost of implementing this cooperation is covered by the state revenue and expenditure budget (*anggaran pendapatan dan belanja negara = APBN*) and regional

revenue and expenditure budget (*anggaran pendapatan dan belanja daerah* = APBD).

Additionally, the central government can provide financial assistance through the central government budget, and the regions can develop a cooperation secretariat. Regional cooperation with third parties includes collaboration in the provision of public services as outlined in cooperation contracts. However, in its development, some of the regional cooperations have failed to meet expectations due to the following reasons:

- often, a collaboration between local governments is treated purely as a formal arrangement;
- collaboration between local government agencies is often formed in response to policy pressure; these policies are usually formulated by central agencies. There are problems that pose hurdles to collaborative efforts, including financing problems and implementation mechanisms.

The cooperation between regions could work well depending on the role of the provincial government to coordinate the districts/cities in their regions. Weak coordination between governments (between the central government, provincial government and district/city government) is one of the reasons that has not been identified as a factor hindering effective collaboration. It is often found that local governments do not consider cooperation between regions as important, and hence it is not considered a policy priority.

To answer the above problems, the government regulation (GR) No. 50/2007 was issued concerning the *procedures for implementing regional cooperation*, followed by regulations passed by the Minister of Home Affairs (MHA). These regulations are as follows:

- Regulation MHA No. 22/2009 concerning the *guidelines for regional technical cooperation*;
- Regulation MHA No. 23/2009 concerning the *guidance and supervision of cooperation between regions*.

The above regulations provide the following insights on the mechanism of cooperation:

- who are the actors involved;
- which areas require collaboration;
- how to determine areas that require collaboration;
- what forms of organizations and monitoring mechanisms must be established to facilitate collaborative efforts?

The regulation-based collaboration is established between the following:

- two provinces;
- provinces and cities/districts;
- two cities/districts;
- provinces and cities/districts;
- provinces and third parties.

The areas of cooperation includes the following:

- development planning and control;
- planning, utilization, and supervision of spatial planning;
- provision of public facilities and infrastructure;
- environmental control;
- investments in administrative services including investments across districts/cities;



- the implementation of other basic services that cannot be implemented by the district/city.

#### **4. Regional cooperation in MSW**

The development of spatial and residential areas, especially, in urban areas results in the construction and operation of municipal solid waste facilities that cannot be handled by the district/city. Often, this scenario leads to regional problems, thereby demanding the intervention of provincial governments.

Law No. 18/2008 concerning the *municipal solid waste management* directs that the following:

- waste has become a national problem, and hence it must be managed comprehensively, integrated from upstream to downstream to provide economic benefits, healthy for the community, and safe for the environment, and change people's behavior;
- local governments can collaborate with other regional governments through the cooperation arrangements and/or establish joint waste management business;
- district/city governments can individually or jointly enter into a partnership cooperation agreement with business entities for developing and implementing waste management solutions;
- waste has become a national problem so that its management needs to be carried out comprehensively and integrated from upstream to downstream in order to provide economic benefits, be healthy for the community, and be safe for the environment, and can change people's behavior;
- local governments can work together with other regional governments in the form of cooperation and/or the creation of joint waste management business;

- district/city governments individually or jointly can develop a partnership cooperation with business entities in the development and implementation of waste management, outlined in the form of an agreement.

GR No. 81/2012 further states that a district/city that executes joint waste management and requires cross district/city waste transportation can propose the provincial government to provide intermediate stations facility (SPA) and transportation facility. The Minister of Public Works Regulation No. 03/PRT/M/2013 directs that in the case of a cooperation agreement for handling cross district/city waste handling, the provincial government can provide and operate the final disposal facility (landfill).

Cooperation between districts/cities, as part of regional autonomy, aims to accelerate the realization of people's welfare goals by improving services and community empowerment. Some problems that pose obstacles to achieving the objectives of regional autonomy are low quality of public services, unclear service standards, and low service accountability. One of the efforts of the district/city government to overcome this problem is to establish cooperation with other regions for the provision and optimization of public services.

The first regional MSW management facility (Suwung regional landfill) was developed in the early 2000s as a result of the agreement between Denpasar city, Badung district, Gianyar district, and Tabanan district in Bali. This was followed by the regional cooperation with the Piyungan regional landfill for the final disposal of waste; this cooperation was named as Kartamantul (Yogyakarta city, Sleman district, and Bantul district).

The management of MSW between regional governments can be witnessed through the regional cooperation on waste management in West Java; it is not only related to regional waste management but also involves the role of planning, construction, and operation of waste processing facilities that function as intermediate treatment and final disposal facilities (see point 5: *Regional cooperation in MSW - West of Java Province*).

The regional cooperation facilities for waste management run by each local government include the following:

1. Makassar metropolitan area (Mamminasata regional cooperation):
  - a pilot project for integrated spatial planning development initiated through the President Decree No. 55/2011 for the integration of infrastructure, including MSW management;
  - a detailed engineering design (DED) for regional landfill (with JICA) was implemented, but the construction was cancelled due to site disapproval by the new Head of a district.
2. The metropolitan of Semarang (central of Java province).
3. West Sumatera regional waste management through GR No. 8/2018.

### **Regional treatment and final disposal of MSW at Sarbagita:**

The first regional waste management cooperation in Indonesia was established in the Denpasar area in 2001. The Denpasar city and the districts of Badung, Gianyar, and Tabanan established an agency called Sarbagita to administer MSW within these areas. It is quite common in Indonesia that an agreement for joint activity is formalized by creating an acronym to represent the names of the districts/cities. Sarbagita is an acronym of the following four cooperating districts/cities:

- Sar: taken from the city Denpasar,
- Ba: taken from the district Badung,
- Gi: taken from the district Gianyar, and
- Ta: taken from the district Tabanan.

The Sarbagita inter-governmental cooperation was established for developing the infrastructure for MSW management, wastewater treatment, clean water, and the provision of regional transportation. The factors that encouraged this association were that the landfills used in the city/district were nearing their full capacities and it was difficult to find new land, because it competes with other facilities to support tourism. One of the largest landfills used was the Suwung landfill.

The legal basis for forming the cooperation was the Law No. 22/1999 concerning *regional government*. A joint regulation was developed in July 24, 2000 for the regional governments involved in Sarbagita; subsequently, an organization named as the *agency for cleanliness cooperation Sarbagita (BPKS = Badan kerjasama pengelola kebersihan Sarbagita)* was formed based on the joint agreement among the head of districts regents/mayor at the Sarbagita area on April 16, 2001, assisted by the governor of Bali. BPKS-Sarbagita is a non-structural institution. The financing budget is agreed based on the share of each local government involved.

The main agenda of the cooperation was to decide the location for the joint regional integrated waste processing installation (IPST = *Instalasi pengolah sampah terpadu*), development of partnerships with third parties or the private sector in the development of IPST, and action program to rehabilitate the conditions of the Suwung landfill.

BPKS-Sarbagita has the duty to invite and determine prospective investors to develop the IPST. In March 2004, an Indonesian private company partnered with a company from the United Kingdom to present a feasibility study to BPKS-Sarbagita on the introduction of GALFAD at the Suwung landfill. GALFAD is the abbreviation for gasification, landfill gas, and anaerobic digestion. The groundbreaking of the project was done in May 2004. About 85% of this site (around 39 Ha) was covered by MSW. This consortium has been allocated 10 Ha, and 6.7 Ha of this land will be used for GALFAD installations.

This consortium was selected as the partner of the Sarbagita regional government for managing IPST by using technology that would convert new and old MSW into electricity that can be sold to the national electricity enterprise (PLN = *perusahaan listrik negara*). First, the consortium was given a concession in part of the Suwung landfill area to prepare the facilities and infrastructure needed and use biogas from the old stockpiles (landfill) as the electricity source connected to the PLN. In 2005, the official opening of the project took place at the Suwung landfill site. The operations of the Sarbagita project began on December 2007 with biogas recovery activity from the old landfill in the concession area, while BPKS-Sarbagita still managed a large portion of the land.

The partnership between the Sarbagita regional government and the consortium was on a build own and operate (BOO) basis. The obligation of the Sarbagita regional government in this partnership was to provide waste of at least 500 tonnes/day and land for the development of the IPST.

Until June 2016, the IPST Sarbagita facility was unable to handle the incoming waste. It only managed the biogas recovery captured from the old landfill in its concession area. The agreement between the Sarbagita government and the consortium obliged the latter

to manage all the incoming waste in the Suwung landfill and generate 9 MW of electricity. During its operation from 2007 to June 2016, this consortium could generate only 0.86 MW of electricity.

The consortium failed to manage waste that was to serve as a source of electrical energy. Some IPST facilities that have been built are waste sorting and biodigester units. It seems that this consortium failed to assess financial feasibility because this cooperation was based on a “*no tipping fee*” arrangement. This consortium relied only on biogas from landfills that can be sold to PLN and the clean development mechanism (CDM) fund. Finally, the Sarbagita regional government officially terminated the cooperation contract on June 2016.

The consortium had requested for funding assistance (tipping fee), but it was rejected by the Sarbagita regional government because of the no tipping clause in the agreement; all financing activities from the construction and management of the IPST project were to be borne by the consortium.

### **Regional final disposal of MSW at Kartamantul:**

Kartamantul is the cooperation among three out of the five districts in the province of Yogyakarta. Kartamantul is an acronym for the following three cooperating cities/districts:

- Karta (taken from the city **Yogyakarta**),
- Man (taken from the district **Sleman**), and
- Tul (taken from the district of **Bantul**).

The idea of inter-local cooperation was initiated in 2003. However, as in the case of other schemes of cooperation, the operation of this cooperation met with delays.

The province of Yogyakarta is a special region that inherits a sultanate kingdom. It only consists of one city and four districts under its jurisdiction. Historically, the districts under the Yogyakarta province's governance are accustomed to close collaborations, and these efforts are coordinated by the provincial government. The integrated approach has also been applied for tackling various issues. Open discussions among the policy makers have been conducted frequently before the initiation of the idea of establishing Kartamantul's joint secretariat. The existence of the sultanate contributes toward maintaining this collaborative spirit from: a city with less than 250,000 population in the 1970s, Yogyakarta has become an urban agglomeration with a population of 1.2 million. The city has spilled over onto the neighboring regencies, five sub-districts in Sleman, and three sub-districts in Bantul.

In the past, the urban infrastructure management in the three local governments forming the Yogyakarta metropolitan was coordinated and handled by the provincial government. However, this has not been the case under the new laws on decentralization since 1999 (Law No. 23/2014).

In 2001, the authorities in the three districts agreed to initiate an effort of cooperation on MSW management, particularly, for the management of the joint landfill site of Piyungan. Initially, the scheme for the cooperative agreement among the three districts of Kartamantul consisted of the following seven areas of cooperation: spatial integrated planning, transportation and road management, drainage, water resource management, solid waste management, and sewerage system. The three heads of regions agreed to form the so-called the *sekretariat bersama* (joint secretariat) of Kartamantul. Of the

aforestated areas, only two areas of the cooperation proved to be effective under the Kartamantul management, namely transportation management and MSW management.

The establishment of the Kartamantul joint secretariat aimed to harmonize the development and management of urban infrastructure initiated by the three local governments. The authorities agreed to enhance the coordination for planning, implementation, monitoring, and evaluation of the urban infrastructure covering the urban agglomeration of Yogyakarta. The cooperation also aims to promote the efficient usage of the three local governments' resources and the optimization of development for enhancing people's welfare in the metropolitan area.

The joint secretariat structure consists of three levels of management. The highest level consists of the mayor of Yogyakarta city, the head of Sleman district and the head of Bantul district. At the second level, the management consists of high rank bureaucrats, such as the secretary of the local government, the head of the planning board, the head of the treasury department, and the heads of other relevant technical units of the local government. The lowest level consists of lower ranking bureaucrats who work at either an implementation or technical level. There was no hierarchical relationship between the provincial and the local governments.

Yogyakarta city generates almost 80% of the total MSW and commits to allocating 80% of the operational costs of the Piyungan landfill site. Accordingly, the remaining operational costs are shared by the Sleman district government (14%) and the Bantul district government (6%).

The idea of establishing a joint secretariat proved to be an important step toward developing cross-border initiatives. The Kartamantul joint secretariat has been found



effective in coordinating and managing solid waste and wastewater infrastructure development. Several key success factors of this joint secretariat are as follows:

- the collective horizontal decision-making process;
- the transparency in the negotiation process among the local governments involved;
- the leadership and shared vision of all the heads of the local governments in the region;
- the shared vision of the heads of the involved local governments.

### **5. Regional cooperation of MSW handling at West Java Province**

The West Java province began the implementation of regional MSW management in 2006 with the operation of the Sarimukti regional landfill. The discussion about the form of regional MSW management institutions in the province of West Java has been carried out since 2002. By the assistance of the central government, the regional MSW management programs for the West Java province was prepared through the *western java environmental management program* (WJEMP). Two WJEMP programs are mainly related to the following final disposal (landfill) locations:

1. DKI Jakarta and Jabodetabek areas in the West Java province (Bogor district, Bogor city, Depok city, Tangerang district, Tangerang city, Bekasi district, and Bekasi city), as per the study of the *jabodetabek waste management corporation* (JWMC).
2. The greater Bandung area includes Bandung district (subsequently, the district was divided into two districts, namely Bandung district and West Bandung district), Bandung city, Cimahi city, a part of Garut district, and a part of Sumedang district, as per a study of the *greater Bandung waste management corporation* (GBWMC).

The study on the formation of JWMC did not get a consensus from the DKI Jakarta Province and the regions located in the West Java province. Subsequently, the West Java provincial government followed up by drafting an understanding of regional waste management in Bogor district, Bogor city, and Depok city. An agreement was reached in 2009 regarding regional MSW management in that region; the draft also identified the location of the shared final disposal facilities in the Nambo village, Klapanunggal sub-district, Bogor district.

The GBWMC study was brought to fruition by the West Java provincial government; in 2009, it set up regional waste management facilities in Bandung district, West Bandung district, Sumedang district, Garut district, Bandung city, and Cimahi city and reached an agreement to manage waste regionally. The agreed shared final disposal location is located in Legok Nangka (Ciherang village and Nagreg village) at Nagreg, Bandung district. As described above, the regional MSW management development in West Java is the result of a long process that began in 2002. The Bandung metropolitan area faces a waste problem, with the Leuwigajah landfill sliding in February 2005; some of the regions, especially, the Bandung and Cimahi cities, also experienced emergency MSW conditions. The emergency waste condition in the Bandung metropolitan area emphasizes the need to accelerate efforts to realize the GBWMC study.

The West Java provincial government seeks to overcome this problem by finding land to replace the Leuwigajah landfill. In May 2005, the West Java provincial government assisted by the *Indonesia forestry enterprise* (Perhutani = *perusahaan perhutanan Indonesia*) provided a forest area located in Sarimukti village (called TPK-

Sarimukti), West Bandung district (TPK = *tempat pengolahan kompos* = *facility for compost treatment*).

Initially, the TPK-Sarimukti was managed by the city of Bandung. However, concurrent to the application of Law No. 32/2004 (replaced by Law No. 23/2014) concerning *regional government*, the Bandung city's government faced a problem that the location of the Sarimukti site was located in the West Bandung district and was not an asset of the Bandung city government. To overcome this issue, the West Java provincial government established the *operational management unit* (UPO = *unit pengelolaan operasi*) of Sarimukti landfill site, which was later strengthened by the West Java governor regulation No. 31/2007 concerning the *establishment of the west java waste management center* (P3JB = *pusat pengelolaan persampahan Jawa barat*), as a non-structural institution; however, the unit was granted operational authority on the basis of West Java province's funding sources (APBD).

Such non-structural institutions do not have a clear organizational hierarchy, personnel administration, and sufficient finance. Therefore, in 2009, a replacement institution was created, based on the West Java GR No. 113/2009 concerning the *regional waste management center* (BPSR = *badan pengelola sampah regional*), as a structural institution under the settlement and housing division of the West Java province. The operational financing mechanism of the new institution is as follows:

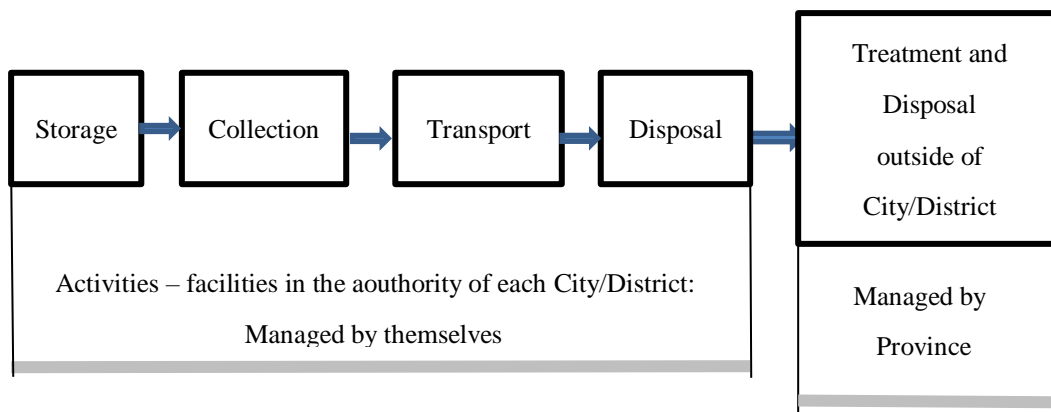
- central government budget (APBN) for basic infrastructure through the Ministry of Public Works;
- Province governmental budget (APBD) for supporting operational facilities;

- the private sector for waste treatment facilities that use certain technology through a mechanism of private partnership participation (PPP);
- operational and maintenance costs are sourced from the West Java provincial government and related district/city governments, which are regulated through cooperation agreements between regions.

The following main tasks and functions of the BPSR are regulated in West Java GR No. 46/ 2010 concerning the *BPSR's main tasks, functions, and task details*, among others:

- compile a work program;
- compile regional waste management technical instructions, especially related to the regional integrated treatment and disposal facility (TPPAS = *tempat pengolahan pemrosesan akhir sampah*) operational services;
- manage the regional TPPAS of the Bandung metropolitan area, Bogor, and Depok, construct and procure facilities and infrastructure, undertake maintenance of facilities, and monitor environmental impacts;
- organize cooperation and partnerships with the private sector and the community;
- coordinate with relevant agencies.

The scope of regional waste management services organized by the West Java provincial government includes the management of TPPAS that is used jointly by the city/district government, as shown in the following Figure.



**Figure 7-2.** Responsibility of local governments in MSW handling  
[modified from Ref 3]

The TPK-Sarimukti TPK was an emergency landfill that has been operated to overcome waste problems in the Metropolitan Bandung, especially Bandung city, Cimahi city, and a part of Bandung district after the Leuwigajah landfill landslide in February 2005, located in Sarimukti village, Cipatat sub-district, West Bandung, about 42 km from Bandung city.

The TPK-Sarimukti uses a land area of 25.2 Ha consisting of forest area; this usage is based on a cooperation with Perhutani regional of West Java and Banten division covering an area of around 21.2 Ha and an additional area of  $\pm 4$  Ha, which was released by the governments of Bandung city and Cimahi City. TPK-Sarimukti was used in May 2006 without any planning and construction of facilities and infrastructure to meet the operational requirements of proper sanitation for landfills.

Although at the beginning of its establishment, this facility was intended to process waste from the Bandung metropolitan area with the composting process, however, during its implementation, most of the MSW entering this facility was handled by landfilling. This landfill is a controlled landfill, which does not have a daily soil cover. The composting process has only reached  $\pm 4$  tonnes/day due to various technical reasons.

The funding for the infrastructure and facilities for processing and final processing of waste in the TPK-Sarimukti built in 2006 came from the central government budget, the West Java provincial budget, and the district/city APBD that used the TPK-Sarimukti. This facility is estimated to reach its full capacity in 2023, and hence the Bandung metropolitan area should prepare a new site for handling its waste.

Based on the governor's regulation, the scope of tasks of BPSR, which was restricted to composting and Sarimukti landfill, was extended for including planning, construction, and operation in the following locations:

1. Development of the TPPAS Nambo for the Bogor-Depok region (Bogor city, Depok city, and Bogor district).
2. Development of the TPPAS Legok Nangka for the Bandung metropolitan area (Bandung city, Cimahi city, Bandung district, West Bandung district, Garut district, and Sumedang district).

Along with overcoming the difficulty of obtaining a landfill site, especially in urban areas, other areas that are proposed to be served by TPPAS Regional are as follows:

- Cirebon Metropolitan area (called: Ciayumajakuning): Cirebon city, Cirebon district, Indramayu district, Majalengka district, and Kuningan district,
- Bekasi and surrounding areas (called: Bekarpur): Bekasi city, Bekasi district, Karawang district and Purwakarta district.

## **6. Regional facility of Waste-to-Energy development in West Java Province**

As a result of the landslide of the Leuwigajah landfill in 2005, the city of Bandung had difficulty dealing with its MSW. In 2007, the city of Bandung decided to use the waste-to-energy (WtE) technology to process its MSW. This technology will be developed in

the Bandung authority to reduce transportation costs. The city of Bandung conducted a study on MSW composition and its characteristics, a pre-feasibility study, and an analysis of environmental impacts; it also conducted a ‘beauty contest’ to decide the private company that will build and operate the facility. The winner was a joint consortium of a national company and companies from China. However, the development of this facility was hampered, owing to site disapproval the community that owned the location. The issue became severe due to the cancellation of contracts by the Court on the grounds of the lack of transparency in the selection of a prospective investor. However, through the GBWMC project, as described above, the West Java province gradually succeeded in formulating a regional facility development plan—the Legok Nangka TPPAS—to serve five cities/districts in the Bandung metropolitan area. The city of Bandung was also chosen as one of the cities among the 12 cities in Indonesia in 2016, which received attention from the central government for the WtE development acceleration program.

The MSW management facility is one of the most important infrastructures in the urban area. Infrastructure development is needed to accelerate economic growth, improve social welfare, and provide better public services. To accelerate the process of better waste management in the cities, the central government of Indonesia (GoI) decided to accelerate the handling of waste using thermal waste processing technology through the President Regulation (PR) No. 18/2016. Seven cities, one of which was the city of Bandung, were appointed to receive assistance from the central government in the form of accelerating the construction of the WtE facility. However, this PR 18/2016 was annulled by the Indonesian Supreme Court, following a request by 15 individuals and 6 NGOs on July 19, 2016. Through PR No. 58/2017, the GoI decided to accelerate the

*national strategic projects* implemented by the central government. One of the projects among them was *WtE development* using thermal process. According to PR No. 38/2015 in the *cooperation between government and business entities in infrastructure*, the development of such projects must be implemented through the public-private partnership (PPP) scheme. In 2018, the President of Indonesia enacted new regulation to replace PR No. 18/2016—a program to accelerate the development of the WtE program through PR No. 35/2018. Under this regulation, the Central government selected 12 cities, including the Bandung metropolitan area (not only city of Bandung), and the West Java Province's government was given the responsibility of the program's execution. This facility is located in Legok Nangka village, as mentioned above.

#### **Regional treatment and final disposal of MSW at Legok Nangka:**

The operation of the Legok Nangka TPPAS would entail considerable delay. The tender preparation is based on best practices. This is because it is supported by regulations prepared by the central government, such as an understanding of the PPP approach that supports the issuance of PR no. 18/2018. The pre-feasibility study has been carried out better than that for Nambo TPPAS, by inviting foreign consultants to participate in the pre-feasibility study. These steps can be used as a reference for other cities that are preparing a study on WtE development.

The six districts/cities in the Bandung metropolitan area already have local regulations that support MSW management in accordance with established norms, standards, procedures, and criteria. The MSW management mandated in Law No. 18/2008 has been used as the basic reference to the district/city regulations as follows:

1. Bandung city regulation No. 9/2011.



2. Cimahi city regulation No. 16/2011
3. Bandung district regulation No. 21/2009.
4. West Bandung district regulation No. 12/2011.
5. Garut district regulation No. 4/2014.
6. Sumedang district regulation No. 2/2014.

In this cooperation, districts/cities in the Bandung area act as users who will use the Legok Nangka TPPAS facility as a means to dispose and process the MSW generated daily by their respective regions. The private sector is the third party, which will process the MSW that enters the Legok Nangka TPPAS.

Districts/cities in Bandung area in collaboration act as users who will use the Legok Nangka TPPAS facility as a means to dispose of and process the MSW generated by their respective regions every day. The third party involved is the private sector which will act as the operator carrying out the waste processing process that enters the TPPAS Legok Nangka.

The West Java province developed the Legok Nangka TPPAS through a regional cooperation signed on April 8, 2014 between the West Java provincial government and local governments of Bandung city, Cimahi city, Bandung district, West Bandung district, Sumedang district, and Garut district. Land for the Legok Nangka TPPAS is owned by the government of West Java province. Basic infrastructure and facilities that have been built include access and operating roads, offices, registration posts, gates, surrounding fences, sites for WtE facilities, and landfilling areas. The construction cost mostly was covered by central government budget. The area that has been acquired spans across 75

Ha, including 20 Ha for processing facilities. The landfill cell facilities are built on 5 Ha. The technology selected for waste processing will be based on the thermal technology.

According to the agreement, the capacity of MSW to be transported to this facility is as follows (920–2,180 tpd):

1. Bandung city: 500–1,200 tpd.
2. Cimahi city: 150 – 250 tpd.
3. Bandung district: 100 – 300 tpd.
4. West Bandung: 50-200 tpd.
5. Sumedang district: 20-30 tpd.
6. Garut district: 100 – 200 tpd.

The status and progress of TPPAS Legok Nangka after 3 years of site preparation, based on the Central and Province's budget, are as follows:

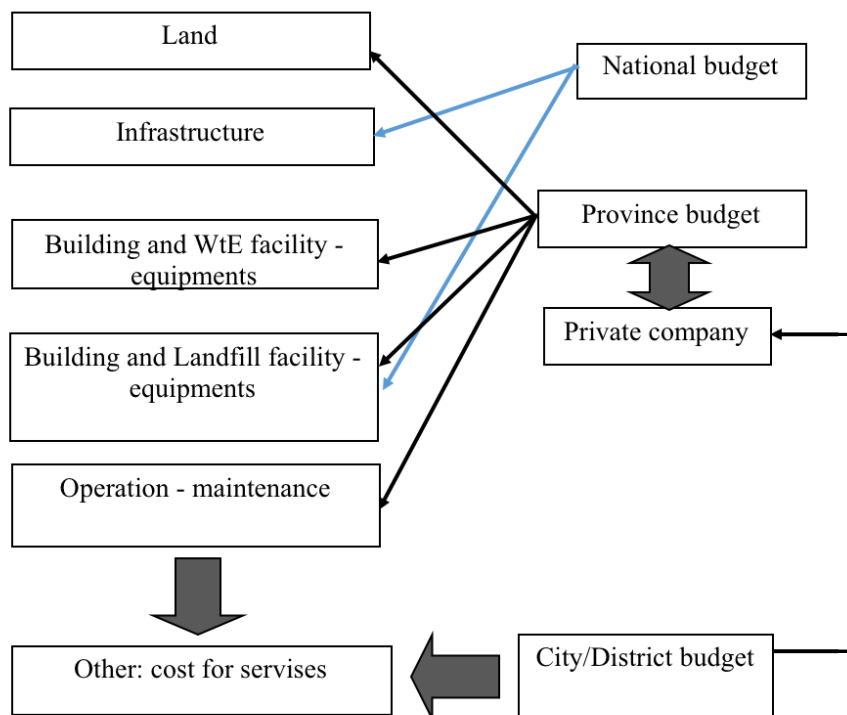
- Capacity: 1,820 tpd;
- Investment: USD 245-mi;
- Technology: thermal process;
- Pre-feasibility study by PwC and final business-case by JICA;
- Developer: Tender document is ready to be published; scheme: PPP;
- Output electricity estimation (per-1,000 t): 21-29 MW.

Concerning the collaboration of regional facilities for waste management, West Java Province issued a Regional Regulation No. 12/2010:

- concerning the authority of the provincial government in managing waste management in cross-local governments, including facilitating regional cooperation and carrying out regional TPPAS operation;

- the province’s government will determine the location of the regional TPPAS through a joint agreement;
- the management of regional TPPAS is carried out through cooperation between regions; the district/city governments must provide a budget for compensation services.

The following figure illustrates the financing responsibilities of the parties in the development of TPPAS Legok Nangka.



**Figure 7-3.** Financing responsibility for TPPAS Legok Nangka [Ref. 3]

The funding scheme for the construction of the Legok Nangka TPPAS is divided into the following three areas:

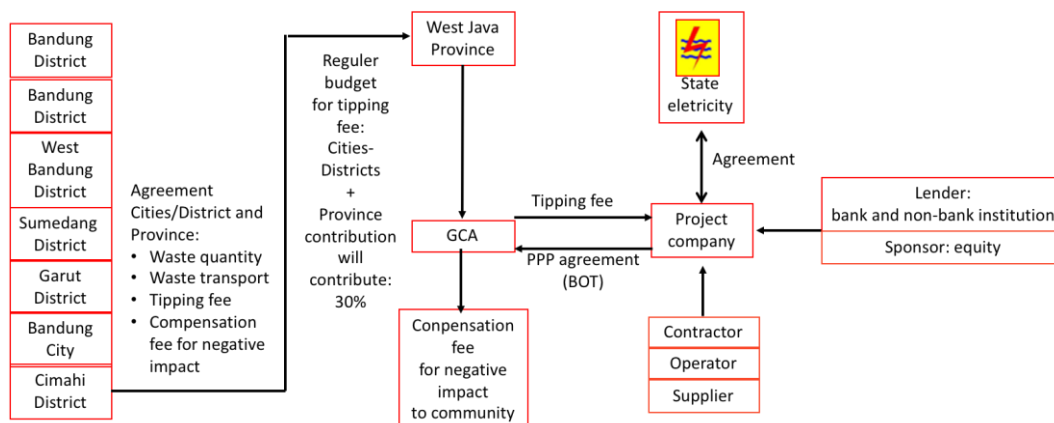
1. State Revenue and Expenditure Budget (APBN) from the Central Government: investment costs for Legok Nangka TPPAS are sourced from the APBN and APBD.

The sources of the APBN will fund the physical construction of the TPPAS infrastructure (access roads and operating roads), buildings, and final processing equipment (sanitary landfills).

2. Regional Revenue and Expenditure Budget (APBD) of West Java Province: the investment costs originating from the West Java Provincial Budget will fund the process of procuring 74.6 hectares of land and the licensing process. The West Java Provincial Budget will also be used to finance physical development; it will include the construction of buildings; the procurement of processing equipment and final processing equipment (sanitary landfills); and the construction of registration posts, gates, weighbridges, concrete fences. In the future, the West Java Provincial budget will also be used to provide financial subsidy for the routine operations and maintenance of TPPAS every day in partnership with the private sector.
3. City/District Revenue and Expenditure Budget (APBD): based on the Cooperation Agreement, it was agreed that the Service Compensation (KJP) as well as the Negative Impact Compensation (KDN), will be paid by the district/city that transports the MSW to the Legok Nangka TPPAS. The KJP value originating from the district/city will also be used to finance the operation and maintenance of the Legok Nangka TPPAS.

In 2016, the amount of service compensation (KJP) was calculated based on the operational and maintenance costs amounting to Rp 67,097,010,000. This amount is divided by the amount of waste, averaging 1,500 tonnes/day, which was transported to Legok Nangka TPPAS. This calculation ensures that the mandated average waste equates the KJP value of Rp 122,552, which is rounded up to Rp 123,000/tonnes. Based on the

2018 pre-feasibility Study, the latest calculation shows that the amount of KJP increases to Rp. 386,000/tonnes and the subsidy from the Provincial Government will be 30%.



**Figure 7-4.** Scheme cooperation for WtE developmen in TPPAS Legok Nangka  
[Ref. 11]

The Nambo WtE Project is not related to PR No. 18/2018; it was purely the initiative of West Java Province. As explained above, the Nambo TPPAS program began in 2002 through the JWMC project. This project was accelerated because the city of Depok and the city of Bogor had difficulty in providing landfill, and hence it was important to find a solution immediately.

The cooperation agreement for the management of the Nambo Regional TPPAS was established on August 18, 2014 among the following parties:

1. Government of West Java Province
2. Bogor Regency Government: No. 050/104/PKS/Huk/2014.
3. Bogor City: No. 119/6/VIII/PRJN/KS/2014).
4. City of Depok Depok: No. 658.1/71/Otdaksm.

The collaboration was made for the development and operation of regional treatment and final MSW handling facilities in the city/district. The land allocated for the Nambo

TPPAS is a state forest area, which is under the management of the Indonesia Forest Enterprise (Perum Perhutani). It is necessary permission to use this area. The plan to develop Nambo TPPAS is a solution to the problem of limited landfill land for handling waste in the area.

Nambo TPPAS is located on an area covering 55 Ha; it is located in Lulut and Nambo villages, Kalapa Nunggal sub-district, Bogor Regency. TPPAS Nambo is located adjacent to the cement industrial area in Bogor Regency; this location ensures that the refuse-derived fuel (RDF) products from this facility can be used by the cement factory.

In the cooperation agreement, it was stated that the maximum MSW processing capacity at TPPAS Nambo is 1,700 tpd, namely:

- Depok City: 300-500 tpd;
- Bogor City: 450-600 tpd;
- Bogor Regency: 400-600 tpd.

According to financial analysis, the cost to be paid by each city/district would be compensation for services worth Rp. 126,000/tonne of garbage transported (10% for compensation of negative impacts).

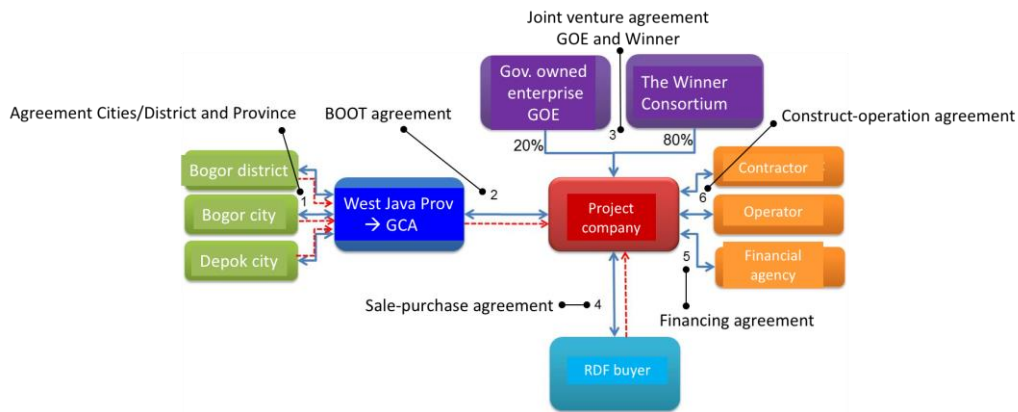
The Nambo TPPAS plans to carry out processing and final processing of MSW with activities including the following:

- sorting of non-organic waste that still has a sale value;
- processing of organic waste to be processed into compost;
- processing of combustible waste into RDF; and
- final processing of waste residue with sanitary landfills.

The handling of waste to be carried out at TPPAS Nambo is largely the responsibility of third parties or private parties who will carry out development as well as operations based on waste management. The main product expected from MSW processing at Nambo TPPAS is RDF, with a target to use 80% of the total incoming waste, which will be sold to the cement industry around the site as co-fuel for coal. About 10% of the organic waste entering this facility will be turned into compost and, according to the agreement, will be given to Perhutani (Indonesia state forest enterprise). The remainder will be considered residue that will be discharged in landfill at that location, which will be operated by BPSR.

Based on the above cooperation agreement, the capacity of the final waste processing and processing plant at the Nambo Regional TPPAS is planned to be 1,700 tpd; it will use waste processing technology to generate RDF alternatives, perform composting, and run a sanitary landfill operating system for final processing of waste processing residues. The final waste processing and processing process is planned to operate for 25-30 years. The operation of RDF technology will be handed over to the private sector through a cooperation mechanism to procure business entities (investment auctions).

Until now, the construction of the operational and supporting facilities and infrastructure at Nambo TPPAS has reached completion, including access roads and operations, fences, gates, guard houses, sanitary landfill cells, drainage, and leachate processing installations, which are built using the West Java provincial government budget. The development of the Nambo Regional TPPAS has long been planned by the West Java Provincial Government, and its groundbreaking development was carried out on December 21, 2018, involving an agreement between a regional-owned enterprise and Korean consortium.



**Figure 7-5.** Scheme for cooperation for WtE development in TPPAS Nambo

[Ref 12]

## 7. List of Abbreviation

APBN	State revenue and expendirure budget
APBD	Regional revenue and expenditure budget
BAPPENAS	National development planning agency
BOO	Build-operate-own
BOT	Build-operate-transfer
BPKS Sarbagita	Agency for cleanliness cooperation Sarbagita
BPSR	Agency for regional waste management
BUMD	Regional owned enterprise
BUMN	National owned enterprise
DED	Detailed engineering design
DKI Jakarta	Special capital region of Jakarta
GALFAD	Gasification-landfill-and-anaerobic digestion
GCA	Government contracting agency
GBWMC	Greater Bandung waste management corporation
GOE	Government owned enterprise
GHG	Greenhouse gases
GR	Government regulation
Ha	Hectare



IPST	Integrated waste treatment facility
Jabodetabek	Jakarta-Bogor-Depok-Tangerang-Bekasi
JICA	Japan international cooperation agency
JMWC	Jabodetabek waste management corporation
Kartamantul	Yogyakarta-Sleman-Bantul
KDN	Negative impact compensation fee
KJP	Services compensation fee
MHA	Ministry of Home Affair
MEF	Ministry of Environment and Forestry
MPWH	Ministry of Public Works and Housing
MRF	Material recovery facility
MSW	Municipal solid waste
No.	Number
NGO	Non governmental organization
GoI	Government of Indonesia
P3JB	Center for waste management of West Java
Perhutani	Indonesia state forest enterprise
PLN	State electricity enterprise
PMA	Foreign capital investment
PPP	Private partnership participation
Rp.	Rupiah (Indonesian currency)
RDF	Refuse derived fuel
Sarbagita	Denpasar-Badung-Gianyar-Tabanan
SNI	Indonesia national standard
SPA	Intermediate treatment facility
TPA	Final disposal site
tpd	Tonne-per-day
TPK	Composting processing site
TPPAS	Integrated waste treatment facility
TPS	Transfer point for MSW
TPS-3R	Transfer point for MSW with recycling activity
UPO	Unit operational management
UPT	Unit technical operation
WJEMP	Western java environmental management program
WtE	Waste-to-energy

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