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Regional Waste Management – Inter-municipal Cooperation and Public and Private Partnership

Edited By

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ERIA

Regional Waste Management –

Inter-municipal Cooperation and Public and Private Partnership

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Preface

This report is the outcome of a Collaborative Research Project between the Economic Research Institute for ASEAN and East Asia (ERIA) and the Institute of Developing Economies, Japan External Trade Organization (IDE–JETRO), titled 'Regional Waste Management – Inter-municipal Cooperation and Public and Private Partnership'.

Most of the Association of Southeast Asian Nations (ASEAN) countries are facing challenges to improve waste management. Traditionally, urban areas had been the main target of waste management, to prevent the spread of infectious waste. The COVID-19 pandemic has demonstrated the importance of collection and proper treatment of not only clinical waste, but also municipal solid waste, which may contain infectious waste. ASEAN countries have also experienced air and water pollution from open dumping sites and incineration plants without pollution control. Such pollution has resulted in residents opposing the construction and operation of waste treatment and disposal facilities.

Recently, the marine plastic debris issue has moved to the top of the agenda in the negotiations on global environmental problems. Southeast Asian countries are regarded as major sources of marine plastic debris. To prevent leakage of plastic waste into the ocean, governments should provide waste collection services not only in urban area, but also in rural areas. In addition, collected waste should be treated and disposed properly. Even if waste is collected, without pollution control plastic waste and microplastics may leak from dumping sites.

Some waste treatment and disposal technologies, including sanitary landfills and waste-to-energy plants, exhibit economies of scale. To achieve economies of scale in waste management, each country should consider introducing regional waste management schemes, in which municipalities jointly use waste treatment and disposal facilities.

This report reviews efforts on regional waste management in Asian countries, especially Japan, the Philippines, Indonesia, and Thailand.

In the course of this project, we conducted interviews and site visits in several countries. In addition, we organised two seminars in Indonesia and Thailand, and had discussions with various stakeholders from central and local governments and private companies, and experts, researchers, and others. We would like to express our special thanks to the stakeholders, especially the co-organisers of the seminars – the Ministry of Environment and Forestry of Indonesia, the Department of Local Administration of the Ministry of Interior in Thailand, the National Municipal League of Thailand, the Solid Waste Management Association of Thailand, and the Faculty of Environment Management of Prince of Songkhla University. We would also like to thank the Ministry of Environment, Japan for the financial contribution to ERIA's research projects on recycling and waste management, including this project.

We hope this report will contribute to some initiatives on regional waste management in the region.

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3Rs	reduce, reuse, recycle
AIC	Akaike Information Criterion
APBD	regional revenue and expenditure budget
APBN	central government budget and expenditure
ASEAN	Association of Southeast Asian Nations
BOO	build–own–operate
BOT	build–operate–transfer
BPSR	Agency for Regional Waste Management
BTO	build–transfer–operate
DBO	design–build–operate
DENR	Department of Environment and Natural Resources
EFAS	External Factors Analysis
EMB	Environmental Management Bureau
EWSM	Ecological Solid Waste Management Board
IFAS	Internal Factors Analysis
IFLS	Indonesian Family Life Survey
IMC	inter-municipal cooperation
KDN	negative impact compensation fee
KJP	service compensation fee
LAL	Local Autonomy Law
LAO	local administrative organisation
LGU	local government unit
MIC	Ministry of Internal Affairs and Communications
MOA	memorandum of agreement
MOE	Ministry of the Environment
MRF	materials recovery facility
MSW	municipal solid waste
NIMBY	Not in My Back Yard
NSWMC	National Solid Waste Management Commission
OECD	Organisation for Economic Co-operation and Development
OLS	ordinary least squares
PAA	partial affairs association
PERHUTANI	Indonesia State Forest Enterprise
PFI	private finance initiatives
PPP	public–private partnership
RA	Republic Act
RDF	refuse-derived fuel

RWM	regional waste management
SLF	sanitary landfill
SWOT	strengths, weaknesses, opportunities, threats
TAO	*Tambon* administrative organisation
TIEZA	Tourism Infrastructure and Enterprise Zone Authority
TPA	final disposal site
TPPAS	waste treatment and final processing site
US	United States
WTE	waste-to-energy
WU	wider-area union

Chapter 1

Regional Waste Management in Asia

Michikazu Kojima[1]

Abstract

Most Southeast Asian countries are struggling to improve their waste management systems. They have enacted and refined laws on waste management, formulating action plans and roadmaps in the process. Although some improvements have been made, the progress is still nowhere near sufficient. The reason behind the insufficient management can be attributed to a lack of appropriate legislation, insufficient government funding, lack of appropriate infrastructure, and lack of technical capacity, amongst other factors.

With these efforts to improve municipal management in Southeast Asia, the importance of regional waste management is starting to be recognised. In Indonesia, some local governments have initiated a regional waste management scheme under financial support from the Clean Development Mechanism, which is a scheme under the United Nations Framework Convention for Climate Change. The Department of Local Administration in the Ministry of Interior of Thailand has also issued a waste management clustering policy. Some regional waste management schemes have been established in areas such as Phuket, Nonthaburi, Koen Kane, and others. But there is a gap between existing schemes in Southeast Asian countries and possible schemes for regional waste management. The benefits and challenges of a regional approach to municipal solid waste management in selected Asian countries are briefly discussed. In addition, in a few Southeast Asian countries, regional *de facto* waste management schemes initiated by private companies are also observed. Such private initiatives are also discussed.

Keywords: municipal solid waste management, regionalisation, inter-municipal cooperation, public–private partnerships (PPPs)

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1.1. Introduction

Most Southeast Asian countries are struggling to improve their waste management systems. The Philippines enacted the Ecological Solid Waste Management Act in 2001 after the collapse of the Payatas garbage dump in July 2000. This act required local governments to close open dumpsites within 3 years and controlled dumpsites by 2006 so that sanitary landfill sites can be used. However, the National Solid Waste Management Status Report (Department of Environment and Natural Resource, 2015) pointed out that 523 open dumpsites and 317 controlled sites still existed in 2014. On the other hand, only 86 sanitary landfill sites operated in the same year. Thailand put some effort into improving solid waste management, but the country needs to make a greater effort to improve its waste management schemes. According to Thailand's Pollution Control Department (2019), 27.8 million tons of municipal solid waste were generated in 2018. Amongst them, 10.9 million tons (39.1%) of waste were disposed of properly, 9.48 million tons (34.4%) of waste were utilised, whilst 7.4 million tons (26.5%) were disposed of improperly. This figure is a significant decrease in the volume of improper disposal from the 14.3-million-ton figure in 2009. Other Asian developing countries face similar challenges.

To improve waste management, governments should spend enough budget to collect, treat, and dispose of waste. But developing countries may have other priorities, such as infrastructure development in roads, water supply systems, and electricity supply systems. The United Nations Environment Programme (UNEP, 2015) regards the affordability limit for the total cost of solid waste management as 1% of the gross national income. It is also noted that some authors regard the limit of the affordability as 0.3%–0.6%. Based on the affordability and cost of waste management, it is also pointed out that low-income and lower-middle income countries have affordability issues for extending collection coverage and eliminating uncontrolled disposal. Upper-middle income countries may be able to afford proper waste management, but they need to use their budgets for waste management efficiently.

One way to budget for waste management efficiently is through regional waste management or inter-municipal cooperation. Some waste treatment and disposal facilities have characteristics of economies of scale (Kojima, 2019; Sasao, 2020). The larger the capacity of the waste treatment and disposal facility, the lower the unit costs associated with the construction of the facility. These include composting plants, waste-to-energy plants, and sanitary landfill sites.

Another way to manage government budgets efficiently is through public–private partnership (PPP) programmes, in which private sector entities develop and operate facilities, whilst the government pays the treatment costs of waste to the private sector. There are some examples of such PPPs and private finance initiatives in the region. Such programmes could be established if more waste was collected from a broader area as unit investment costs would be saved.

Apart from the financial aspect, scarcity of land might be another reason for regional waste management. It may be difficult for densely populated urban areas or small local governments to find land for waste treatment and landfill sites. A lack of human capacity might be another reason for regional waste management. Small local governments may not be able to hire experts on waste management.

This introductory chapter provides an example of regional waste management in Asia, discusses the types of regional waste management, and introduces the structure of this report. In Section 1.2, examples from India, a leading developing country in the field of regional waste management, are introduced. Another leading country in regional waste management is Japan, which is discussed in Chapters 2 and 3 of this report. Section 1.3 focuses on the types of regional waste management. Section 1.4 introduces the contents of Chapters 2 to 8.

1.2. Regional Waste Management in India

In 1994, pneumonic plague was spread in Surat in Gujarat, India, due to a lack of waste collection services, which worsened the local sanitary conditions. More than 50 people died as a result of these practices. India's economy was also damaged by a decrease in exports and incoming tourists (Ministry of Urban Development, 2013; Furedy, 1995).

In 1995, the Indian Planning Commission released a report on urban solid waste management for the High Power Committee, in which the necessity of regional waste management was mentioned. For example, it mentioned that 'Small and medium towns might have to share a trans-municipal land disposal facility.' However, the first national regulation on waste management, the Municipal Solid Wastes (Management and Handling) Rules, issued by the Ministry of the Environment and Forests in 2000, did not mention regional waste management.

One of the leading cases of regional waste management in India was proposed in 2008 by the state of Gujarat. The project study in 2008 pointed out that if each urban local body (ULB) or municipality were to develop their own waste treatment facility or landfill site, they would need to spend US$25 per ton. However, if ULBs worked together in clusters, they would only need to spend US$9.40 per ton (UNEP, 2015).

Around 2010, the necessity of regional waste management was well recognised in India. The Ministry of Urban Development then made a guidance note on municipal solid waste management on a regional basis (Ministry of Urban Development, 2011). The report illustrated the economies of scale on landfill sites on the basis of a number of assumptions such as degree of slope, depth from ground level, and squareness of the site. In addition, the report classified the structure of regional waste into three types: (i) state government concession agreement structure, (ii) authority concession agreement structure, and (iii) structure when a private party provides land. In the state government concession agreement structure, the land for the facility is owned by the state government. In the authority concession agreement structure, the land for the facility is owned by a specific authority, such as a ULB. In the third case, as indicated by the name, the land is owned by a private party. Thus, the leading actors are different in each structure. The report also shows some cases of regional waste management in India and developed countries.

Table 1.1. Some Cases of Regional Waste Management in India

Area	Population in Area	Contents
Gujarat State	60 million (2011)	If all 159 urban local bodies operate their own facilities (composting and landfill), they would have to pay US$25, whilst if they formulate clusters, the cost would be reduced to US$9.40.
Kerala State	33 million (2011)	One regional landfill site saves US$106 million in construction costs and US$1.8 million in operations and maintenance costs compared to landfill sites in all five cities and 49 municipalities.
Ranganj, Jamuria, and Kulti	0.6 million (2011)	Three municipalities in West Bengal under the nodal Asansol Durgapur Development Authority have developed regional engineered landfill sites, by forming a public–private partnership for the project implementation.

Source: Compiled by the author, based on UNEP (2015) and Ministry of Urban Development (2016).

In 2016, the Municipal Solid Waste Management Rules were issued, whilst the Municipal Solid Wastes (Management and Handling) Rules (2000) were suspended. Revisions to the rules require the Ministry of Urban Development to 'facilitate establishment of common regional sanitary land fill for a group of cities and towns falling within a distance of 50 km (or more) from the regional facility on a cost sharing basis and ensure professional management of such sanitary landfills.'

The Ministry of Urban Development also published a Municipal Solid Waste Management Manual in 2016. It emphasises that a state-level strategy should include facilitating regional facilities and promoting decentralised waste management as appropriate. It is pointed out that regional waste management is beneficial to both large and small local governments.

Some of these guiding documents mentioned cases of regional waste management, including the estimated savings generated by regional waste management. Table 1.1 shows some examples of regional waste management in India.

1.3. Types of Regional Waste Management

There are a number of ways to classify regional waste management schemes. Hulst et al. (2009) classified inter-municipal service delivery from three perspectives: scope (single-purpose or multi-purpose), composition (horizontal or vertical), and organisational integration (standing organisations and contractual agreements). Kojima (2019) classified regional waste management into four types as shown in Table 1.2, focusing on the institutional setting, with specific attention paid to the main actors.

The Regional Government Scheme is a vertical cooperation scheme. Local government municipalities, such as state governments in India and provincial governments in Indonesia, accept waste from municipalities and operate regional treatment and disposal facilities, or contract private sector entities to operate such facilities. The Leading Municipality Scheme is led by a municipality hosting a waste treatment and disposal facility. The leading municipality contracts with neighbouring municipalities and receives waste from them. Facilities are operated by a leading municipality or by the private sector establishing a contract with the leading municipality. In other cases, municipality associations, which are formulated by local governments, serve as actors in waste management. An example of this are the Japanese partial affairs associations, which are explained in Sasaki and Kojima (2020) and Kimura (2020). These three types of organisations are classified under inter-municipal cooperation.

There are some cases in which the private sector invests in waste treatment and disposal facilities and accepts waste from various municipalities. Each local government separately contracts with a private company. For example, the TPI Polene Power Public Company in Thailand receives municipal waste from various municipalities and produces and uses refuse derived fuel as raw material in power plants. The company has 12 sorting plants, five refuse derived fuel plants, and one power plant. In Thailand and the Philippines,

private landfill sites receive municipal solid waste from local governments. Such schemes are not regarded as inter-municipal cooperation, but the schemes can be regarded as regional waste management.

Table 1.2. Types of Regional Municipal Solid Waste Management

	Types	Examples	Explanation
Inter-municipal cooperation	Regional Government Scheme	Waste-to-energy plant planned in West Java, Indonesia	The regional government makes agreements with local governments in the region and accepts waste from them.
	Leading Municipality Scheme	Waste-to-energy plant in Phuket in Thailand, Kitakyushu City in Japan, and neighbouring municipalities	A municipality hosting waste treatment or disposal facilities makes an agreement with and receives waste from other municipalities.
	Municipalities' Association Scheme	Partial affairs associations in Japan	Local governments formulate associations to treat and/or dispose of waste jointly.
	Private Sector Leading Scheme	Private landfill sites in Japan accepting ashes from waste to energy plants located in other areas. RDF plants in Thailand accept waste generated in other areas.	The private sector operates waste treatment and disposal facilities, which accept waste from multiple local governments.

RDF = refuse derived fuel.
Source: Compiled by the author.

1.4. Structure of the Report

The following chapters of this report focus on inter-municipal cooperation or regional waste management in specific countries. Chapter 2, 'Inter-Municipal Cooperation and Regional Waste Management in Japan,' discusses the history of inter-municipal cooperation in Japan, including types of inter-municipal cooperation and waste-related activities. Chapter 3, 'Inter-Municipal Cooperation in Solid Waste Management in Japan: Its Challenges and Implications for ASEAN Countries,' describes inter-municipal cooperation on municipal solid waste management in Japan. It discusses local government-formulated associations or unions jointly treating and disposing of municipal solid waste. It also points out that Japan has a legal basis to formulate associations of local government, whilst Southeast Asian countries have a limited legal basis to formulate such associations. Chapter 4, 'Cost Efficiency of Regional Waste Management and Contracting out to Private Companies,' estimates economies of scale in waste management in Japan

and the Philippines. Previous studies show the economies of scale by using data from developed countries. The data of the Philippines show that a 1% increase in the amount of waste raises the costs by 0.64%. Economies of scale are also observed in developing countries. Chapter 5, 'Promoting Local Collaboration on Waste Management: Lessons from Selected Cases in the Philippines,' reviews the legal basis for promoting local collaboration in waste management, the status and types of local collaboration, and the challenges and opportunities associated with waste management. In addition, it focuses on some emerging trends in public service delivery such as the promotion of PPP and its relation to waste management. Chapter 6, 'Internal and External Factors in the Development of Regional Waste Cooperation in the Greater Bandung Region,' applies a SWOT analysis to the regional waste management schemes in West Java, a province of Indonesia. West Java established the Regional Waste Management Agency (BPSR) in 2006 as the regional waste management coordinator. A SWOT analysis is applied to the role and function of the BPSR and the newly-developed waste treatment and disposal facilities in Legok Nangka. Chapter 7, 'The Effect of Local Government Separation of Public Service Provision in Indonesia: A Case of Garbage Pickup Services in Urban Areas', analyses the impact of district splitting on waste management. It addresses the increase in the number of local governments from 290 to 514 over the course of 20 years. The chapter finds that urban residents living in a district that has been split have experienced a lower probability of having a public waste collection service. Chapter 8, 'Clustering and Public–Private Partnerships: The Tools of Municipal Solid Waste Management Reformation in Thailand', points out how clustering and PPP have recently been regarded as major tools to improve waste management, with some regional waste management schemes enjoying great success. Despite this, small local governments face difficulties in finding private companies to treat and dispose of waste.

1.5. Conclusion

Most Southeast Asian countries are trying to improve waste management. But some local governments may not have sufficient budgets or the technical capacity to manage waste. In such circumstances, the necessity and concern as it relates to regional waste management is gradually being recognised in Southeast Asian countries. Compared with India and Japan, guidelines or legal foundations to formulate inter-municipal cooperation are limited in Southeast Asian countries. Using shared experiences in Asian countries, regional waste management schemes should be carefully designed and implemented throughout Southeast Asia.

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Chapter 2

Inter-Municipal Cooperation and Regional Waste Management in Japan

Shunsuke Kimura[2]

Abstract

There are three significant features of Japan's administrative situation. First, Japanese local governments are given a large range of authority; second the Japanese government has begun taking inclusive measures to counteract the shrinking society; including to promoting inter-municipal cooperation (IMC); and third, the need for wide-area public services has been so strong in Japan that both consolidation and IMC measures are advanced concurrently. In this situation the question is 'what are the principal changes to Japanese IMC?' The principal changes to IMC in Japan are that as an area becomes depopulated, the number of affiliated entities increases. Various IMC initiatives have been developed and making use of IMC methods is closely related with each region's strategy for revitalisation.

IMC methods are significant in the environment area. But in this area nuisance and contiguous costs are intrinsic, and consensus-building amongst the affiliated entities is important. This situation has two characteristics. First, the diversity of IMC initiatives has become prominent. Where partial affairs associations are well-suited for formulating consensus, they will become more developed. On the other hand, where flexibility of a business is given higher value or a central city has already established leadership in the region, the contract type will be preferred. Second, value should be placed on broad fact-finding through IMC before starting the policy-planning process as the Kansai Wide Area Union case shows. In conclusion, IMC strategies are closely related to regional revitalisation in depopulated areas and are worth consideration. How to effectively make use of an IMC system for a garbage disposal service has been significant, and it will gain in importance for local administration stakeholders and citizens in the coming decades in Japan.

Keywords: Inter-municipal cooperation, regional waste management, broader-based

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administration, municipal consolidation, partial affairs association, delegation of duty

2.1. Introduction

Hulst and Mongort (2007) state that 'a series of developments over the past fifty years have put pressure on local governments' performance, domain and even existence'. One of the strategies used to deal with the rising scales of production and mobility, and growing market pressures such as privatisation, deregulation, and appearance of government agencies (Hulst and Mongort, 2007) is inter-municipal cooperation (IMC). Japan created the framework of IMC in 1888[3] in response to pressures of modernisation after the Meiji Restoration.[4]

IMC has played a role in the implementation of various local government initiatives, including regional waste management. Regional waste management has advanced and is now one of many IMC-driven services.

This chapter provides an overview of the history of IMC in Japan, and discusses the current state of IMC-driven regional waste management in a bid to answer the following questions:

- What are the principal changes in Japanese IMC?
- What is the key to effective IMC-driven regional waste management?

2.2. Framework of Japanese Local Administration

2.2.1. Ordinary Local Public Entities

In Japan, a local public entity has a juridical entity under Article 2, Local Autonomy Law (LAL). There are two major categories of local public entities: ordinary and special. Local public entities are typical local governments in their organisation, affairs, and power. They are subject to the constitutional guarantee of autonomy and are broken into prefectures, which are divided into municipalities. The number of ordinary local public entities in Japan is shown in Table 2.1.

[3] The IMC legal framework is stipulated in Choson-sei (The Town and Village Law) which came into force in 1888 (Kamiko, 2010a).

[4] Japan's modernisation process is believed to have started in 1868, the year the Meiji Restoration started, marking the transfer of the governing authority from the Tokugawa Shogunate to the Imperial Court (Kamiko, 2010b).

Table 2.1: Classification and Number of Ordinary Local Governments (as of 1 July 2019)

	No.		
Prefectures 47			
To	1	Tokyo	Has different functions from other kinds of prefectures: fire service, water supply, sewerage, etc. (area of special wards)
Do	1	Hokkaido	Has only minor differences from Fu and Ken
Fu	2	Kyoto, Osaka	Have no differences in legal status from Ken
Ken	43	ALL others	
Municipalities 1,724			
City (Shi)			
Designated cities	792		Population of 50,000 or over, etc.
Core cities	20		Population of 500,000 (practically 700,000) or over
(Remaining) Special cities	27		Population of 200,000 or over[1]
Other cities	687		
Town (Cho or Machi)	743		Town and village are the same in their function and authority.
Village (Son or Mura)	189		

Note: Until March 2015, the population requirement for 'core cities' was 300,000 or over, and at that time, there was another category of 'special cities' with a population of 200,000 or over. The limit of the core cities was lowered in March 2015. Those cities designated as 'special cities' by that time may retain the special status with the delegated function.
Source: Created by author.

2.2.2. Characteristics and Affairs of Prefectures and Municipalities

a) Prefectures

Characteristics

Japan's prefectures – To, Do, Fu, and Ken – are wide-area local governments that encompass municipalities. At present, there are 47 prefectures in the country. The Tokyo Metropolis, the capital of Japan, is the only prefecture designated as To. Hokkaido is also the only prefecture designated as Do. Kyoto and Osaka are designated as Fu and all others are designated as Ken. Each prefecture is situated above the municipalities of which it is comprised, but it cannot exercise hierarchical or authoritarian power over them. Prefectures and municipalities have different tasks, and both levels must cooperate on an equal standing as local entities. According to Article 2 of the LAL, the duties of prefectures fall into three categories:

1. Covering a wider area than a municipal territory
2. Requesting the cooperation and coordination of multiple municipalities
3. Duties deemed inappropriate to be handled by ordinary municipalities when taking such municipalities' scale and characteristics into account

Affairs

The affairs dealt with by prefectures are:

1. Wide-area affairs (e.g. maintenance of national roads, construction of prefectural roads, management of harbours, conservancy of forests and river, public health centres, vocational training, police)
2. Communication and coordination affairs relating to municipalities (e.g. advice, recommendation, guidance for rationalisation of organisation and operation of municipalities)
3. Supplementary affairs for municipalities (e.g. high schools, hospitals, public universities, museums)

b) Municipalities

Characteristics

Municipalities are the local governments involved in affairs closest to the lives of residents. There were 1,724 municipalities (792 cities, 743 towns, and 189 villages) in Japan as of 1 July 2019 (Table 2.1).

Municipalities are primary-level local entities that take charge of all local administration other than those tasks attributed to prefectures. There are three categories of municipal appellation: Shi (cities), Cho (towns), and Son (villages). The following conditions must be met in order to be deemed a Shi (Art. 8, LAL):

1. population of more than 50,000;
2. more than 60% of the total number of residences are located within the central urban area;
3. more than 60% of the population (or their dependents) is engaged in commercial, industrial, or other urban activities; and
4. other conditions stipulated by prefectural bylaws.

Steiner (1965, pp.176), describing the situation in Japanese municipalities, said:

> The inhabitants must, first of all, recognize the community as a unit that is meaningful to their lives. This recognition may spring from the closeness of a face-to-face group, in which case the feeling that the inhabitants belong together and that the local community is 'theirs' is likely to be endowed with emotional intensity. It may also spring from a perceived identity of certain needs shared by the inhabitants, and from common efforts to meet them.

Affairs

The affairs dealt with by municipalities are:

1. Affairs relating to residents' life (e.g. residents' registration, family register, residence indication)
2. Affairs relating to ensuring the safety and health of residents (e.g. garbage disposal, fire service, water supply, sewage)
3. Affairs relating to the welfare of residents (e.g. nursing insurance, national health insurance, public assistance)
4. Affairs relating to the urban development plan (e.g. urban design, city parks, municipality roads)
5. Affairs relating to the establishment and management of various facilities (e.g. elementary and junior high schools, libraries, day care facilities, public halls, citizens' halls)

2.3. Special Local Government Circumstances

An overview of the history and current state of Japan's local administration must include a discussion of three Japanese special circumstances: the large range of public affairs, the population decline, and the development of broader-based administration. These three have impacted Japanese local administration and will have a significant effect on IMC.

2.3.1. Large Range of Public Affairs

The authority and responsibilities of the three tiers of government are allocated to them by governing national acts and laws as shown in Table 2.2.

Table 2:2: Authority and Responsibilities of Three Tiers of Government, Japan

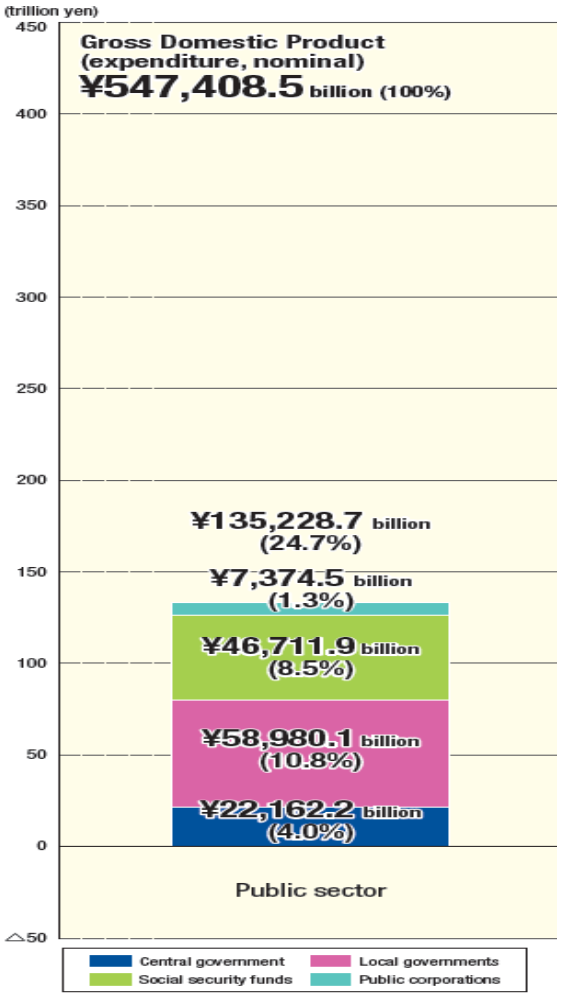
	Basic, safety	Education	Welfare, Sanitation	Social infrastructure	Industry, Economy
Central	• Diplomacy • Defence • Judicature • Criminal punishment	• University • Subsidy for private school (university)	• Pension • Social insurance • Licence for doctor • Approval of medicine	• Highway • National road • (designated section) • First-class river • Airport	• Currency • Banking regulation • Customs • Regulation on transportation • Regulation on Telecommunication • Economic policy
Local Prefecture	• Police	• High school • Salary/personnel of elementary/junior high school • Subsidy for private school (others) • Sports facility • Cultural facility	• Livelihood assistance • (area of town/village) • Child welfare • Elderly welfare • Health centre	• National road (other section) • Prefecture road • First-class river (designated section) • Second-class river • Port • Public housing • Urban	• Vocational training • Support for small businesses

				planning	
Municipality	• Fire defence • Family register • Resident register	• Elementary/junior high school • Kindergarten • Sports facility • Cultural facility	• Livelihood assistance (city) • Child welfare • Elderly welfare • Nursery care insurance • National health insurance • Water supply • Sewerage • Waste disposal • Health centre (specific city)	• Municipal road • Small river • Port • Public housing	• Regulation on agricultural land use

Source: Created by author.

Local government public services cover a large scope. They include basic services, safety, education, sanitation, social infrastructure, industry, economy, and more. Municipalities focus on affairs that affect residents' life, safety, and health.[5] Consequently, the local government expenditure (¥58 trillion) is much larger than that of the central government (¥22 trillion) (Figure 2.1). The breakdown of local government expenditure shows that significant portions are spent on sanitation, education, safety, and public welfare (Figure 2.2).

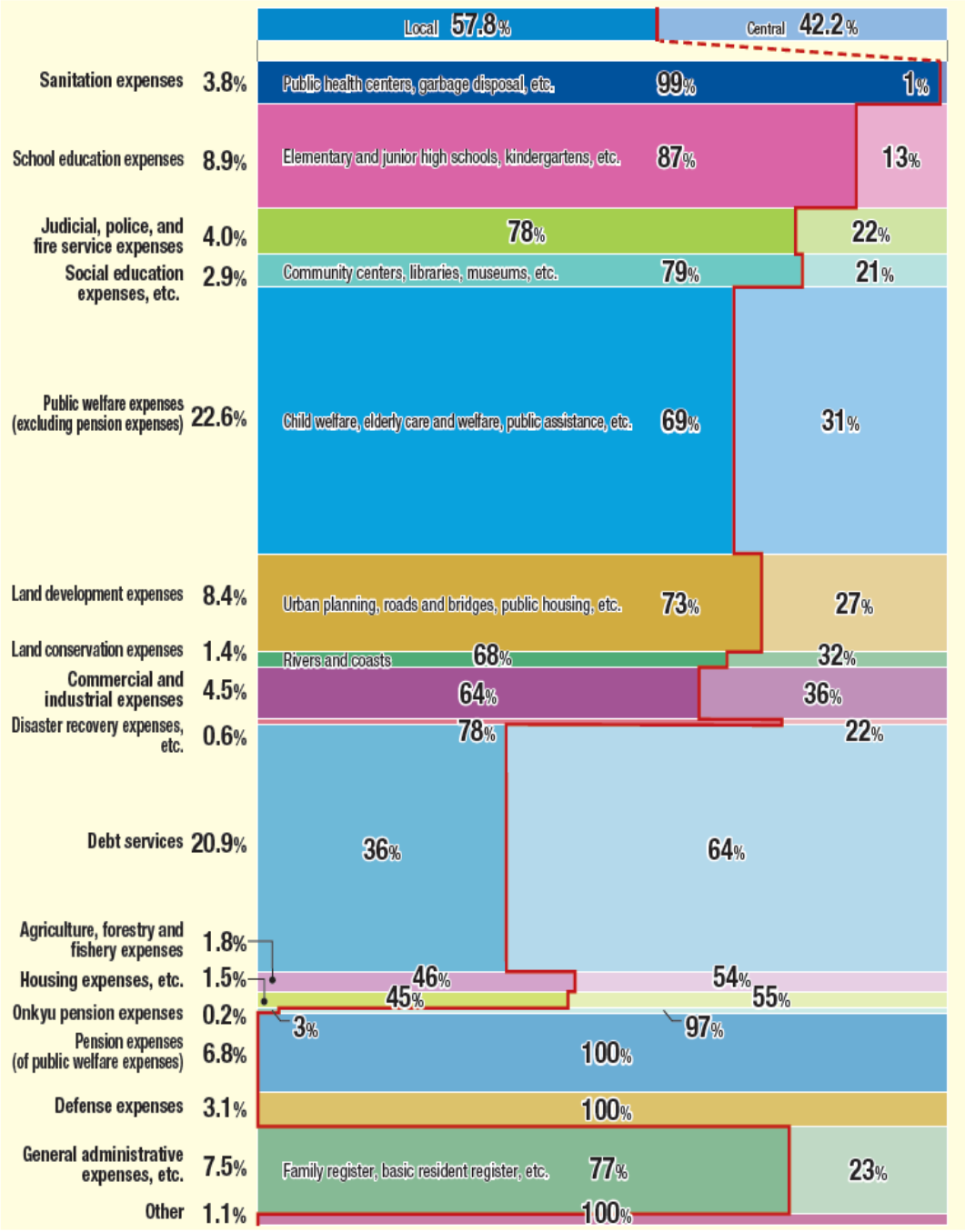
Figure 2.1. Gross Domestic Product (expenditure, nominal) and Local Public Finance (FY2017)



Source: Ministry of Internal Affairs and Communications (2019), White Paper on Local Public Finance.

[5] Waste disposal belongs to the field of sanitation in Figure 2.2.

Figure 2.2. Share of Expenditures by Purpose of Central and Local Governments (final expenditure based)



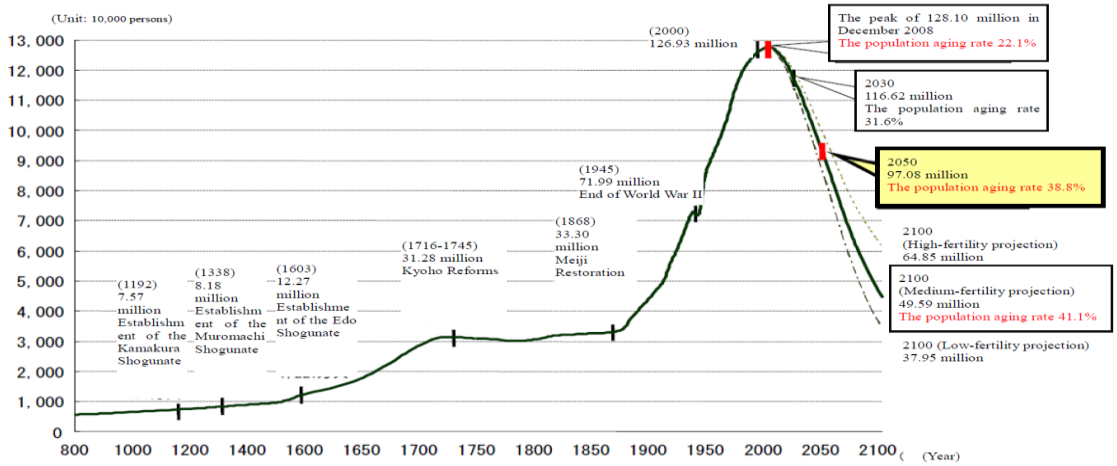
Source: Ministry of Internal Affairs and Communications (2019), White Paper on Local Public Finance.

Local governments play a principal role in internal public affairs. As earlier stated, residents recognise the community as a unit that is meaningful to their lives. In this situation, waste disposal has been the typical and principal affair of municipalities in Japan.

2.3.2. Population Decline

Japan's population, which recorded a sharp rise in the aftermath of the post-war baby boom (1940s) and the second baby boom (1970s), has been declining steadily after peaking at 128.08 million in 2008. According to the National Institute of Population and Social Security Research, the medium fertility variant projection assuming the total fertility rate is approximately 1.35, showing that the Japanese population will fall below 100 million in 2050 (Figure 2.3).

Figure 2.3. Population Projections for Japan



Source: Long-Term Forecast Study Group, Policy Subcommittee, National Land Council (2011), The Interim Summary of the Long-Term Vision for National Land.

The government has begun taking measures to counteract this. These are generally long-term goals, including:

1. creating 300,000 new jobs for the younger generation by 2020;
2. attaining equilibrium between the number of people moving into and those moving out of the capital region;
3. developing conditions that promote marriage amongst the younger generation, and
4. promoting inter-communal cooperation.

The steady fall in Japan's population has called for immediate and actionable countermeasures. Under the policy that drives this vision, all local governments created various comprehensive strategies for regional revitalisation that incorporate sustainable city policies.

2.3.3. Development of Broader-based Administration

The requirement of local government

Herein, we consider the best size for a municipality that is beneficial to residents. Theoretically, there are four major ways a large population size influences positive outcomes of local governments:

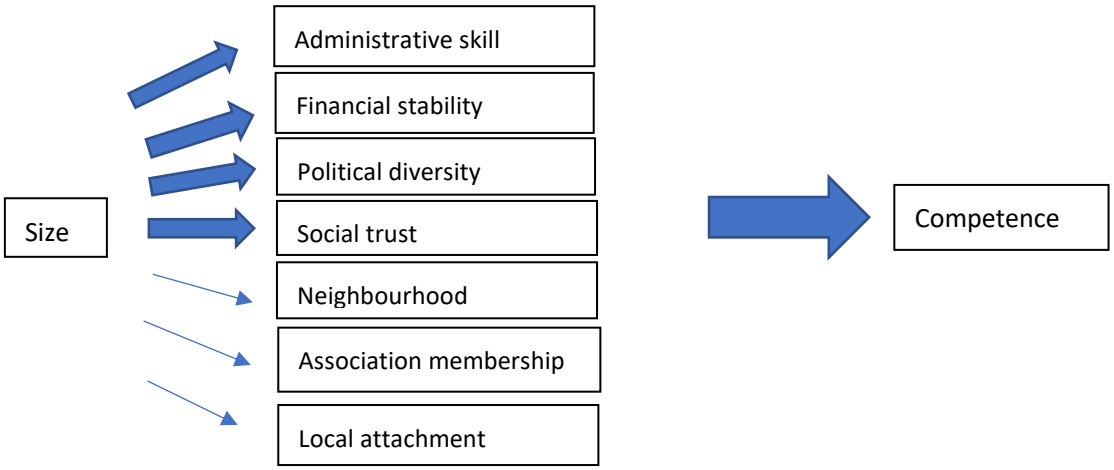
- Large local governments provide more administrative specialists like doctors, nurses, childcare workers, nutritionists, agricultural engineers, building engineers, civil engineers, and librarians. In this way, size is positively related to the administrative skill of the local government.
- The larger the local government, the larger its tax base, accounts, and funds. In that sense, size is positively related to financial stability.
- Large local governments have relatively large populations that are made up of diverse individuals, families, and corporations, which tend to increase the political diversity of the government.
- The scope of public projects and groups potentially influenced by policy are relatively large, which leads to social trust in the government.

A large population size can also negatively impact local government in any of the below-discussed ways:

- Large local governments do not engender close interpersonal relationships between members of the communities.
- Local attachments and subjective orientations are negatively affected by large population size because it negatively influences social embeddedness.
- Residents of local areas with large population sizes are less engaged than their counterparts in smaller municipalities. These social factors negatively influence the competence of the basic local government. However, citizens are expected to select a size based on social preferences.

After the promulgation of the Municipal Government Act in 1888, Japan instituted the administrative village that transitioned local governments from natural villages to administrative villages. This is because an administrative village is believed to be more favourable to the social factors that relate government size to positive outcomes. Moreover, under the requirements of national administrative modernisation in the 20th century, and the responses to decentralisation in the 21st century, the local governments have been expected to deal with the social factors appropriately (Figure 2.4).

Figure 2.4. Relationship Between Size and Political Competence in Local Government

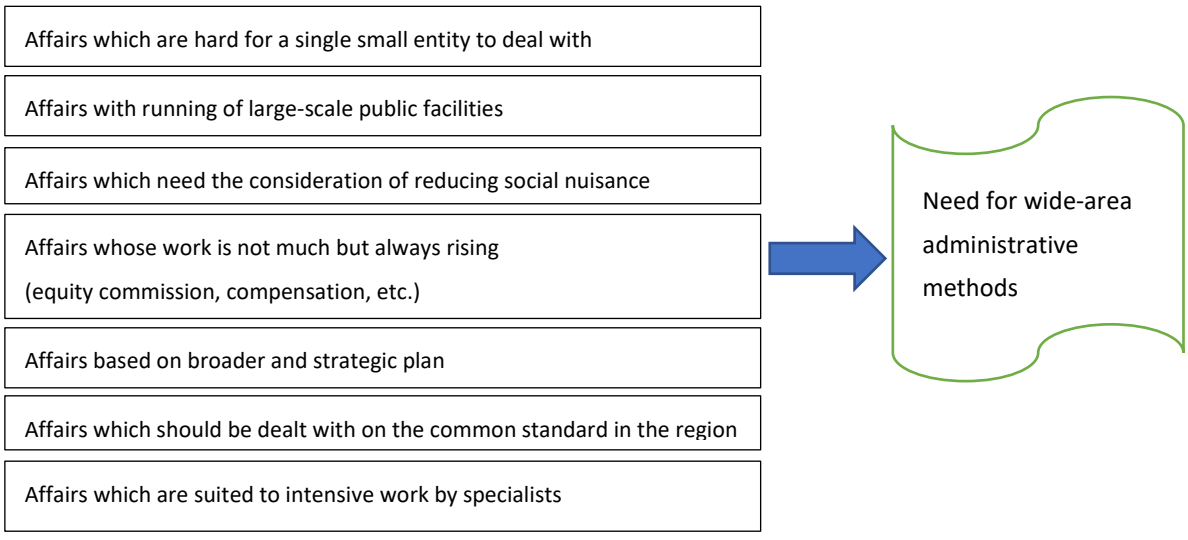


Source: Kimura (2017).

Need for wide-area public services

Municipalities are fully operational entities that manage all the administrative responsibilities allocated to them by law. Local governments manage a broad range of services, some of which are difficult to provide from a small local government's resources. Figure 2.5 shows some of these services which are imperative in Japan's modern local government system.

Figure 2.5. Need for Regional Administrative Involvement



Source: Kimura (2017).

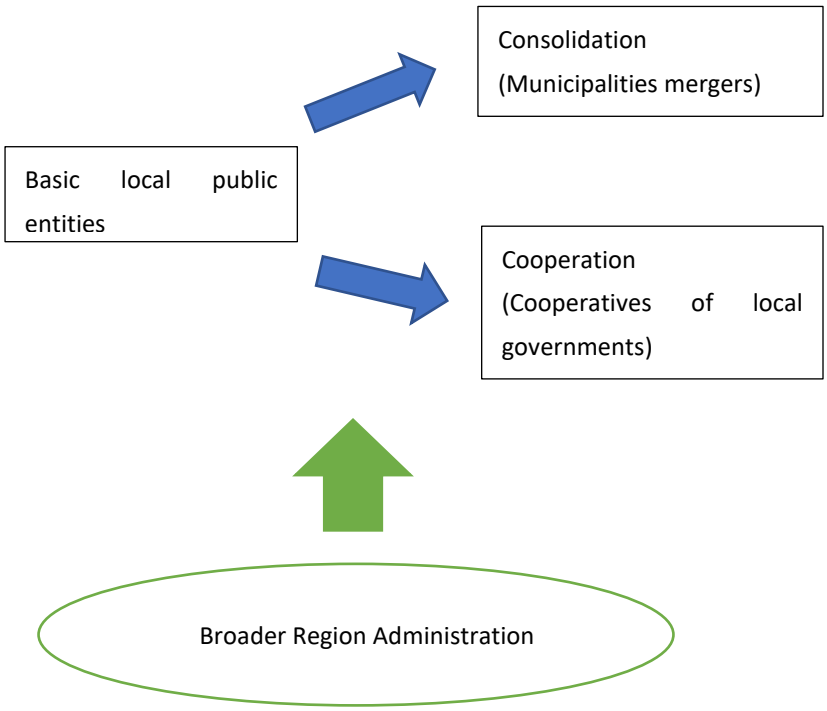
- Services that are challenging for individual small governments to manage.
- Some services need regional administrative management and some need significant clerical attention. Those matters are sometimes challenging for an individual small government to handle (e.g. regional development plans, medical care for the elderly, and forest road maintenance).
- Matters regarding the operation of large-scale facilities.
- Some services require large public facilities that would be challenging for an individual small municipality to manage because of extensive construction and maintenance costs (e.g. refuse disposal, crematoria, and sewage systems).
- Matters regarding the reduction of social nuisances.
- Some activities, such as noise and ground pollution can become nuisances. For those types of problems, cooperation amongst governments for nuisance abatement is crucial (e.g. refuse disposal).
- Although the extent of clerical work regarding some activities may not initially be great, the potential of an increasing volume of work exists. For those activities, sharing the administrative workload is reasonable (e.g. public workers' compensation, retirement allowances for civil service workers, and equity commission).
- Activities based on broad strategic plans.
- Some matters require consensus amongst relevant local governments in a regional unit (prefecture) (e.g. broad area (regional) development plans).
- Some matters should be handled using the common standard of a region.
- Some activities need to be managed in accordance with the common administrative standards of a region (prefecture) (e.g. nursing insurance and elder care services).
- Services that require the attention of specialists.
- Some matters and services need specialists, and the sharing of those human resources is a reasonable way to manage those matters (e.g. fire defence, emergency medical care, and welfare of handicapped people).

Regional administration is required for all of these matters. This situation is a global phenomenon, and every country has local governments facing problems of regional administration. Therefore, wide-area administrative methods are imperative for effective and efficient public services.

What is the orientation of regional governance? In Japan, there have been two approaches to regional governance. One approach has been the *consolidation approach*, which has generally taken the form of amalgamating municipalities.

The other approach is the *cooperation approach,* which involves the coming together of local governments for a goal or task. Local governments can take wide-area administrative methods like establishing partial affairs associations (PAA), delegation of affairs, and so on. When a local government chooses consolidation or cooperation, its decision is based on its preferred size for local government administration. When a local government meets the needs of the regional public services, the local government that prefers a larger administration based on the relevant social factors would choose to consolidate (Figure 2.6).

Figure 2.6. Regional Governance



Source: Kimura (2017).

Municipal consolidation

Municipal consolidation is conducted in municipalities that are the basic local governments. These consolidation is initiated by the national government.[6] There have been 47 prefectures in existence since 1888, but the number of municipalities decreased from 71,314 in 1888 to 1,718 in 2014[7] (Table 2.3).

[6] Japan has three great consolidation movements: Meiji consolidation, Showa consolidation, and Heisei consolidation. They were not mandated by law, but it seems probable that in practice the Meiji consolidation came very close to being mandatory and that and the Showa consolidation was also taken under strong pressure from the national government. (Yokomichi, 2007).
[7] The number of municipalities was 1,724 in June 2019.

Table 2.3. Changes in the Number of Municipalities

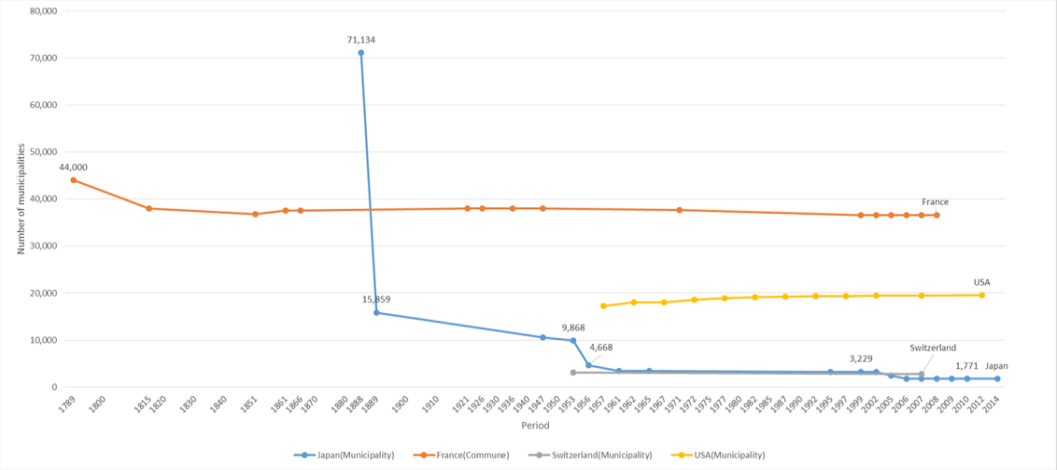
	City	Town	Village	Total	Events
1888	-	-	-	71,314	
					Big Consolidation of Meiji Standard minimum size 300–500 households • To properly execute functions such as elementary school, taxation, family register, etc.
1889	39		15,820	15,859	Municipal Government Act (1889.4)
1945. Oct	205	1,797	8,518	10,520	
1947. Aug	210	1,784	8,511	10,505	Local Autonomy Law (1947. 5)
1953. Oct	286	1,966	7,616	9,868	Towns and Villages Amalgamation Promotion Law (1953. 10 Expired in 1956. 9)
					Big Consolidation of Showa Standard minimum size 8,000 in population • To effectively manage at least one junior high school.
1956. Apr	495	1,870	2,303	4,665	New Municipality Construction Law (1954. 6 Expired in 1961. 6)
1956. Sep	498	1,903	1,574	3,975	
1961. Jun	556	1,935	981	3,472	
1965. Apr	560	2,005	827	3,392	Law concerning Special Measures for Municipal Amalgamations (June 1965. Effective for 10 years)
1995. Apr	663	1,994	577	3,234	3rd Extension of the above law (1953. 3 Expired in 2005. 3)
1999. Apr	671	1,990	568	3,229	Big Consolidation of Heisei
2002. Apr	675	1,981	562	3,218	
2005. Mar	722	1,423	366	2,521	
2005. Apr	739	1,317	339	2,395	Law concerning Special Measures for Municipal Consolidation
2006. Apr	779	844	197	1,820	
2007. Apr	782	827	195	1,804	
2008. Apr	783	812	193	1,788	
2009. Apr	783	802	192	1,777	
2010. Feb	783	799	189	1,771	
2014. Apr	790	745	183	1,718	

Source: Created by author.

The primary reason for this large decrease is the municipal consolidation that occurred during the three great consolidation movements. The first of these was the Great Meiji Consolidation of 1888–1889, when the number of municipalities declined to about one-fifth of the original number, from 71,314 to 15,859. Between 1953 and 1961, the Great Showa Consolidation was conducted, resulting in a further decrease of about two-thirds, from 9,868 to 3,472. Finally, the Great Heisei Consolidation was implemented between 1999 and 2010, which decreased the number of municipalities by about one half, from 3,229 to 1,771.

The latest consolidation, the Great Heisei Consolidation, was implemented in a unique context. Amongst other things, it was in response to the ongoing decentralisation process[8] and the financial deterioration of the local governments. These conditions intensified the consolidation's influence on local governments' administrative management, reinforcing their administrative and financial foundations, and installing efficient municipal public services. The number of Japanese municipalities has reduced to about one-fortieth in 120 years. This sharp decline is contrary to the stable trend in France and the United States (US) (Figure 2.7).

Figure 2.7. Change in Number of Basic Local Government Municipalities



Source: Kimura (2017), pp.58.

[8] With the enactment of the Uniform Decentralization Law in April of 2000, local government, the delegated function system that was reinforcing centralisation was abolished and municipalities were expected to conduct all of their administrative business independently under the principle of autonomous decision making. The reform was controversial, and it was argued that municipality consolidation and increased competencies of local governments were requisite for transferring the numerous administrative duties. In that context, the Great Heisei Consolidation was powerfully advanced (Kimura, 2017).

Japan's consolidation has made positive impacts like boosting effectiveness through economies of scale, establishing new identities, etc. on the regions. On the other hand, they have caused new issues such as an overflow of public facilities in new districts. For example, if two cities, each of which has a library, have consolidated, the new city now has two libraries. These overflows became hot issues amongst the municipalities in the 2010s, prompting urgent action by the municipalities.

Cooperation

Outline

As earlier mentioned, local governments have two options when responding to the needs of the regional citizenry. One is to consolidate and the other is to cooperate (Figure 2.6). Japan has progressed in the area of consolidation, which local governments have efficiently employed alongside cooperation. Regional needs have encouraged the development of cooperative arrangements, which are wide-area administrative methods stipulated in the LAL. It is a global development; as other countries have pursued IMC. For example, as shown in the bottom row of Table 2.4, the US has special districts, school districts, and so on; the United Kingdom has combined authorities, joint boards, and so on; France has SIVU, Métropole, and so on; Germany has Ober regionale-gemeindverland, Amt/Samt gemeinde, and so on; and Italy has Unione di comuni, Comunità montane, and so on.

Table 2.4. Comparison of Countries

Item	United States	United Kingdom	France	Germany	Italy	Japan
Style	**Federal**	**Singular nation**	**Singular nation**	**Federal**	**Singular nation**	**Singular nation**
Tier of local government unit	State + two tiers (or one tier)] County Municipality	England parallel; two tiers single tier Two tiers County – district (single tier) Unitary (Scotland, Wales, Northern Ireland) single tier; autonomous government	Three tiers Region Department Commune	Land + two tiers (parallel; Kreis-freie Stadt) Kreis Gemeinde (parallel; Kreis-freie Stadt)	Three tiers Regime Provincial Commune	Two tiers Prefecture Municipality
Main affairs of basic local government	education, police, health, welfare, road, fire-fighting, water and sewerage, transport	(single tier) local plan, regulation of development, housing, environment sanitation, social welfare	elementary school, kindergarten, childcare centre, city planning, road, waste collection, cleaning	school house (building/maintenance), sewage, waste disposal, livelihood assistance	social welfare, health, public works, vocational education	social welfare, health, operation of elementary/junior high school, road, fire-fighting
Main MIC systems	Special district School district	Combined authority Joint board	SIVU Métropole	Ober Regionale-gemeindeverland Amt/Samt Gemeinde	Unione di comuni Comunità montane	Cooperation association

Source: Created by author.

Types of inter-municipal cooperation

Administrative demands are highly diverse, therefore local governments must be highly specialised and integrated into a broader region. In addition, the number of sectors, whose concerns are believed to be more efficiently and rationally administered under mutual and joint cooperative agreements between or amongst local governments rather than by individual local governments, is increasing. In this context, the IMC system is adopted. The local governments which co-found an IMC will be called affiliated entities hereinafter.

Altogether, there are six types of these systems of wide-area methods, and they can be broadly categorised according to whether they have corporate legal status. The corporates legal status type is classified into two types: PAAs and wide-area unions. Both types are referred to as unions, and they are designated as special local public entities under the LAL. The non-corporate legal status type is classified into contract type and other type. The contract type is further classified into three categories: delegation of duties, agreement, and substitution (Table 2.5).

Table 2.5. Types of Inter-Municipal Cooperation

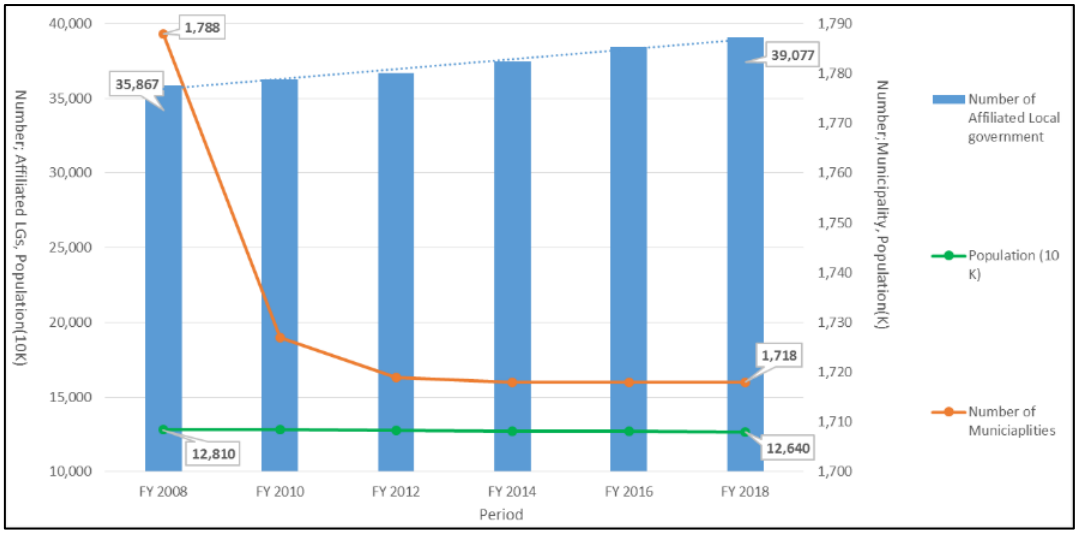
Method			Contents of system
Corporate legal status type	**Partial affairs association**		The association is established amongst prefectures, municipalities, or special wards for the purpose of jointly administering a part of their functions. It has a corporate legal status. It is stipulated as a type of union by the Local Autonomy Law (See Chap. I, IV3(2)).
	Wide-area union		The association is established amongst prefectures, municipalities, or special wards for the purpose of jointly administering a part of their functions. It has a corporate legal status. It is stipulated as a type of union by the Local Autonomy Law (See Chap. I, IV3(2)).
Non-Corporate legal status type	**Contract Type**	**Delegation of duties**	A local government may delegate a portion of its affairs to other entities. And it may force the delegated entity (trustee) to administer and execute affairs in that portion pursuant to its regulations.
		Agreement	This method has a one-for-one style and can ensure flexibility in the contents of cooperation. Based on this legal framework, the affiliated entities take measures for sharing of roles.
		Substitution	A local government may act as an agent for another one.
	Other Type	**Council**	An ordinary local public entity may establish a council through which it can consult with other entities to establish regulations and administer a portion of the affairs jointly pursuant to such regulations.
		Shared administrative organisation	An ordinary local public entity may consult with other entities to establish regulations and jointly set up committees, affiliated organisations, and chief executive and may jointly provide members supplementary personnel and expert members for such committees and organisations pursuant to such regulations.
		Dispatch of personnel	A chief executive, committees, and the members of a local public entity may request other local public entities to send one or more of its personnel to administer and execute affairs.

Source: Created by author.

Current Situation

The current legal framework for wide-area government was presented in the LAL in the 1950s. Since then, local governments have actively practiced wide-area administrative methods. IMC is established through the partnership of several local governments. The total number of municipalities has been decreasing since 2008[9] alongside national population. Under this situation, the number of the affiliated entities has been growing. Figure 2.8 shows that more municipalities have begun to make use of IMC in depopulated societies, where there is a shortfall in users of public services. Local governments are required to strategically invest in and maintain their public facilities in light of the reduced number of users.

Figure 2.8. Change in Number of Affiliated Entities of IMC



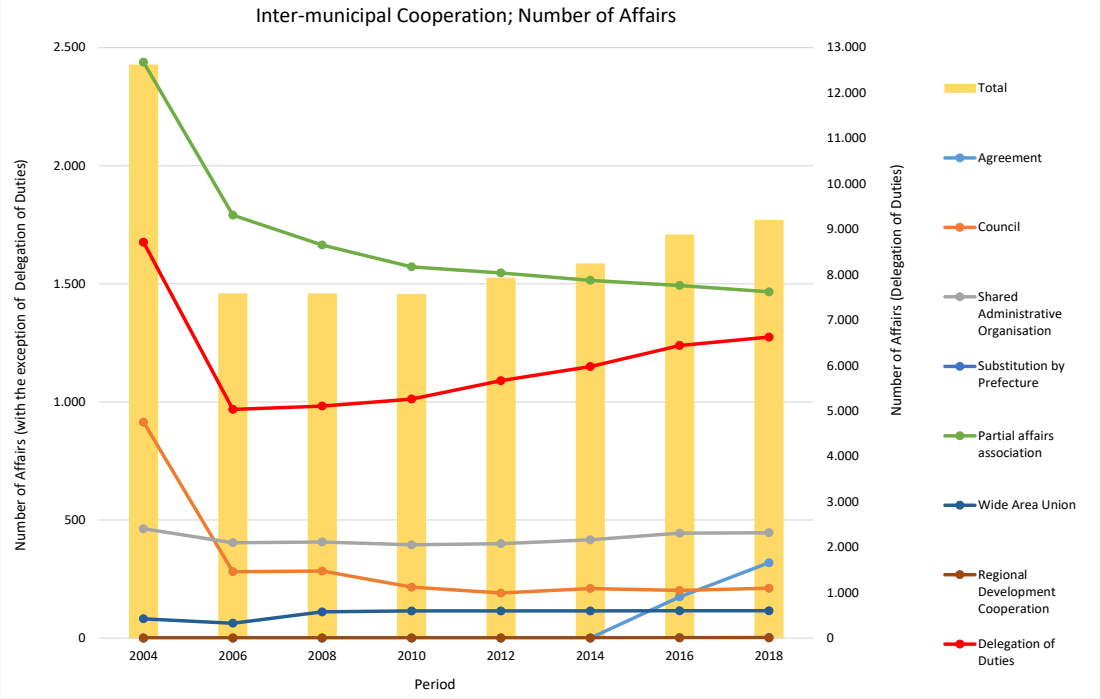
IMC = inter-municipal cooperation.
Source: Created by author.

Next, we focus on the breakdown of IMC. The total number of IMC affairs remained essentially the same between 2006 and 2010, but significantly increased in 2012. This increase can be attributed to the increase in the number of delegation of duties type (duties such as issuing residency cards and matters regarding medical care for the elderly) by many administrations. The number of PAAs steadily decreased, mostly because of the Great Heisei Consolidation. This trend reflects the disbanding of related associations that accompanied a reduced need to merge as the municipalities consolidated. The numbers of councils and shared administrative organisations remained mostly stable and the

[9] The Heisei Consolidation movement began in 1999 and since 2004 the number began to decrease remarkably.

number of regional unions, established in 1996, gradually increased. These suggest that the demand for a broad-based public service is significant for consumptive investment such as issuing residency cards and matters regarding medical care (Figure 2.9).

Figure 2.9. Change in Number of Affairs of IMC



IMC = inter-municipal cooperation.
Source: Created by author.

In low density areas, the demand for public services has shifted to a new framework; from building infrastructure to more meticulous public services such as issuing residence certificates and approvals for nursing care. Generally, the applicable IMC types such as the delegation of duties and agreement have become popular.

2.4. Principal Inter-Municipal Cooperation

In this section, we provide an overview of the principal IMC under the corporate legal status type and non-corporate legal status type. The representative type for the former is a PAA and that of the latter is delegation of duty.

2.4.1. Partial Affairs Associations

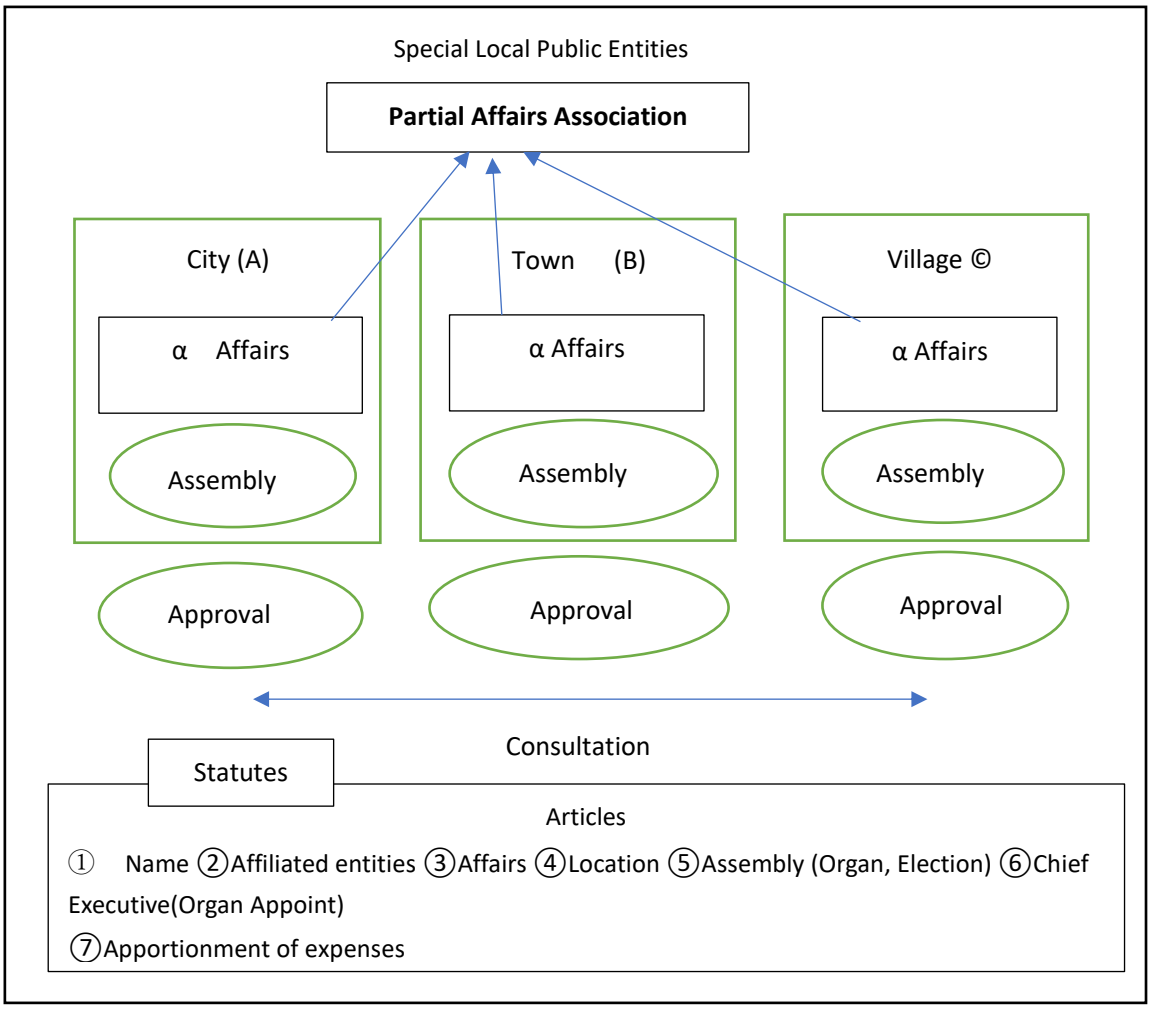
Outline

This section focuses on the structure, status, and agenda of PAAs. PAAs are not regulated to the extent that they are in the jurisdiction of the local governments that are affiliated. When several local governments agree to jointly administer some of their services or other matters and establish a PAA, they simply give all responsibility for those matters to the PAA.

The need for PAAs

As shown in Figure 2.5, some local public matters are difficult for individual governments to manage, particularly those that are costly or require significant or specialised staff. For those matters, PAAs can effectively support and supplement local government efforts. An image of the PAA structure is shown in Figure 2.10.

Figure 2.10. The Structure of a Partial Affairs Association



Source: Created by author.

If a city (A), a town (B), and a village (C) have common concerns (α affairs in Figure 2.10) and they all agree that establishing a PAA would be a reasonable approach to managing those concerns, they can create a PAA and transfer the α affairs to it for administration by following the process stipulated by Article 284 of the LAL. The basic characteristics, processes, and responsibilities of PAAs are stipulated by statute.

Merits of PAAs

The merits of PAAs for the wide-area method are summarised in Table 2.6.

Table 2.6. Merits of Partial Affairs Associations

Points	Remarks
Corporate legal status	PAAs have corporate legal status and they can independently carry out the acts of law and hold properties. Therefore, they can supply public services through the operation of large public facilities, e.g. refuse disposal, fire-fighting, nursing home, school house, water supply, hospital.
Dual representative system	PAAs have their own chief executive organisations, assemblies, and auditors. Through those dual representative systems (presidential system), they can clarify where the responsibilities lie for their management.
Disposal of multiple affairs	PAAs can discharge multiple responsibilities if they define them in their statutes. Moreover, the complex-PAA system was established incrementally in 1974; that the affairs were common to all the affiliated governments is not required for the complex PAA.
Grand-scale budget use	PAAs compile their own budgets. They can make a scale of expenditures through using shares from affiliated entities and local bonds.

PAA = partial affairs association.
Source: Created by author.

First, PAAs have corporate legal status, meaning that they can provide public services through large public facilities and, therefore, cover a wide range of public services. PAAs can manage public services using the Internet and those that require facilities.

Second, PAAs use a dual representative system comprising a chief executive, administrator, and deliberative body (PAA assembly). Moreover, the system is based on the checks and balances principle. This system recognises the delegation of responsibilities and contributes to the transparency and democratic management of the PAA.

Third, PAAs can handle the numerous matters that need to be administered when these

matters have been defined in their articles. Moreover, the complex-PAA system was incrementally established in 1974; it was not necessary that the services were common to all of the affiliated entities. Therefore, it was easier to join a PAA as an affiliate because the PAAs were internally individualised.

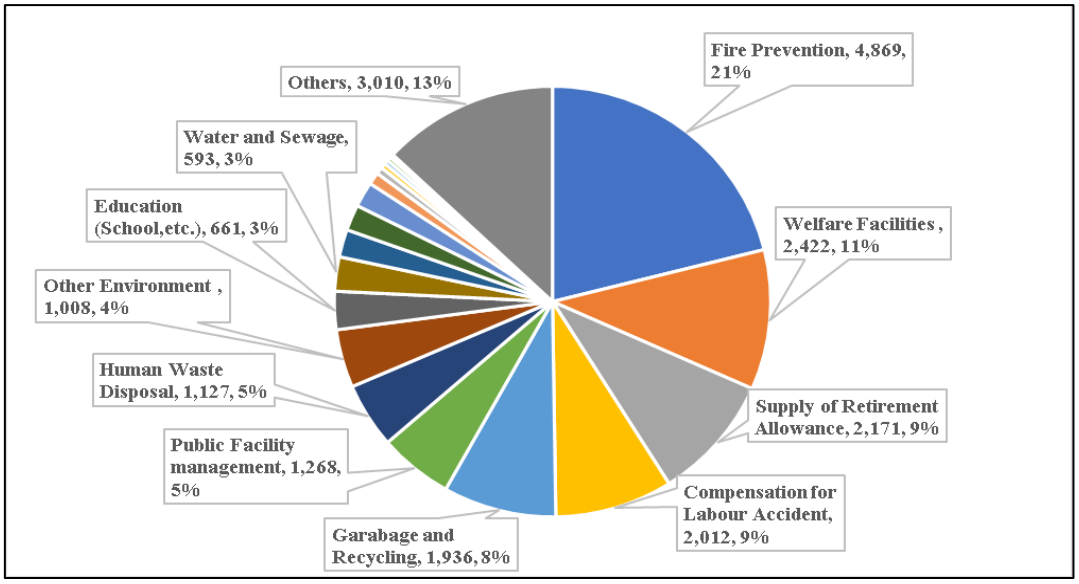
Fourth, PAAs have independent budgets and they can manage high expenditure by selling shares, local bonds, and so on. Taken together, the merits of a PAA can create comprehensive and stable public administrations.

These merits clearly distinguish PAAs from the other types of administration and their superiority has led many local governments to affiliate with PAAs.

Affairs of PAAs

Based on the number of PAAs as at 2018, fire prevention (21%), welfare facilities (11%), and supply of retirement allowances are principal areas (Figure 2.11).

Figure 2.11. Number of Affiliated Entities of Partial Affairs Association (FY2018)



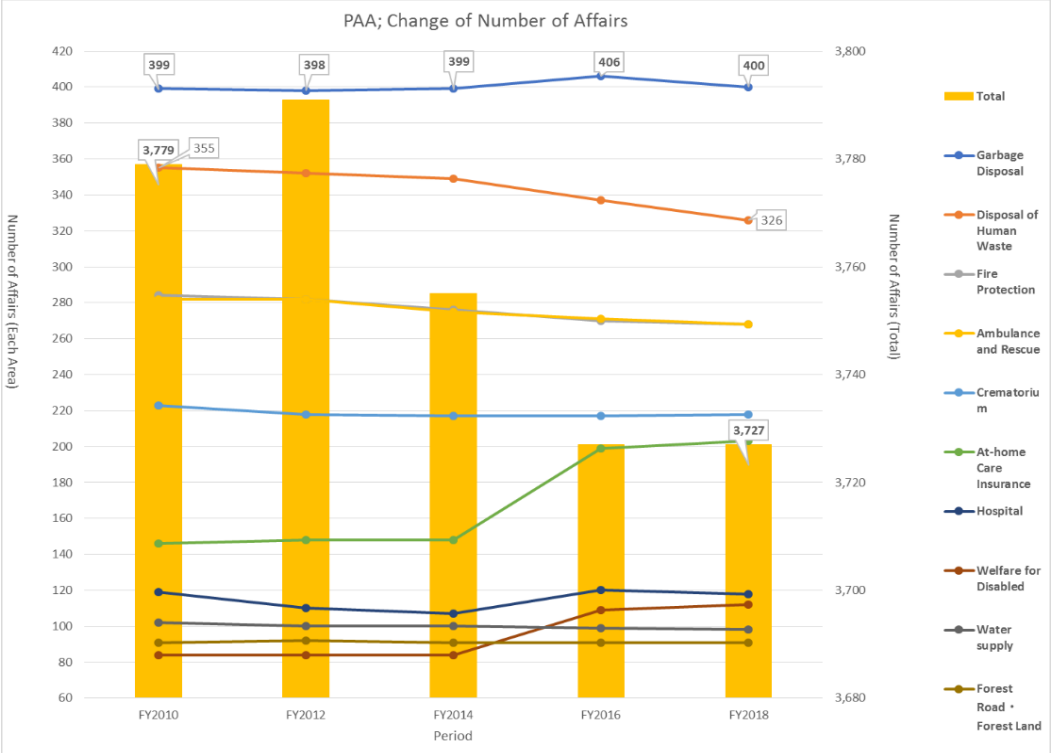
PAA = partial affairs association.
Source: Created by author.

There are two principal PAA field types. The first type is the operation of large public facilities like fire prevention, welfare facilities, and garbage disposal and recycling. This type involves providing public services through the use of public facilities. The second type is 'not so frequent but highly probable needs' like retirement allowances, compensation for labour accidents, and such. A PAA has corporate legal status as shown in Figure 2.10 and it can independently make contracts, hold assets of its own, and manage large budgets.

PAA trends

The number of PAAs has steadily decreased since 2014, mostly because of the Great Heisei Consolidation. When the affiliates merged, there was no need, in some cases, to retain the related PAAs. The total consolidation of public entities cancels the need for partial association. However, certain principal affairs such as garbage disposal, human waste disposal, fire prevention, crematorium, etc. are retained. This shows that the corporate legal status type is well-suited for these public services. Typical PAA types have been garbage disposal and fire prevention, but nowadays the growth of social welfare stands out as indicated by the increase in at-home care insurance and welfare for the disabled (Figure 2.12).

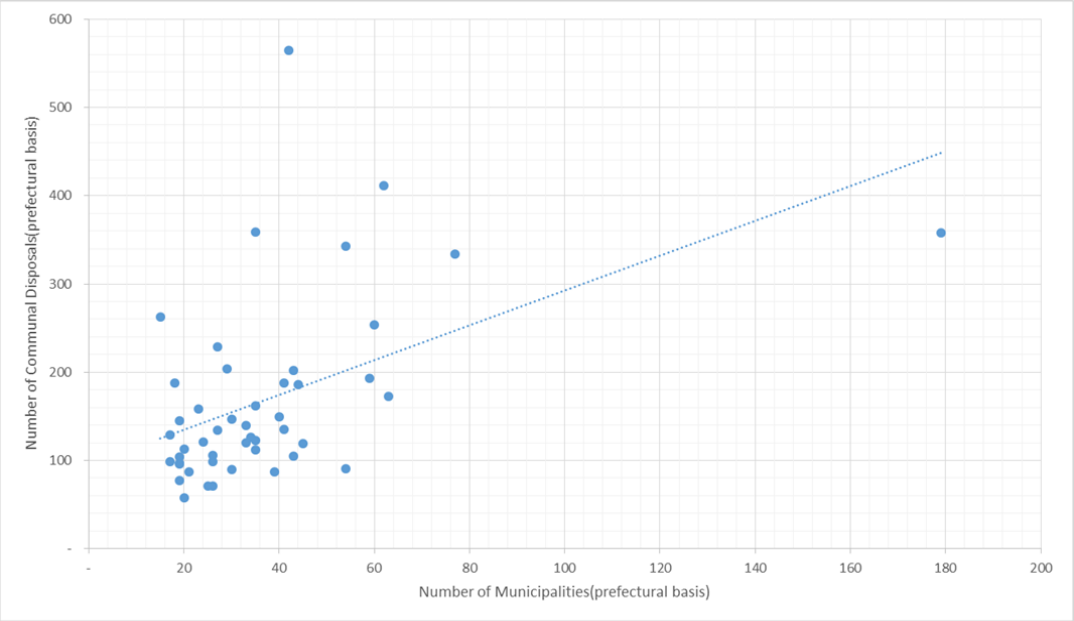
Figure 2.12. Change in Number of Affairs



PAA = partial affairs association.
Source: Created by author.

Making use of wide-area administrative methods is discretionary in principle. Whether the method is adopted by the affiliates depends on the agreement between them. Then, where are wide-area administrative methods aggressively used? Are many methods adopted in a region where a lot of municipalities are located? Figure 2.13 shows the relationship between the number of municipalities per prefecture to the number of communal disposals per prefecture.

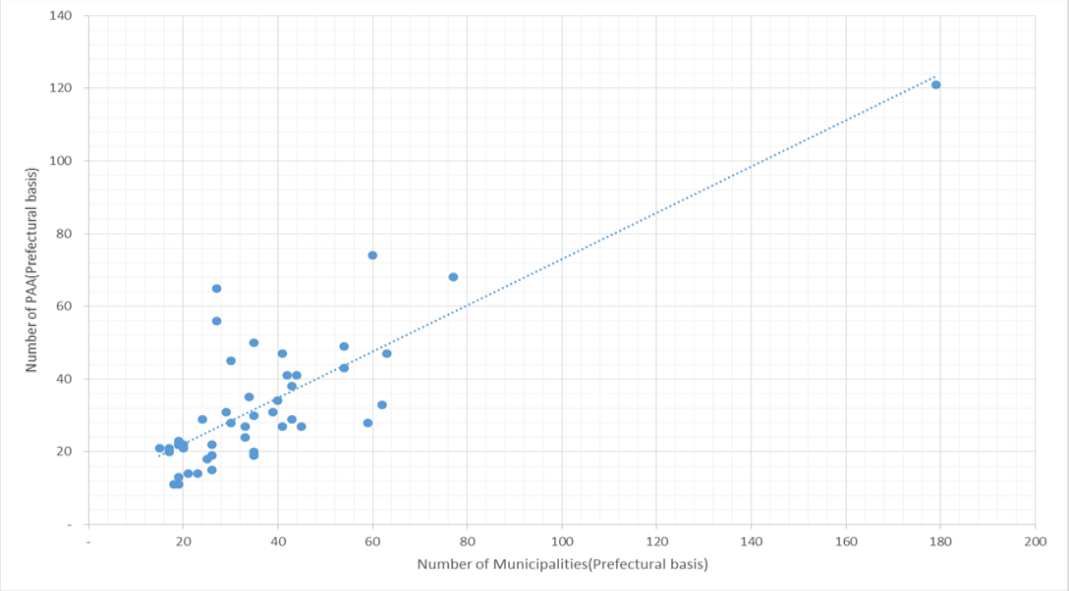
Figure 2.13. Relationship Between the Number of Municipalities and that of Inter-Municipal Cooperation by Prefecture (r = .489)



Source: Created by the author using Ministry of Internal Affairs and Communications (2014), Survey of the System of Joint Administration in 2010–2018.

The correlation is weak (r = .489), suggesting that regions with many municipalities do not always set up many communal disposals. The alternative causes, such as the development and motivations of local governments, may influence the observed differences amongst the prefectures. However, each local government should explore options for effective utilization of wide-area administrative methods. Figure 2.14 shows the relationship between the number of municipalities per prefecture and the number of PAAs per prefecture.

Figure 2.14. Relationship Between the Number of Municipalities per Prefecture and the Number of Partial Affairs Associations per Prefecture (r = .821)



Source: Created by the author using Ministry of Internal Affairs and Communications (2014), Survey of the System of Joint Administration in 2010–2018.

The correlation is quite strong (r = .821), suggesting that PAAs have become positively established in regions with many municipalities and are a principal wide-area administrative method.

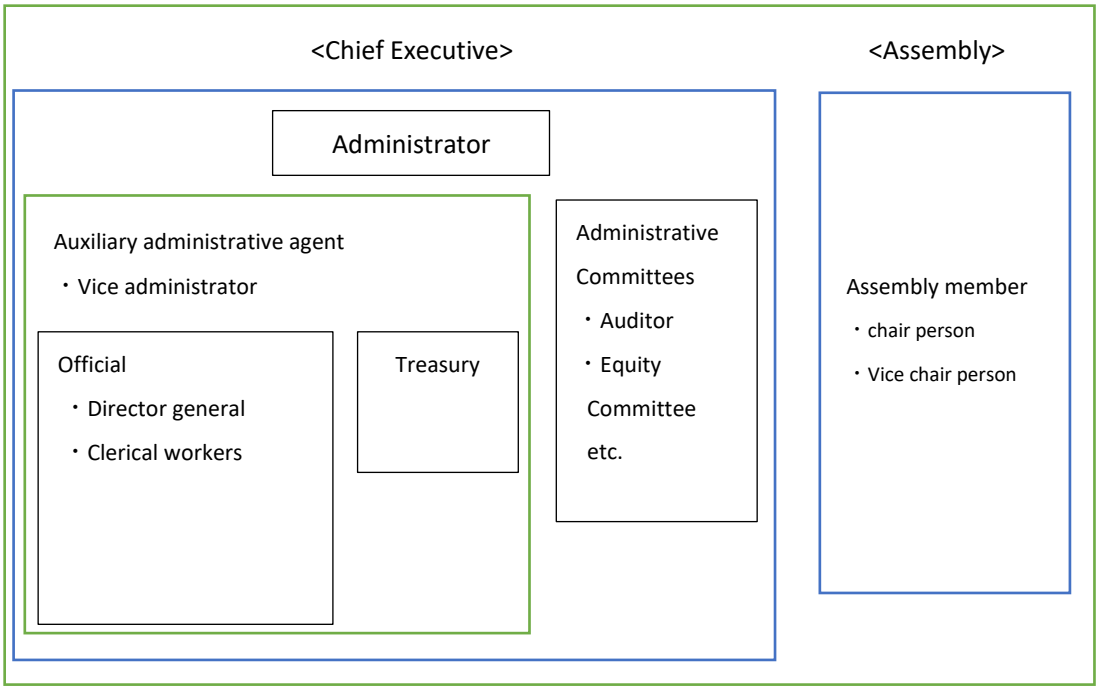
Organisation

The creation process of a PAA is stipulated in Article 284 of the LAL. First, de facto consultations amongst the potential affiliates are held, where they consider statutes such as organisational design. These include the structure of the chief executive officer of the PAA, the assembly members, methods of election, matters and services to be administered by the PAA, the burden of charges to the affiliates, and so on. Second, each mayor (chief executive officer) of the potential affiliates submits a bill of incorporation of the PAA and a bill of the draft of the statute. Third, after each individual assembly has approved the bills, the chief executive officers of the potential affiliates conduct an official consultation. If all the potential affiliates are municipalities, the chief executive officers submit the application to organise the PAA to the governor (of the prefecture). Otherwise, they submit the application to the minister of IMC .

Structure of a PAA

A PAA is established through consultation amongst the affiliates (Article 284, LAL). This consultation is a joint legal act. A PAA is a special local administration and the LAL is applied accordingly (Article 292, LAL). The structure of a PAA is pursuant to the ordinary local government, and, like one, is planned as a dual representative system. Figure 2.15 shows the structure of a PAA. The head of a PAA is called the administrator. The administrator has the status and functions similar to a governor or mayor of an ordinary local government pursuant to the LAL. The administrator has administrative responsibilities that include submitting bills to the assembly. The PAA assembly makes resolutions, submits bills, investigate duties, and so on. A PAA's chief executive officer and assembly are expected to manage the services and other matters through a system of checks and balances as shown in Figure 2.15.

Figure 2.15. Structure of Partial Affairs Associations



Source: Created by the author.

PAA statutes

The LAL is *mutatis mutandis* applied to a PAA as the basic management rule, but some items are exclusively set down by a PAA's statute. Statutes provide the fundamental structure and rules that govern PAAs. When the affiliates agree to establish a PAA they automatically agree on the contents of the PAA statute. The consultation has the capacity

to enact law and statutes, which are the subsisting basis of the PAA, and are binding on the affiliates. Therefore, the bylaws and rules enacted by the PAA should be compatible with its statutes. Figure 2.16 below shows the seven articles that guide PAA creation (Article 287, LAL).

Figure 2.16. Required Items of Partial Affairs Associations

Items of Statutes
① Name ②Affiliates ③Affairs ④Place of Office ⑤Assembly (Composition, Election) ⑥Chief Executive Officers (Composition, Appointment) ⑦Apportionment of expenses

Source: Created by author.

If any one of the above is missing, the statute is invalid, and establishment of a PAA will not be approved by a minister or governor.

The reasons for requiring these items are as follows:

Name

There is no specific legal regulation regarding the name of a PAA. However, a PAA is expected to pay attention to the following points.

1. The name should include the PAA.
2. The name should include the types of matters that the association administers, such as fire defence or public affairs association.
3. The name can include the name of the gun (county) if the affiliates are all members of that county to clarify the PAA's identity.

Affiliates

Each affiliate's name should be stated in the statutes. If all of the affiliates are municipalities of a prefecture, a description, such as 'all the municipalities of X prefecture' is considered acceptable. However, if the number of affiliates is up to 10 (e.g. all of the municipalities in a county), listing each one would be appropriate.

Affairs (services and other matters)

The function of a PAA is valid within the scope of the named services and matters of communal disposal, and the affiliates forfeit responsibility for that function at the same time the PAA assumes it. For example, if Town X establishes a PAA regarding fire defence with Village Y, X and Y lose the individual authority to enact fire prevention bylaws. The matters of communal disposal should be written in the statutes as specifically as possible.

Place of office

Place of office means the location of the main office. The block number should be specified in the statutes. A PAA must observe Article 4(2) of the LAL. In establishing or moving the office location in accord with the preceding paragraph, consideration must be given to traffic conditions, geographic proximity to other public offices, and so on to maximise the convenience of the residents.

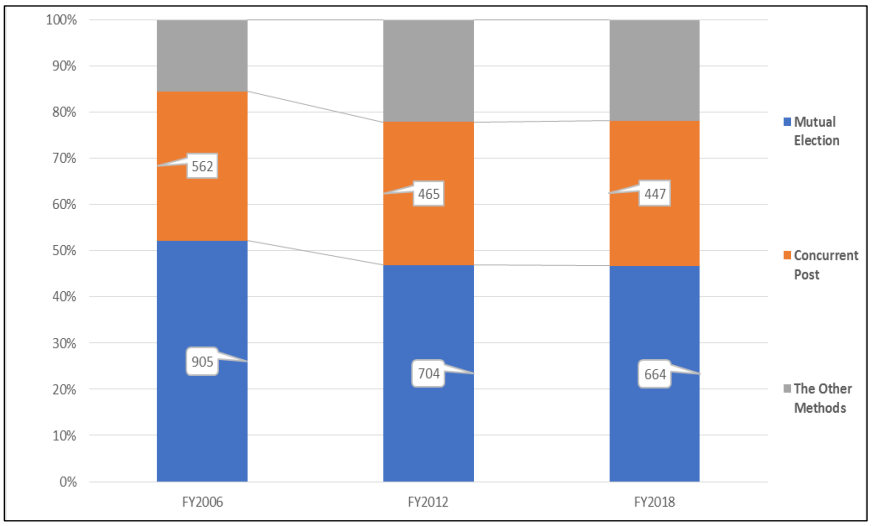
Assembly

Assembly seats, terms, chairpersons, vice-chairpersons, methods of election, and panels of candidates should be stipulated in the statutes. The method of electing PAA assembly members is specifically described in the statutes. The affiliates must use direct suffrage, which is very different from the rule in ordinary local governments. Statutes set forth the number of assembly members, the parent population of the elected PAA assembly, and election methods.

Chief executive officers

The role of the chief executive officer and the method of appointment of the administrator are determined by the statutes (Article 287, LAL). There were 1,379 (91.9%) administrators elected from amongst governors or mayors. Only 21 were elected from amongst members of the PAAs' assemblies. Most PAA administrators are selected from amongst the heads of the affiliates. The management of a PAA influences the affiliates' policies. Therefore, selecting the head is central to ensuring the uniformity of policies. Figure 2.17 shows the distribution of methods of appointment.

Figure 2.17. Partial Affairs Associations' Administrator: Change of Election Methods



Source: Created by the author.

In 2018, 47% (664) of entities used mutual elections and about 32% (447) used the concurrent post method. The concurrent post method means a certain mayor regularly accedes to the administrator of the PAA by common consent amongst the affiliates. The use of the concurrent post method is increasing; as direct election of the administrator of the PAA is not required by the Constitution and national law.

Apportionment of expenses

The apportionment of PAA expenses is defined by the PAA statutes. The general standard is provided by the IMC, as follows.

General Standard:

> The PAA meets the expenditure with property revenues, charges and fees. When it has deficits, it makes up the difference with burden charge amongst the affiliated entities.

There are several rules regarding expenses. The typical ones are:

a) Fully flexible

This focuses on the flexibility of social and economic change. It does not use a basis, such as population, and a sample style is:

'The administrator decides the next fiscal year's budget charge for each affiliate through the approval of the PAA assembly.' This secures full flexibility, but the affiliates renegotiate the financial burdens every year. Moreover, from the outside, it is difficult to understand the financial relationships between the PAA and each of its affiliates.

b) Variability oriented

This focuses on the variability of the expense burden based on the idea that the apportionment responds if administrative demands on affiliates increase.

The following calculation bases of the apportionments are typical.

> (e.g.) per population
> per population of the specific region
> per number of students
> per quantity of water supply

c) Stability oriented

This focuses on the stability of the expense burden. If this style is adopted, the burden amount would not change. It makes it easy for the affiliates to know what to expect to pay to the PAA each year.

The following calculation bases of the apportionment are typical.

(e.g.) per capita
fixed share
per number of houses

In many cases, several bases are adopted and mixed in a calculated formula that is stated in the PAA statute.

Issues with PAAs

The opinion of affiliates

PAAs have both merits and demerits. What do the affiliates think about the current wide-area government? The results of a 2012 survey are shown in Table 2.7.

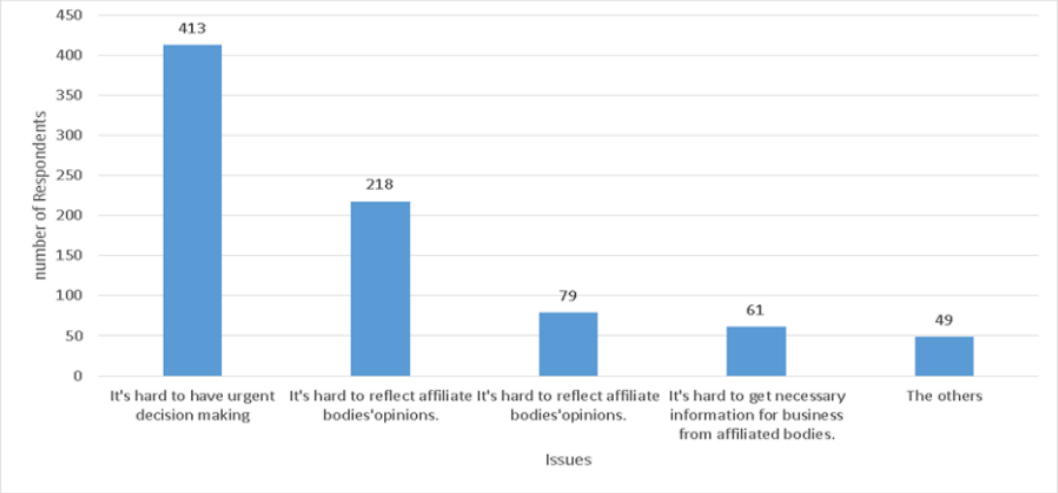
Table 2.7. Issues of Wide-area Government (as of 31 December 2012)

Method of Wide-area administration	Municipalities which operate wide-area administration (respondent)	Answer: The issues exist (Multiple answers allowed)												Answer: The issues do not exist	
		Total		Issues of wide-area administration											
				It's hard to have urgent decision making		It's hard to reflect affiliate bodies opinions.		Where responsibilities lie is not clarified.		It's hard to get necessary information for business from affiliated bodies		The others			
		Number of answers	Share(%)	Number of answers	Share(%)	Number of answers	Share(%)	Number of answers	Share(%)	Number of answers	Share(%)	Number of answers	Share(%)	Number of answers	Share(%)
Partial affairs association	1,623	526	32.4	413	78.5	218	41.4	79	15.0	61	11.6	49	9.3	1,097	67.6
Wide-area union	1,578	412	26.1	271	65.8	176	42.7	102	24.8	41	10.0	43	10.4	1,166	73.9
Council	664	174	26.2	149	85.6	61	35.1	32	18.4	14	8.0	15	8.6	490	73.8
Joint establishment of organs and such	706	109	15.4	74	67.9	28	25.7	21	19.3	14	12.8	16	14.7	599	86.984.6
Delegation of duties	1,106	145	13.1	69	47.6	56	38.6	22	15.2	27	18.6	24	16.6	961	86.9

Source: Created by the author using MIC Survey of the System of Transactions of Municipalities (2012).

A significantly high number of respondents (32.4%) agree that there are issues with PAA methods. This is much higher than others and suggests PAAs have been facing more than a few problems. Top of these problems are that 'It is hard to have urgent decision-making' and 'It is hard to reflect affiliate bodies' opinions'. (Figure 2.18).

Figure 2.18. Types of Problems with Partial Affairs Associations



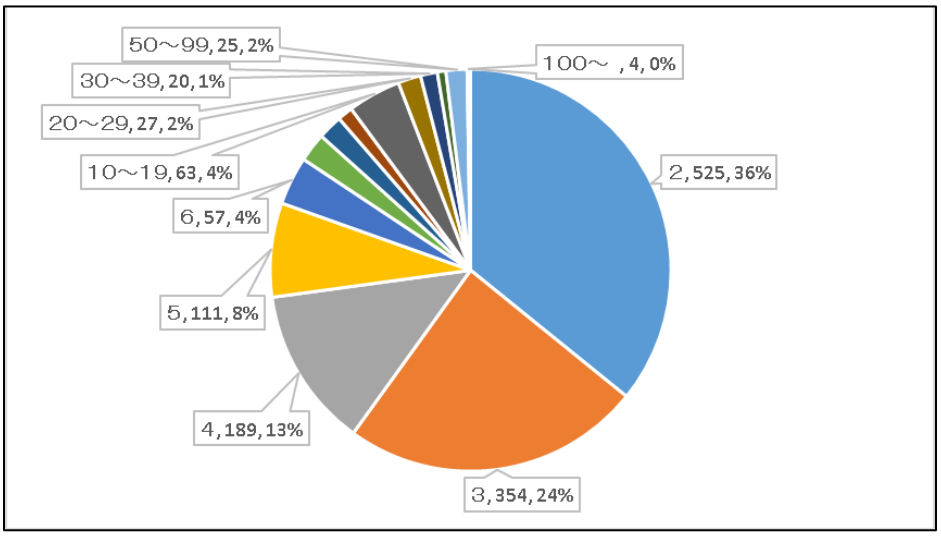
Source: Created by the author using MIC Survey (2012).

Other major sources of discontent with PAAs concern 'running out of time' and 'an imperfect reflection of views of the affiliates'. In many PAAs, the head of the chief executive is appointed from the heads of the affiliates, and decision making is based on consensus amongst the affiliates. Those structures often seem related to these concerns. Compared to the PAA, the council has fewer problems that take a long time to achieve consensus, but find it easy to include affiliates' in the decision-making process.
Overall, the affiliates want faster decision making and adequate consideration of their opinions, which leads them to taking simpler and more flexible administrative approaches.

Simplification of the system

Another problem for PAAs is the need to simplify the system. The distribution in the number of affiliates is shown in Figure 2.19. The number varies widely: the largest exceeds 100 and the smallest is just two. About 36% of all PAAs have only two affiliates (mini-PAA).

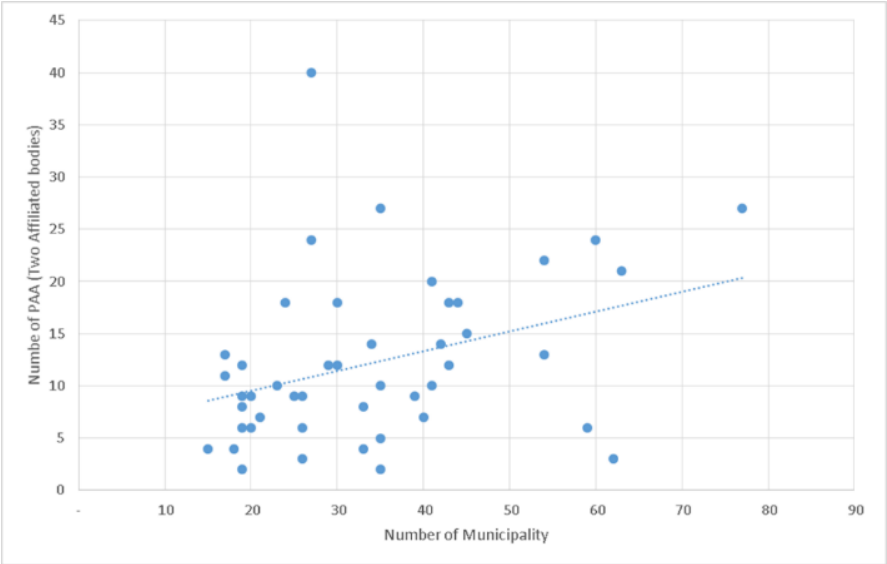
Figure 2.19. Distribution of Affiliates as of 2018



PAA = partial affairs association.
Source: Created by the author using MIC, Survey of the System of Joint Administration in 2018.

The percentage is not low, but it demonstrates overall inefficiency because the purpose is to join efforts. In some cases, the delegation of duties administrative approach would be more appropriate because the need for an independent office and staff might be ambiguous. The relationship between the number of municipalities and the number of mini-PAAs by prefecture (r=0.35), as shown in Figure 2.20, is weak.

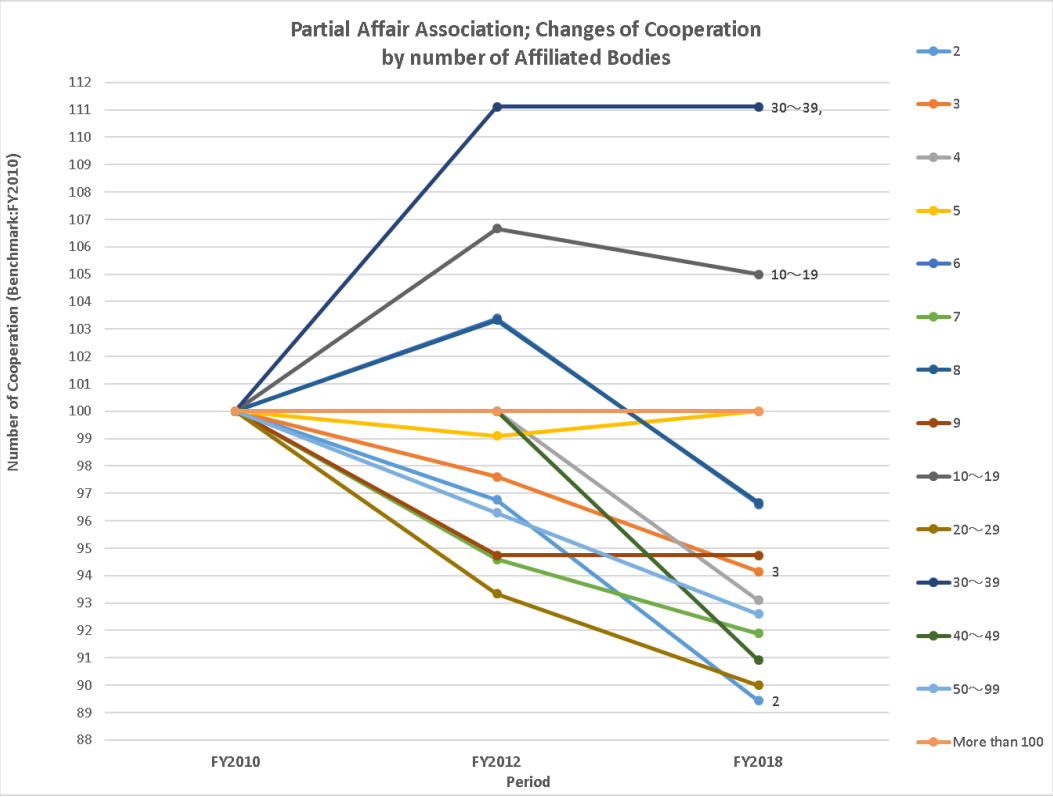
Figure 2.20. Relationship of the Number of Municipalities and the Number of Mini-Partial Affairs Associations by Prefecture



Source: Created by the author using MIC, Survey of the System of Joint Administration in 2014.

This means that the number of mini-PAAs is not closely related to the number of municipalities. Currently, mini-PAAs are believed to exist because of consecutive municipal consolidations and other historical factors. When these facts are considered, the way forward for wide-area administration is to make a 'flexible transition' from a PAA to one of the other methods. In some cases of a mini-PAA, it would be more reasonable to transition to a delegation of duty or to a joint establishment of organ method due to the costs of downsizing. After that, when the situation changes, a further transition may be required. Flexibility is required in today's local governments. The trend shows that the number of mini-PAAs has been decreasing, whilst mid-sized PAAs, whose affiliated entities are more than 30 but less than 40, have increased. Increasing in size is one of the characteristics of current PAAs (Figure 2.21).

Figure 2.21. Change in Number of Partial Affairs Associations by Number of Affiliated Entities

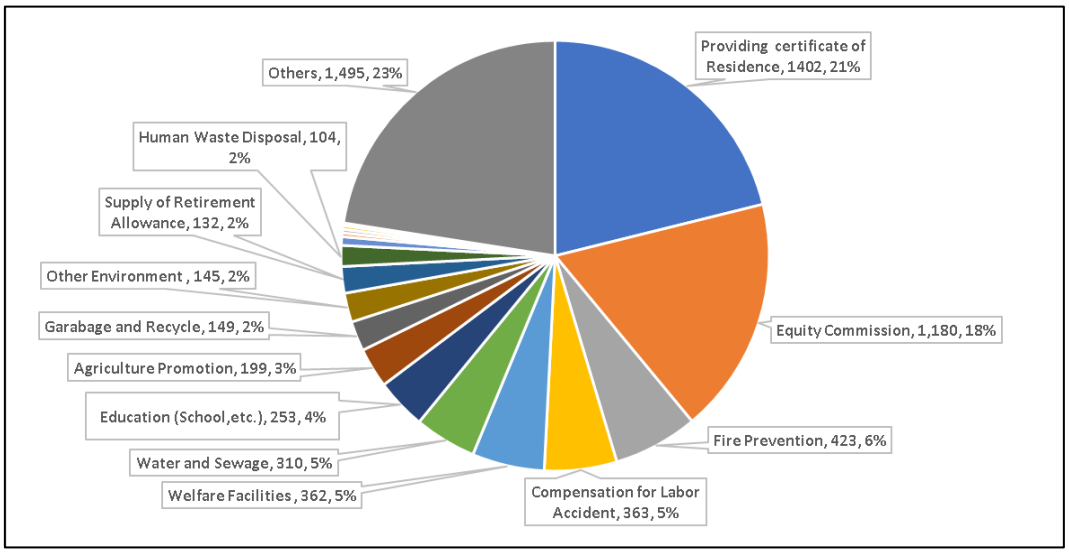


Source: Created by the author using Survey of the System of Joint Administration in 2010–2018.

2.4.2. Delegation of Duty

Delegation of duty is a contract type of IMC. An assignor entity (local government) and an assignee make a consignment contract; the authority concerned by the public affair is relegated to the assignee entity. For example, the bylaw concern of the assignee is applied to the jurisdiction of the assignor. This contract type IMC does not create a legal corporate status, and it makes neither the employments nor the facilities which bring about labour or operation cost amongst affiliates. Consequently, it is flexible and can easily transform to the IMC type a situation demands. The current principal affairs are providing certificate of residence (21%), equity commission (18%), fire prevention (6%), all of which are services which interface with residents' daily lives and require specialists (Figure 2.22).

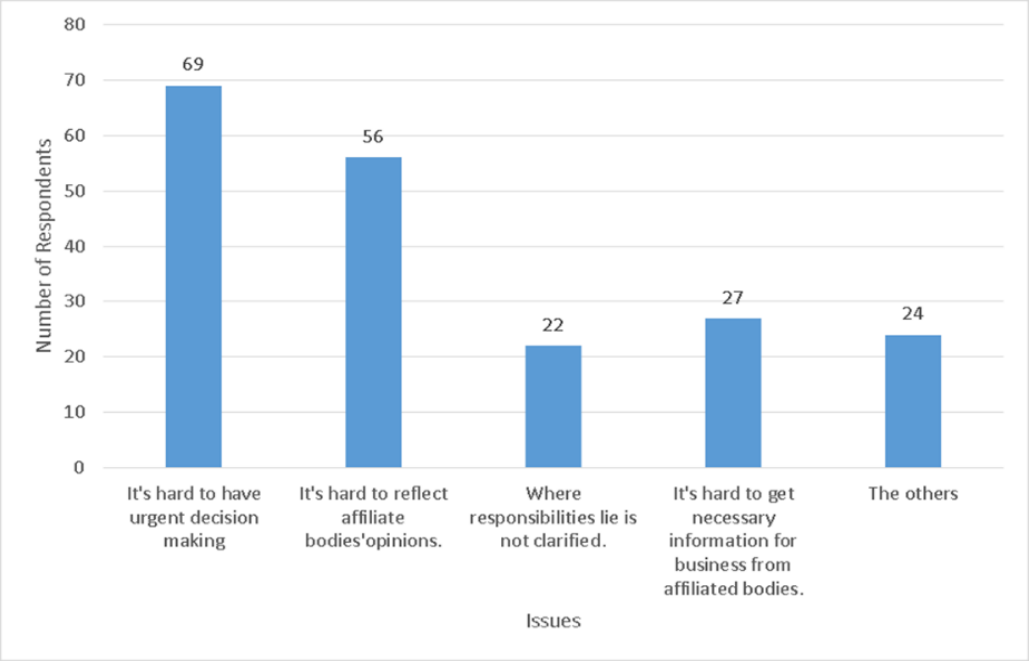
Figure 2.22. Affairs, Delegation of Duty



Source: Created by the author using MIC, Survey of the System of Joint Administration in 2018.

Delegation of duty is popular amongst IMC methods, but it has demerits. In the earlier-mentioned survey, 13.1% reported that problems exist, although this is less than half of the percentage that reported problems with PAAs. The inability to make urgent decisions was again picked as a common problem. This is in addition to 'It is hard to get necessary information for business from affiliates', according to 18.6% of the respondents, which is a remarkably high percentage. Concerning delegation of duties, the insufficiency of necessary information for business seems to be the problem that need to be addressed, but the amount of discontent is much lower here than with other administration methods (Figure 2.23).

Figure 2.23. Types of Problems with the Delegation of Duties



Source: Created by the author using MIC, Survey of the System of Transactions of Municipalities.

2.5. Garbage Disposal and Inter-Municipal Cooperation

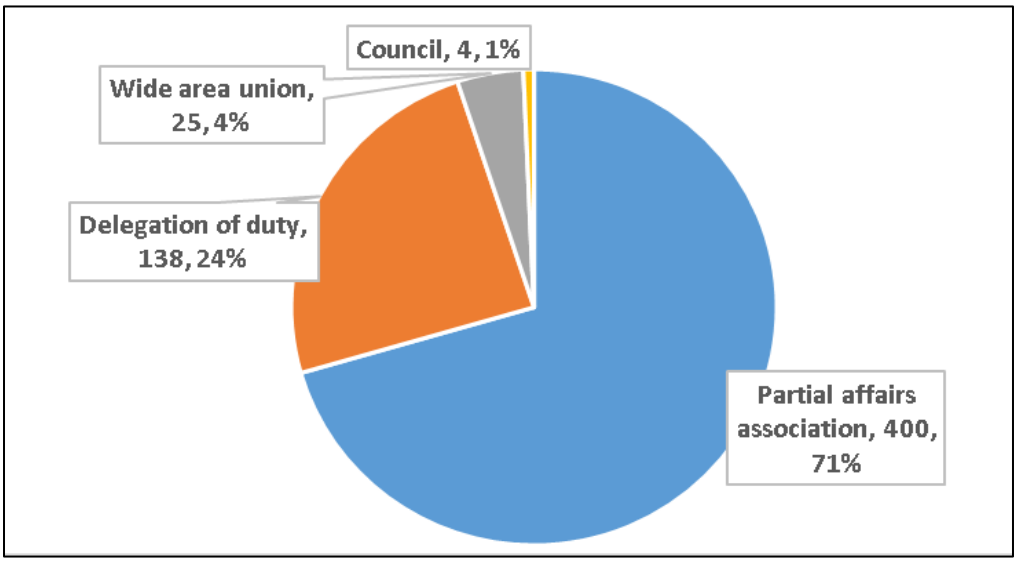
In the preceding sections, we gave an overview of the situation of IMC methods. This section is a survey of garbage disposal and IMC.

2.5.1. Partial Affairs Associations

Situation

PAAs are essential for garbage disposal as they include 71% of IMC entities. This is because garbage disposal services require certain staff and public facilities and corporate legal status type that can independently make contracts with their counterparts (Figure 2.24).

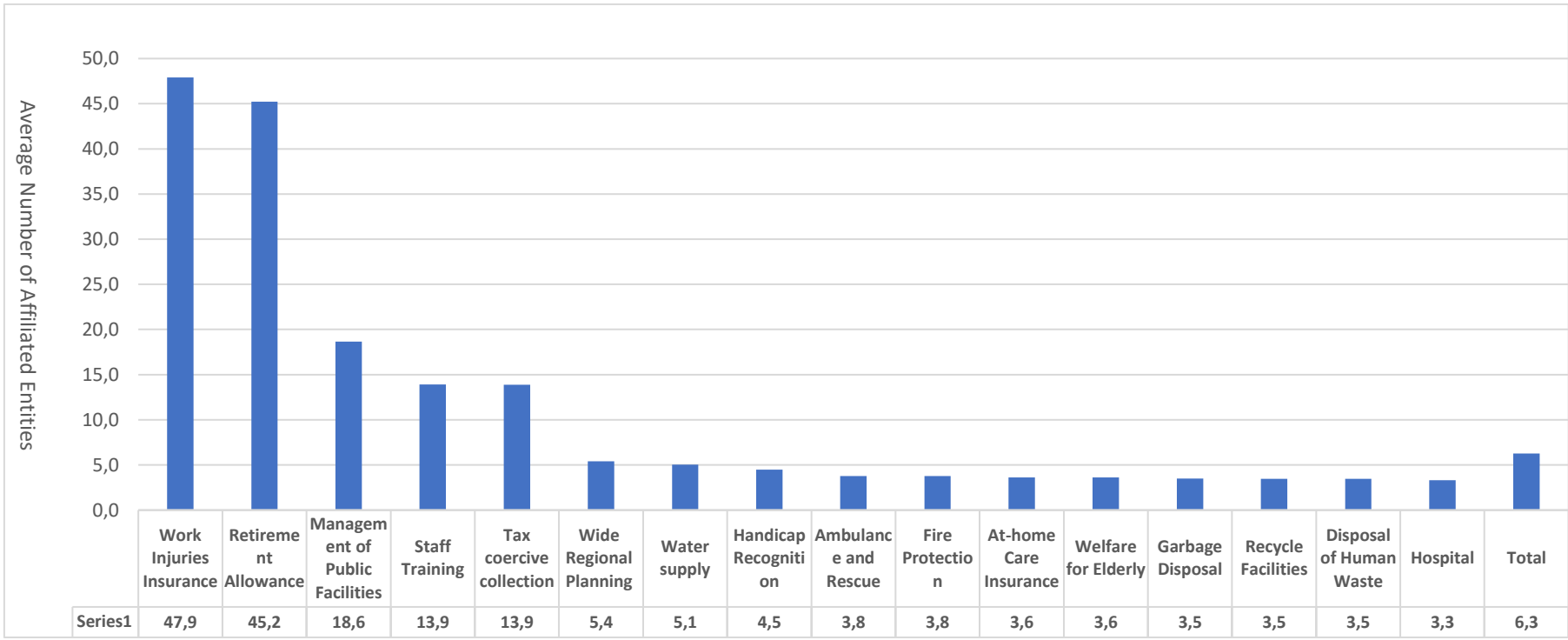
Figure 2.24. Garbage Disposal, Situation of Cooperation (FY2018)



Source: Created by the author using MIC, Survey of the System of Joint Administration in 2018.

The average number of the affiliated entities shows gaps depending on the type of service. The average number of affiliated entities of total PAA is 6.3 and that of garbage disposal PAA is 3.5; it is much fewer than the average (Figure 2.25).

Figure 2.25. Average Number of Affiliated Entities (FY 2018)

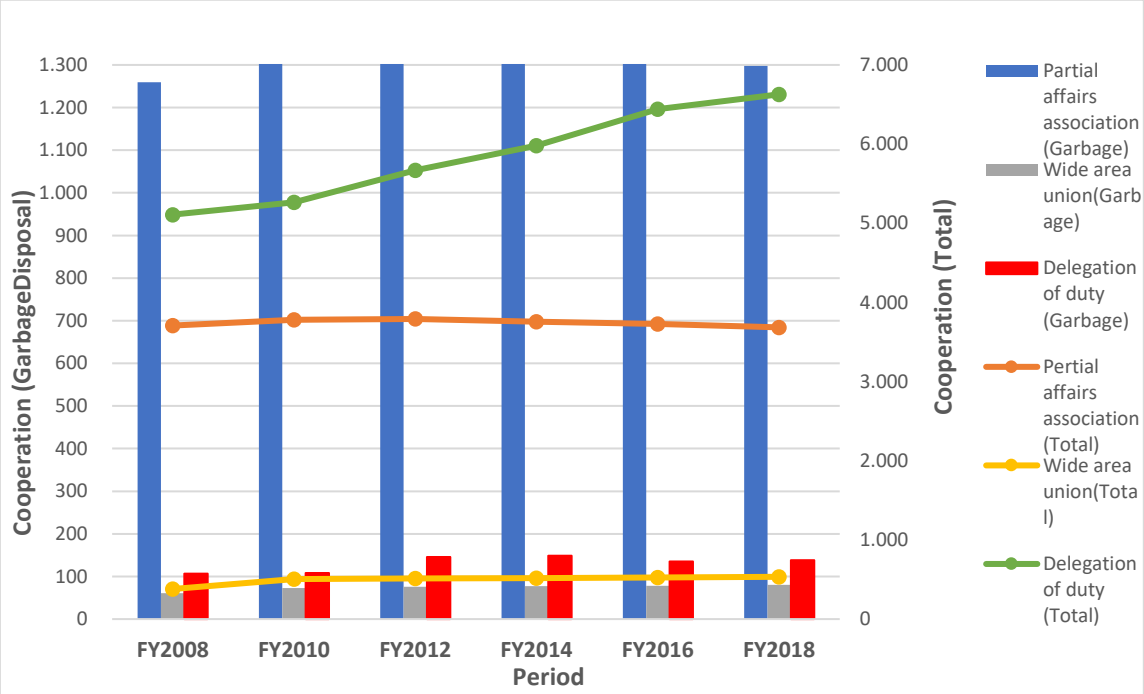


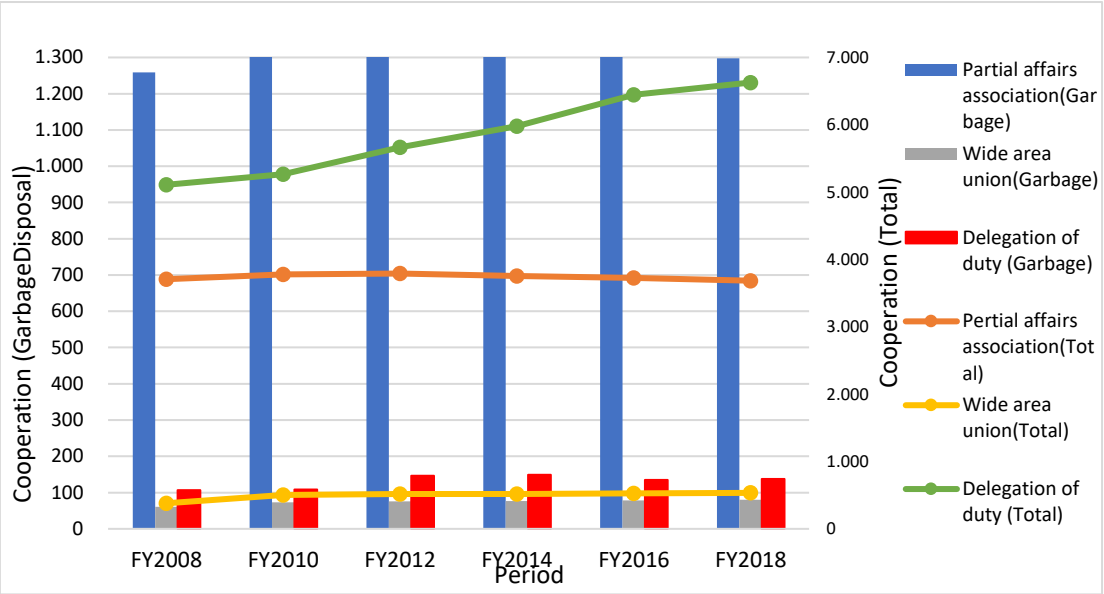
	Work Injuries Insurance	Retirement Allowance	Management of Public Facilities	Staff Training	Tax coercive collection	Wide Regional Planning	Water supply	Handicap Recognition	Ambulance and Rescue	Fire Protection	At-home Care Insurance	Welfare for Elderly	Garbage Disposal	Recycle Facilities	Disposal of Human Waste	Hospital	Total
Series1	47,9	45,2	18,6	13,9	13,9	5,4	5,1	4,5	3,8	3,8	3,6	3,6	3,5	3,5	3,5	3,3	6,3

Source: Created by the author.

This suggest that the type of PAA has an impact on the size of the affiliated entities. The type ‘not so frequent but highly probable needs’ is well-suited to mass disposal because it has a large number of the affiliated entities. The other type, ‘operating large size of public facilities’ has generally fewer affiliated entities. It also requires higher cost—investment for the facilities and payment of staffs—therefore the need for smooth consensus-building may cap the number of the affiliated entities. Since 2008, the total number of PAAs has been decreasing, whilst the total number of delegation of duty has been increasing. Under these situations, the number of PAA and the delegation of duty garbage disposal methods remains mostly at the same level (Figure 2.26).

Figure 2.26. Garbage Disposal Cooperation, Change of Number

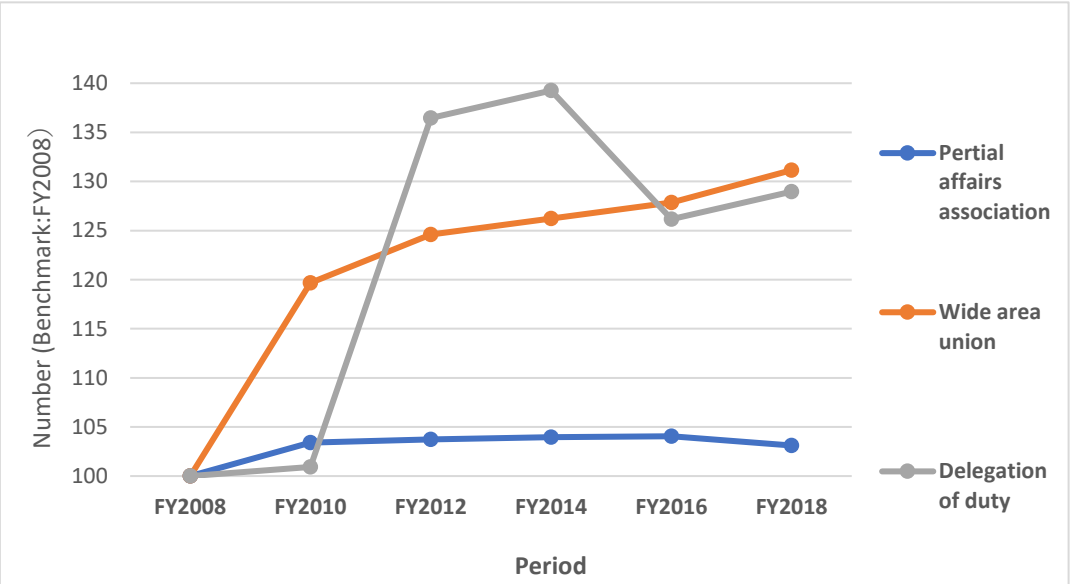




Source: Created by the author.

When we overview the change of the number in recent years with reference to that of the year of 2008, the number of PAA of garbage disposal has been increasing slightly and gradually. On the other hand the number of delegation of duty and wide area union has been fluctuating and increasing. This shows the fact that the new setup and the dissolution of the delegation is carried out more frequently amongst IMC methods.(Figure 2.27).

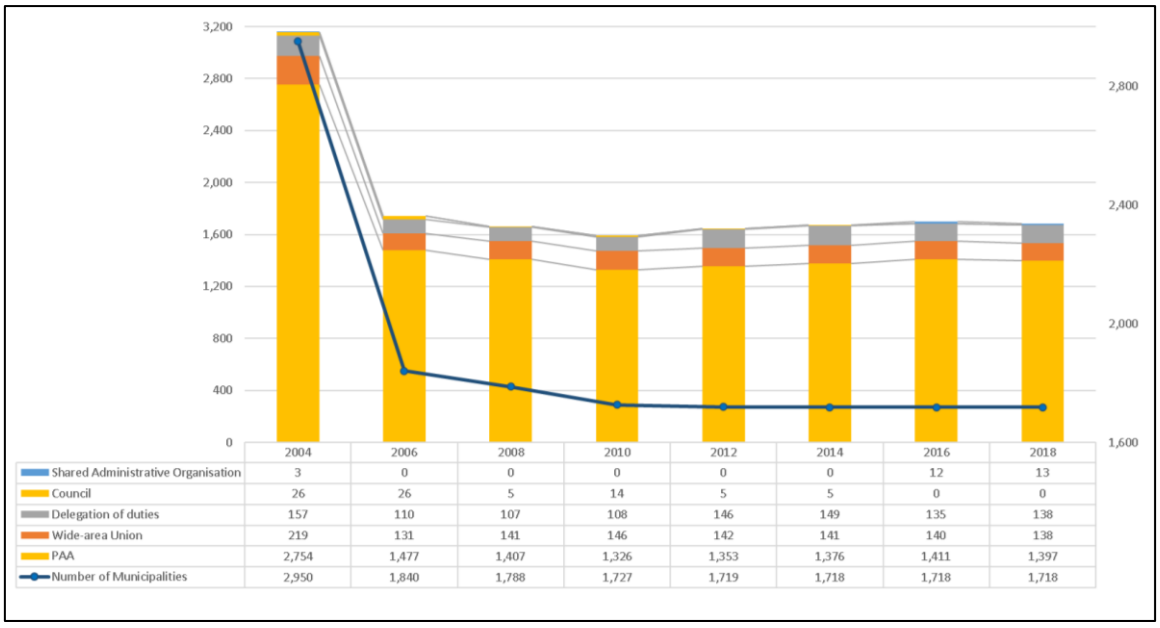
Figure 2.27. Garbage Disposal: Change in Numbers



Source: Created by the author using MIC, Survey of the System of Joint Administration in 2018.

The number of the IMC affiliated entities for garbage disposal shows a decrease in 2006 but a gradual increase since. Meanwhile, the total number of municipalities has significantly decreased because of the Heisei Consolidation. Figure 2.28 shows that, in spite of the progress made by municipal consolidation, the need for broader administration for garbage disposal is still strong. It also shows that IMC growth is still ongoing (Figure 2.28).

Figure 2.28. Garbage Disposal: Change of Number of Affiliated Entities



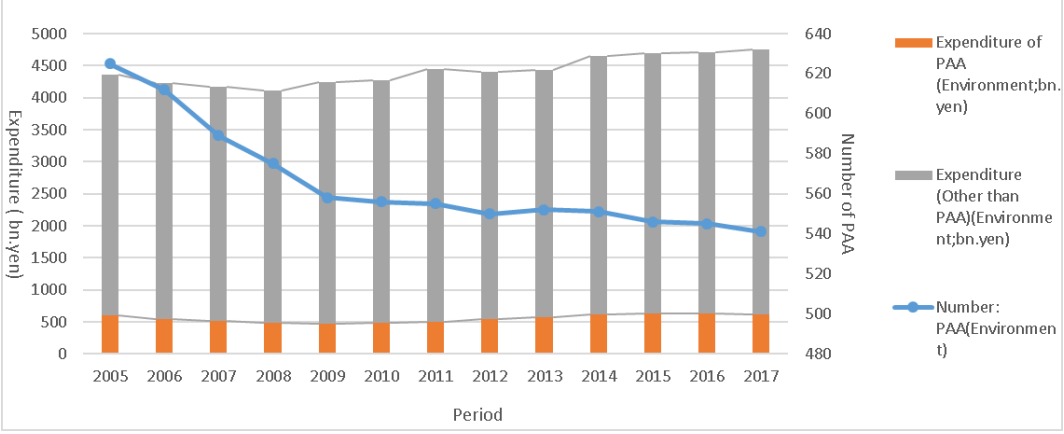
	2004	2006	2008	2010	2012	2014	2016	2018
Shared Administrative Organisation	3	0	0	0	0	0	12	13
Council	26	26	5	14	5	5	0	0
Delegation of duties	157	110	107	108	146	149	135	138
Wide-area Union	219	131	141	146	142	141	140	138
PAA	2,754	1,477	1,407	1,326	1,353	1,376	1,411	1,397
Number of Municipalities	2,950	1,840	1,788	1,727	1,719	1,718	1,718	1,718

Source: Created by the author using MIC, Survey of the System of Joint Administration in 2004-2018.

Expenditure

Next we shall view the scale of administrative activities through the size of expenditure. In the area of the environment, we shall classify PAAs in charge of environment administration (environment PAA) and others (sole municipality or other types of IMC). The number of environment PAAs steadily decreased, but the total number of PAAs has slightly and gradually increased (Figure 2.29).

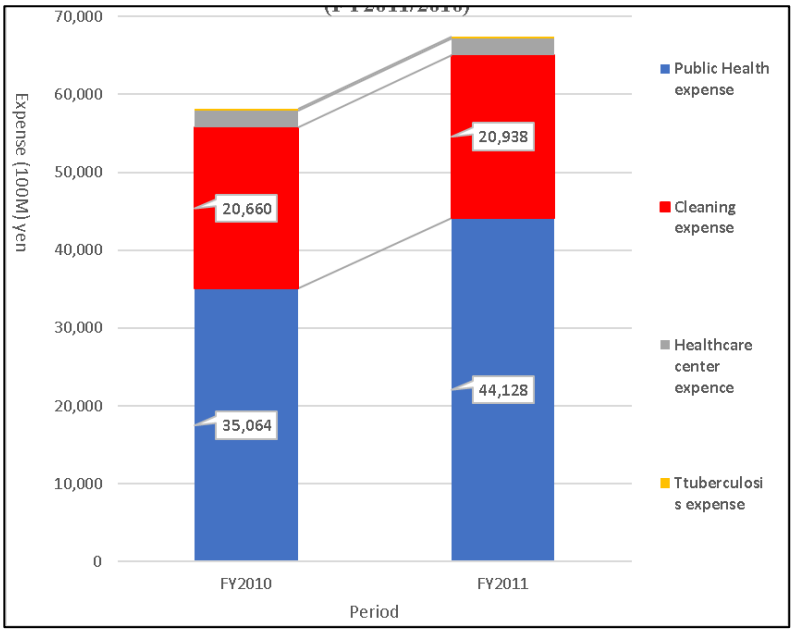
Figure 2.29. Expenditure Size of Environment: Public Affairs Associations and other Municipal Methods



Source: Created by the author using MIC (2019), White Paper on Local Public Finance, 2007–2019.

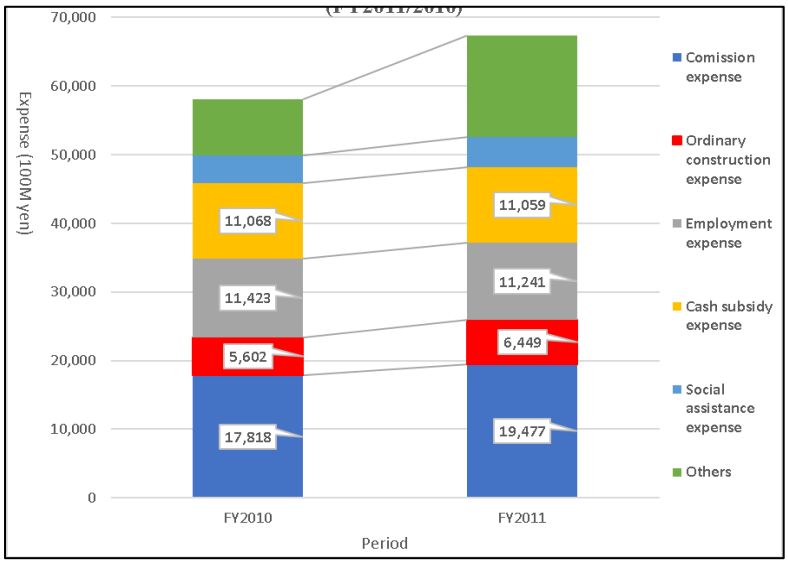
The turning point was the Great East Japan Earthquake in 2011. The disaster recovery and the emergency restoration called for more garbage disposal methods. This caused a sharp rise in garbage disposal expenses that are significantly higher than those of 2010, with about 11.4% disposed by PAAs. The commission expenses and ordinary construction expenses also increased in 2011 (Figure 2.30 and Figure 2.31).

Figure 2.30. Change of Environmental Sanitation Expense by Function (FY2011/2010)



Source: Created by the author using MIC (2019), White Paper on Local Public Finance, 2007–2019.

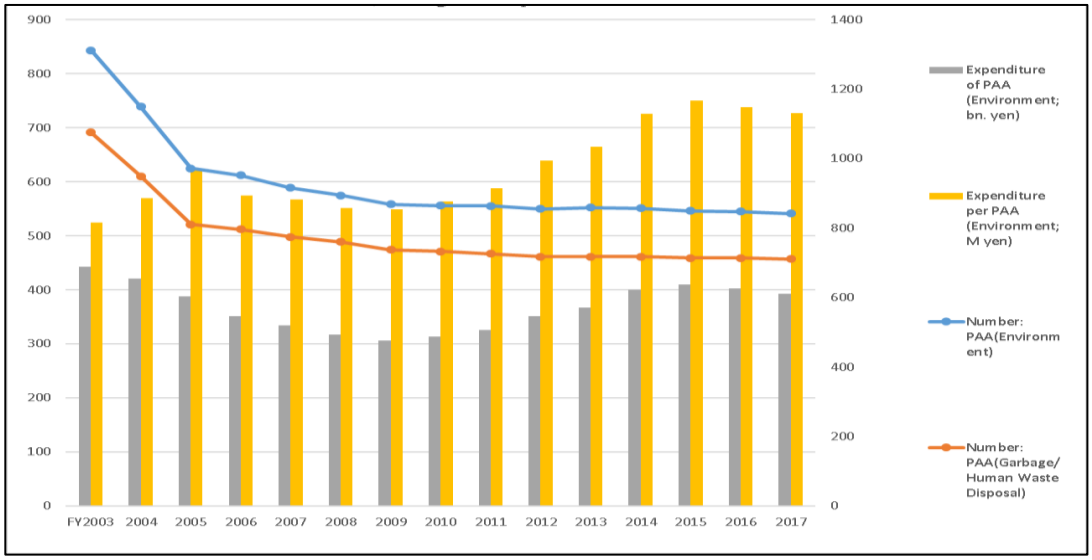
Figure 2.31. Change of Environmental Sanitation Expense by Characteristics (FY2011/2010)



Source: Created by the author using MIC (2019), White Paper on Local Public Finance, 2007–2019.

This is a typical case where a natural and social change has a clear impact on the demand for public service. This disaster showed the important role that PAAs play in the provision of public services. The number of the environment PAAs have decreased, especially those for garbage and human waste disposal PAA. However, the total expenditure of environment PAAs is fluctuating with an upwards trend after 2011. As a result of this, the expenditure per environment PAA draws a similar curve (Figure 2.32).

Figure 2.32. Environment Public Affairs Associations: Change of Expenditure Size

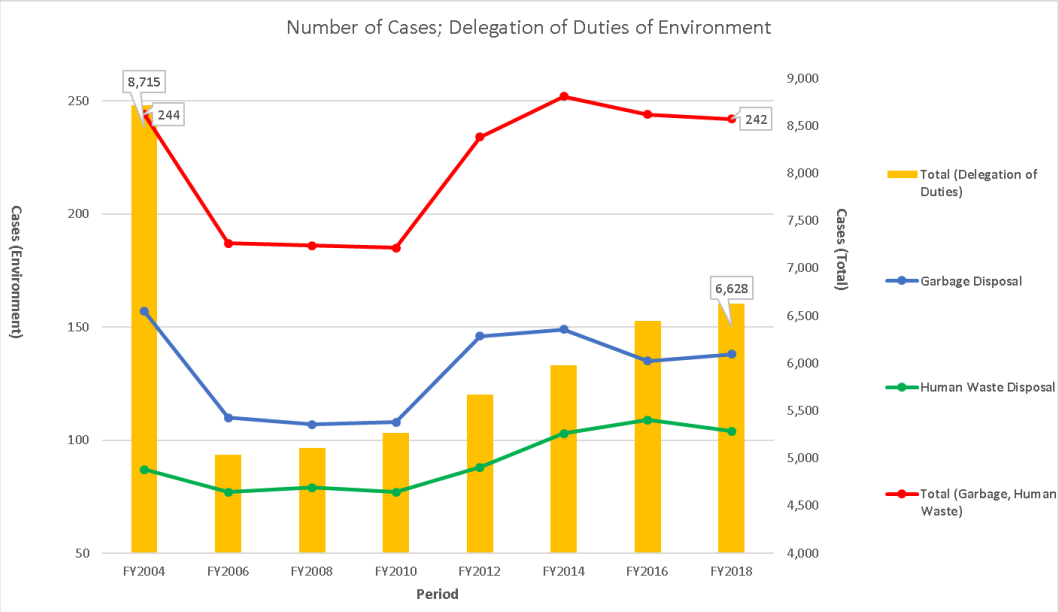


PAA = partial affairs association.
Source: Created by the author using MIC (2019), White Paper on Local Public Finance, 2007–2019.

2.5.2. Delegation of Duty

2011 was a turning point in public service provision: environment expenditure increased significantly because of the disaster recovery and emergency restoration shown in Figure 2.29. By the same token, the number of the affiliated entities, especially PAA and the delegation of duty types, increased as shown in Figure 2.28. Both of them have been principal and preferred IMC methods of most municipalities. Affiliated entities which make much of consensus-building have a preference for PAA, and a central city in the region with the initiative for broader disposal would accept a delegation of duty with neighbouring smaller municipalities (Figure 2.33).

Figure 2.33. Number of Cases, Delegation of Duties of Environment

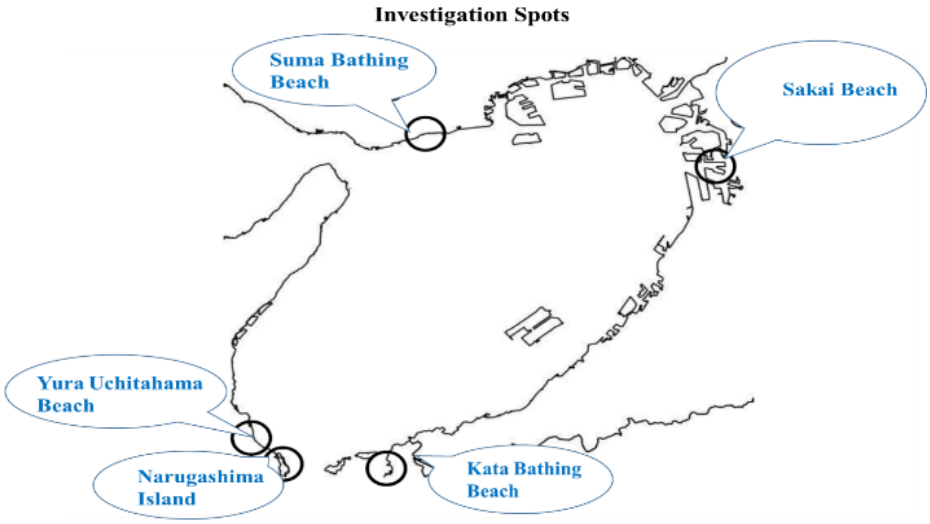


Source: Created by the author using MIC (2019), White Paper on Local Public Finance, 2007–2019.

2.5.3. Wider-area Union

The new wave is the wider-area union (WU). We shall focus on the case of the Kansai WU where plastic garbage is becoming a hot issue. In reaction, the Kansai WU carried a broad area survey of the generation of plastic garbage along Osaka Bay, across each affiliated entity's boundary as shown in Figure 2.34.

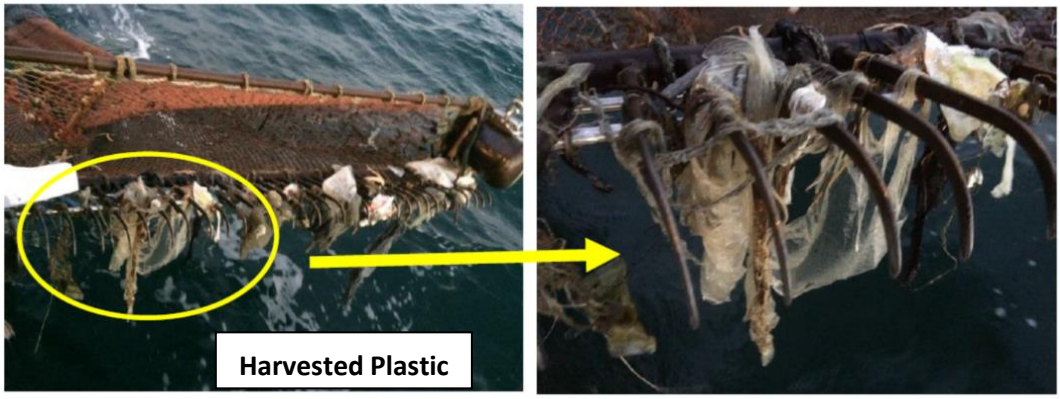
Figure 2.34. Survey at Osaka Bay



Source: Kansai Wider-area Union (2019), Report by the Committee on Counter-measure against Ocean Garbage.

Figures 2.35 shows the results of the Kansai WU fact-finding survey.

Figure 2.35. Plastic Garbage Harvested from Osaka Bay



Source: Kansai Wider-area Union (2019), Report by the Committee on Counter-measures against Ocean Garbage.

General waste disposal is the affair of municipalities. The Kansai WU is implementing the entitlement program. Based on the data and analysis of the surveys, each affiliate can plan regulation (through bylaws) and the other detailed policies. The contemporary society is getting complex and throwing up new administrative demands such as plastic waste. Such situations call for broader area fact-finding functions that can be done through IMC.

2.6. Conclusion

Based on the overview above, the following conclusions are made:

2.6.1. The Principal Changes of Japanese Inter-Municipal Cooperation

The question was 'what are the principal changes to Japanese IMC? In answer, we came to the conclusion that there are three significant and defining features of Japan's administrative situation.

1. **The large range of public affairs**

   The local governments are given a large range of authority and responsibilities amongst the total government sectors according to national acts concerned. This is the basic framework and the characteristic of Japanese internal administration.

2. **The population decline**

   The population of Japan has been declining sharply after peaking at 128.08 million in 2008. The government has begun taking inclusive measures to counteract this shrinking society; promoting inter-communal cooperation as one of the central policies. The significance of the IMC system is widely-accepted in the government sector.

3. **Need for wide-area public services**

   The need and the expectation for wide-area public services have been so strong in Japan that both consolidation and IMC measures advanced concurrently.

In light of these, the principal changes to Japanese IMC are:

1. **Growing number of affiliated entities**

   When the need for wide-area public services are still strong and an area becomes depopulated, the reasonable decision is pursuing IMC. This has resulted in a steady increase in the number of the affiliated entities.

2. **Progress of diversity**

   The legal framework is provided in the LAL even as the contemporary society becomes more complex. Various IMC initiatives have been developed, including corporate legal status types and non-corporate legal status types. These are the main changes to the current IMC frame and how to make use of the IMC methods is closely related with each region's strategy for revitalisation.

2.6.2. The Key to Effective Regional Waste Management

The IMC methods are significant in the environment area. In this area nuisance and contiguous costs are intrinsic and consensus-building amongst the affiliated entities is especially important. Under this situation this area has two characteristics:

1. The diversity of IMC initiatives has become prominent. Where PAAs are well-suited for formulating consensus such as in location of garbage facilities, range of emission standards, scale and timing of investment, they will be more developed. On the other hand, where flexibility of the business is given higher value or a central city has already established leadership in the region, the contract type will be preferred.
2. Much value should be placed on broad fact-finding through IMC before starting the policy-planning process as the Kansai Wide Area Union case shows; for example. This is because precise fact-finding for an upcoming administrative agenda is highly significant.

In conclusion, IMC strategies are closely related to regional revitalisation in depopulated areas and are worth paying attention to. How to effectively make use of an IMC system for the garbage disposal service has been significant but it will gain in importance for the local administration stakeholders and the citizens in the coming decades in Japan.

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Chapter 3

Inter-Municipal Cooperation on Solid Waste Management in Japan: Its Challenges and Implications for ASEAN Countries

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Abstract

As municipal solid waste (MSW) management is globally recognised as an imperative issue towards the decarbonised future, inter-municipal cooperation gains momentum. It can expect mutual benefits such as improvement of cost efficiency and introduce environmentally sound technologies amongst member cities (and sometimes via public–private partnerships). This chapter clarifies the status quo of inter-municipal cooperation on MSW management in Japan and analyses the incentives and challenges by showing several case studies. It also drew some implications for cities in the Association of Southeast Asian Nations (ASEAN) countries. Inter-municipal cooperation varies depending on the needs and capabilities of municipalities so that each municipality needs to investigate the most suitable approach and cooperation type. In the context of ASEAN countries, issues in finance, legal systems, and governance need to be tackled to introduce a system for inter-municipal cooperation.

Keywords: Municipal solid waste management, inter-municipal cooperation

3.1. Introduction

The importance of municipal solid waste (MSW) management is increasingly recognised in the discourse of urban sustainability as populations in cities explosively rise globally. Although many cities struggle with severe economic conditions, they try to reduce the costs and maintain sufficient public services by exploring different approaches such as

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amalgamation and cooperation with neighbouring cities. Inter-municipal or regional cooperation is one way that several municipalities (and the private sector) work together for the efficient delivery of public services and mutual benefits. The cooperative arrangements amongst municipalities have been widely implemented in many countries, and it is not a new attempt in Japan either. Because of depopulation, financial distress, and response to climate mitigation, however, the Japanese government has encouraged municipal governments to cooperate regionally and concentrate on waste treatment facilities in recent years.

In this chapter, we aim to clarify the status quo of inter-municipal cooperation on MSW management in Japan and analyse the incentives and challenges. We also attempt to draw the implications for the cities and regions in the Association of Southeast Asian Nations (ASEAN), confronting the severe problems of MSW, such as insufficient collection, open burning, and open dumping. For instance, the Indonesian government has recognised an emergency of MSW, enacting regulations for building waste-to-energy (WTE) plants for waste incineration and energy generation (Damanhuri, 2019; Diela, 2019). One of the leading cities, Bandung, the capital city of West Java has limited land for waste treatment and disposal facilities. Some of the WTE-related facilities are constructed near Bandung and can receive waste from several municipalities. In Thailand, the national government promotes a policy for clustering municipal governments on waste management in wider regions. The issues of waste reduction and renewable energy for climate change mitigation are considered urgent in many ASEAN countries. Although there already exist international cooperation programmes by different agencies, including the Japan International Cooperation Agency, the demands for learning from the Japanese experiences of regional waste cooperation would increase further. [12]

This chapter is composed of three parts. First, section 3.2 gives a brief overview of the historical development of MSW management in Japan. By looking at the shifts of policy interests over the years, it focuses on incineration, the dominant treatment method in Japan, and regional waste management. Second, this chapter explains inter-municipal cooperation in Japanese MSW management by introducing various types of cooperation as well as challenges. The last section discusses the analysis and gives a short implication

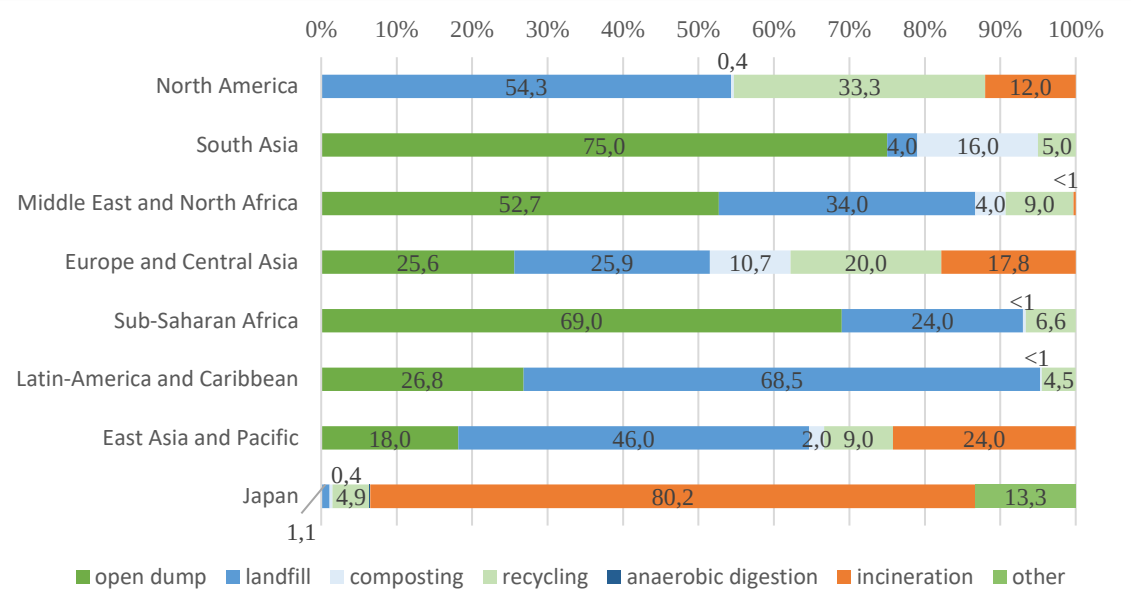
[12] The activities by inter-municipal organisations for international cooperation are still limited in Japan. One of the most active players of international cooperation for knowledge transfer of MSW management is the Clean Authority of Tokyo, an inter-municipal body of 23 wards in Tokyo. See Sasaki and Kojima (2019) for detailed information.

for ASEAN countries.

2.2. Overview of Municipal Solid Waste Management in Japan

The high ratio of incineration in treatment methods is one of the major characteristics of MSW in Japan. As shown in Figure 3.1, compared with other countries in the world, Japan relies heavily on incineration. Since land is constrained by a dense population, incineration has, at times, seemed to be the only appropriate solution. It was initially encouraged with the aim of combatting epidemics. Nevertheless, as the incineration technology has been developed, it has gradually become a major disposal method for reducing the amount of wastes and generating energy.

Figure 3.1. Waste Disposal Methods by Region



Notes: The percentages are based on a graph from Kaza, et al. (2018) and the dataset of World Bank (2018). Some numbers are shown as '<1' as stated in the original graph. The number in East Asia and Pacific does not meet 100%, but it is also based on the original data.
Source: Compiled by the authors based on Kaza et al. (2018) and World Bank (2018).

Waste management has been treated as a part of a larger set of hygiene policies since the 19th century. These policies were aimed at tackling epidemics by patients and to disinfecting their living areas (Yatsuki, 2004). Following the Waterworks Ordinance in 1890, the laws for waste management (Waste Cleaning Act) and sewerage (Sewerage Law) were enacted in 1900.

Since then, Japanese municipalities have played an active role in waste management. The Waste Cleaning Act determined that the collection and disposal of waste are under the responsibility of municipalities. It also placed 'waste treatment operators under the

supervision of government organisations to establish a waste administration system' (MoE, 2014, p.3). At the same time, it is stated within the act that the waste needs to be desirably incinerated (MoE, 2014, p.3). The Act on Emergency Measures concerning the Development of Living Environment Facilities, enacted in 1963, also pushed forward the promotion of incineration facilities in municipalities (MoE, 2014, p.4). Under rapid economic growth, Japan urgently needed to treat urban waste by introducing incineration plants. The construction of landfill sites was not an easy task in a country with scarce land. Later, the purpose of waste management gradually shifted from sanitation to environmental protection. Dioxin emissions from incineration became problematic in Japan in the latter half of the 1990s. The national government began to implement measurements and enacted a law against dioxin emissions. As larger incineration plants were enabled to have a stable combustion condition for dioxin reduction, the national government encouraged the local governments to install such high-performance facilities by cooperating with neighbouring municipalities to concentrate on the plants (Ministry of Health and Welfare, 1999).

To promote those measurements, the government prepared the subsidies for MSW, especially incineration plants with special facilities. For instance, incineration plants with the WTE technology are subsidised up to half of the total cost (Kaza, et al., 2018, p149). Also, the prefectural governments were encouraged to make a plan for regional cooperation and concentration, and they were subsidised by the central government based on such plans. Such measurements have proceeded since the mid-1990s resulting in reductions in the number of incineration plants by 40% all over the country: from 1,769 in 1998 to 1,120 in 2016 (MoE, 2019a). At the same time, the incineration facilities have scaled up and almost half of the plants had a capacity of over 100 tons/day in 2016, contributing to dramatic reductions in the emission of dioxin and achieving the goal, 33 g TEQ/year (MoE, 2019a).

The Ministry of Environment continuously encourages the municipalities to set larger-scale goals for their incineration facilities. These goals include over 100 tons/day for all facilities and a scaling up to over 300 tons/day for areas with 100 to 300 tons/day. If the scaling up seems difficult, a measurement for utilising the applicable efficient technologies to collect the energy (e.g. gasification of biomass) should be considered (MoE, 2019a).

2.3. Inter-Municipal Cooperation in Waste Management

2.3.1. Cooperation Types

Cooperation amongst neighbouring municipalities is commonly implemented officially and unofficially in many countries. Particularly, inter-municipal cooperation is widespread throughout western Europe in various forms and is adapted to the historical, geographical, legal, or political background of each country. (Hulst, et al. 2009; Kamo, 2010).

According to Hulst, et al. (2009), arrangements of cooperation can be classified into three perspectives: (i) composition (only municipalities or mixed of different actors, i.e., public and/or private ones), (ii) scope (single-purpose or multi-purpose), and (iii) degree of organisational integration (public services are delivered by separately established organisations or through agreements of partnering cities).

With respect to the regional cooperation in MSW management in Japan, various kinds of cooperation could be classified based on the perspectives of Hulst et al. (2009) (Table 3.1).

Table 3.1. Inter-municipal Cooperation for MSW in Three Perspectives

		Examples in Japan
(i) Composition	Inter-municipal: organisations consisting of municipalities	partial affairs association, wide area cooperative
	Public–private: municipality and private sector	PFI/PPP (e.g. DBO, BOT), outsourcing
	Mix: several municipalities (or regional governmental body), other public entities, private sector	PFI by a partial affairs association, BOT concession by several municipalities
(ii) Scope	Single-purpose: setting up an organisation or agreement a single purpose	Inter-municipal organisation aimed only for MSW management
	Multi-purpose: setting up an organisation or agreements for multiple purposes	agreement for comprehensive regional collaboration
(iii) Degree of organisational integration	Setting up a separate governmental body	a partial affairs association, wide area cooperative
	Agreements	agreements of several municipalities, concession agreement

BOT = build–operate–transfer, DBO = design–build–operate, MSW = municipal waste management, PFI = private finance initiative, PPP = public–private partnership.
Source: Compiled by the authors, based on the three perspectives on inter-municipal cooperation by Hulst, et al. (2009).

The composition of inter-municipal cooperation could be inter-municipal, public–private, or mixed. The most common type for MSW management in Japan is inter-municipal, establishing associations in several municipalities under the Local Autonomy Law (horizontal cooperation in many cases). Amongst such associations, a partial affairs association (*ichibu jimu kumiai*) and a wide-area cooperative (*koiki rengo*) are the most numerous (MIC, 2018).[13] Both are established for municipalities to cooperate and implement certain tasks together. Wide-area cooperatives were created in 1995 as a new type of regional cooperation, enabling local governments to collaborate more flexibly with national/prefectural governments compared with partial affairs associations. In 2017, there existed over 9,000 cases of inter-municipal cooperation in Japan. Amongst them, 567 organisations were established for waste treatment (MIC, 2018)[14].

The congress of these associations is independent from the member municipalities. In many cases, such associations consist of neighbouring municipalities and the mayor of one of the members is inaugurated as a head. According to the Local Autonomy Law, inter-municipal organisations ought to make agreements regarding several points, such as election of congress members and selection of members to an executive committee. The number of congress members, selected from the assembly of a respective municipality, are commonly decided based on the population size. For instance, the Osaka Waste Management Authority consists of four municipalities. There are 22 assembly members: 15 members from Osaka City, the largest city amongst them, three from Yao City, and two each from Matsubara City and Moriguchi City,[15] In the case of the Congress of Clean Authority of Tokyo, there are 23 congress members and they are all chairs of the assembly of the 23 participating wards in Tokyo.

Public–private composition includes various kinds of public–private partnerships (PPP), including private finance initiatives (PFI) and design–build–operate (DBO) as well as outsourcing, which will be explained later. Cooperation amongst different types of actors, e.g. municipalities (inter-municipal organisations), other public entities, and the private sector can be classified as mixed.

Cooperation can be aimed for single-purpose or multi-purpose. For example, if a partial affairs association is established only for waste management, it is considered as single-

[13] Translation for the names of associations are not fixed. For example, ichibu jimu kumiai can be translated as partial administrative cooperation, partial cooperative, or any terms.

[14] The number is only for waste treatment, excluding operation of facilities for recycling and sewage. Regarding the number of cases, there would be an overlap in counting when some organisations deal with multiple duties.

[15] See the articles of the Osaka Waste Management Authority. http://www.osaka-env-paa.jp/index.html

purpose. If the association is organised for several aims, e.g. sewage or firefighting, it is considered as multi-purpose.

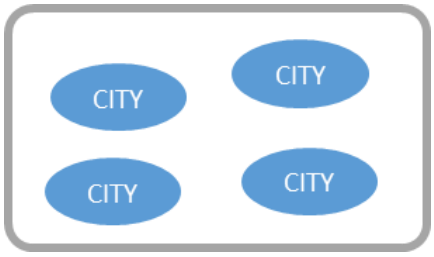
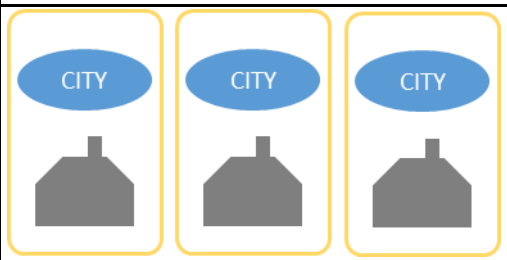
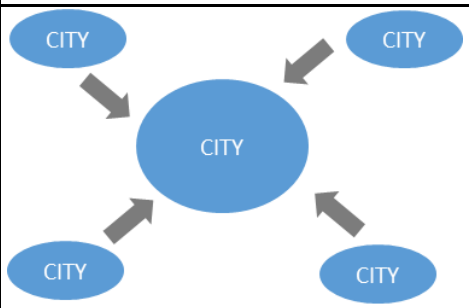
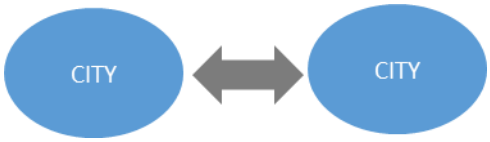
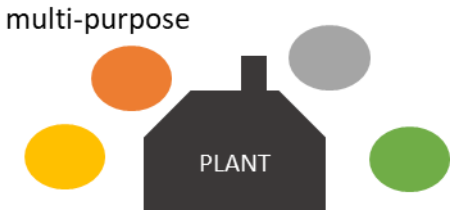
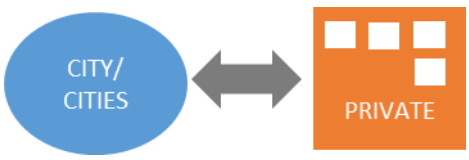
The degree of organisational integration also differs in each form of cooperation. Municipalities can choose to establish a separate governmental body like a partial affairs association or to make agreements. Abe (2010) explained that a cooperation scheme is not limited within the legal framework but also entails various committees, meetings, or even informal exchanges of information amongst officers between municipalities.

In Japan, the cooperation of municipalities on waste management was initially proposed for reducing the volume of waste being dumped and regulation pollution of waste incineration plants around the 1970s. Since then, the aim has been shifted to increase efficiency in MSW management and to contribute to sustainable development, including climate change mitigation. Japan struggles with depopulation and its world-leading aging rate, and financial shortages and a lack of capacity for MSW are severe issues at the local level. On the other hand, waste reduction and greenhouse gas emissions are a prerequisite for sustainable waste management. Inter-municipal or regional cooperation can expect economies of scale; these require a smaller number of waste management facilities than those being treated by a respective municipality, resulting in reduced costs. Under such circumstances, the government expects that collaboration in several cities for waste management will be enhanced to increase efficiency and build a reciprocal relationship amongst partner cities.

Through notification by the Ministry of Health, Labour and Welfare in 1997, the national government has encouraged municipalities to cooperate in this way. In 2019, the MoE released a new notice on wide-area waste management and concentration for securing sustainable and adequate treatment (MoE, 2019a).

The MoE (2019a) addresses the purposes of regional cooperation and concentration as (i) securing sustainable and proper treatment, (ii) implementation of climate change mitigation measures, (iii) promotion of the use of biomass and waste as resources, (iv) reinforcement of disaster measurement, and (v) creation of new values in the community accepting the facility.

Table 3.2. Different Types of Regional Cooperation and Centralisation

Types	Image	Description
(1) Establishing (inter-municipal) organisations		Neighbouring municipalities establish an inter-municipal association for treating waste together. Examples: partial administrative associations, wide-area cooperatives or other forms of cooperation/agreement
(2) Sharing the roles of MSW treatment amongst municipalities		Several municipalities share the roles of waste treatment and divide the tasks based on the type of waste.
(3) Accepting of MSW at a large municipality from smaller municipalities		A large municipality accepts and treats MSW from surrounding small municipalities.
(4) Mutual support amongst municipalities in case of waste plant closure for restoration		In case of closure of waste facilities due to the restoration of main facilities of waste management treatment, other municipalities cooperate to treat MSW.
(5) Multi-use MSW plant with other infrastructure		Waste treatment facility has multi-functionality, including sewage treatment facilities.
(6) Utilisation of private sector (PPP)		Municipality (or inter-municipal organisation) consigns waste treatment to facilities of private enterprises to fortify the waste facilities. Examples: PFI/PPP, outsourcing

MSW = municipal waste management, PFI = private finance initiative, PPP = public–private partnership.
Source: MoE (2019a). The brackets and examples were added by authors.

Table 3.2 describes six different methods for implementing regional cooperation and centralisation stated in the notice by MoE (2019a). Besides (5), all the methods could be considered as different types of cooperation amongst cities and/or the private sector.

(1) Establishing (inter-municipal) organisations: one of the major methods is to establish an organisation with neighbouring municipalities to achieve cooperation for waste treatment, such as partial administrative associations or wide-area cooperatives.

(2) Sharing the roles of MSW treatment amongst municipalities: several municipalities share the role of waste treatment, and each municipality takes a part of the entire MSW treatment. In the case of cities like Yokosuka and Miura in Kanagawa Prefecture, for instance, two municipalities signed the agreement to share the roles of waste treatment. Yokosuka City is in charge of construction and maintenance of intermediate facilities, whilst Miura City takes a part of the construction and maintenance of the final disposal facility (Yokosuka City and Miura City, 2008). They share the costs of construction, maintenance, and the restoration of facilities (Yokosuka City and Miura City, 2008).

(3) Accepting of MSW at a large municipality from smaller municipalities: a large municipality accepts SMW from neighbouring small municipalities and treats the wastes. These small municipalities pay the waste treatment costs to the large municipality. For example, Kitakyushu City, a metropolitan city in Fukuoka prefecture, made an agreement with 16 neighbouring smaller municipalities to accept the solid waste that they generated. They currently plan to develop it as an administrative body, the Kitakyushu Wide Area Region (*Kitakyuhu koikiken*), and the agreements on regional waste cooperation will be included within the vision of the body (Kitakyushu City, 2019).

(4) Mutual support amongst municipalities in case of waste plant closure: this is a case considered for situations in which a waste treatment facility is closed such as for restoration and other municipalities need to cooperate for MSW treatment.

(5) Multi-use of MSW plants with other infrastructure: to utilise an MSW plant efficiently, multi-use of plants is encouraged, such as with sewage treatment.

(6) Utilisation of private sector (PPP): a municipality(ies) or inter-municipal organisation builds a partnership with the private sector through PFI or outsourcing. This concept will be explained later in this section.

Table 3.2 does not cover all types of cooperation. Municipalities form different settings that are suitable for them. Fukuoka City, the capital of Fukuoka prefecture is another case. The city and four neighbouring cities established an association called 'Fukuoka Metropolitan Region Nambu Association,' which consists of a population of 1.8 million people. The five member municipalities signed an agreement in 2002, and the association

started to manage an incineration facility with the capacity of 510 tons/day and a landfill site in 2016 (Fukuoka Metropolitan Region Nambu Association, n.d.). Fukuoka City itself possesses three other incineration plants, but the city is a part member of an association, whilst retaining its own waste facilities (Fukuoka Metropolitan Region Nambu Association, n.d.).

The merging of municipalities is another way to enjoy economies of scale. In some western European countries such as Germany or Sweden, the merging of local governments has been promoted for efficient and sufficient delivery of public services, whereas France and Spain keep small-scale cities and maintain services mainly by regional cooperation (Kamo, 2010; Hulst, et al., 2009). In Japan, there was a large-scale amalgamation of municipalities in the 2000s, resulting in a decrease in the number of municipalities from about 3,200 to about 1,800. Although the arrangements for inter-municipal cooperation are maintained, the merger affected the waste management policy as well. Inter-municipal cooperation could also be considered an excuse to avoid this kind of amalgamation (National Association of Chairpersons of City Councils, 2018). However, even in the event of amalgamation, it does not mean that the roles of inter-municipal organisations decrease. Rather, its significance is increased as such organisations function intermediately between the lower and higher levels of governments, which builds up a 'multi-tier government' (Kamo et al., 2010).

2.3.2. Challenges of Inter-municipal Cooperation

Although municipalities are motivated to build cooperation due to considerations of cost efficiencies of public service delivery, transaction costs or start-up and coordination costs could be higher than those for a single municipality (Bel and Warner, 2015; Hulst, et al., 2009). Inter-municipal cooperation has increased in number in Japan, but some municipalities face difficulties. This section introduces the following three cases as examples of the challenges municipalities face.

Case 1: Failure in consensus building amongst municipalities and citizens (Tagawa East Environment Sanitation Association)

In the Tagawa region, located in Fukuoka Prefecture, four municipalities agreed to build a new incineration plant in 2000. They established a partial administrative association in the following year and decided to build the plant until 2005. However, the site selection process has taken them 12 years because of four different changes to the proposed site,

resulting in the dismantling of the cooperative arrangement in the end (MIC, 2016). It was caused by Not in My Back Yard issues (NIMBY), strong opposition from residents, and different views amongst member municipalities (Soeda Town, 2018; MIC, 2016). They later proposed to build small-scale (less than 100 tons/day) plants in each city separately, yet the plan was again opposed by residents. After reorganising and adding new member cities, they have finally agreed to co-build a new facility in one of the member municipalities, Oto Town, in 2017 (Soeda Town, 2018).

This example above shows that a waste treatment plan cannot be implemented until municipal governments reach an agreement. Steep resistance from the citizens living near the site is understandable since it seems unfair; the burdens should be equally shared amongst the member cities (Kurishima, 2004; Sasao, 2004). The costs for start-up and coordination could be enormously high unless a mutual consensus between municipalities and citizens is built. Public participation from the early stages of the process would help to build consensus and trust amongst cities and citizens (Sasao, 2019).

Case 2: Cost efficiency and decision making through public preference (Yamagata wide-area environmental administrative association)

In another case, an administration of inter-municipal cooperation decided to change a construction plan for a larger plant and divide the facilities into two plants (MIC, 2016). Four municipalities in Yamagata Prefecture previously planned to shut down three incineration plants and integrate them into a larger plant. A local partial administrative association (Yamagata Wide Area Environmental Administrative Association, *Yamagata koiki kankyo jimukumiai*) offered to take over the responsibility for building the new plant. However, the association could not persuade the residents in order to obtain a new construction site of approximately 6 hectares and ended up downscaling the facilities in 2010 and built two incineration plants within the area instead (MIC, 2016).

As seen in Case 2, a cooperative arrangement is aimed for improving cost efficiency, but sometimes, the perception from citizens is different. The optimal solution in cost might not be the best result for local communities. Similar to Case 1, consensus building amongst cities and citizens in the planning process is important.

Case 3: Managing an irregular accident by an inter-municipal organisation (Gotemba City–Oyama Town Regional Administrative Association)

The Gotemba City–Oyama Town Regional Administrative Association, a partial affairs association of two municipalities in Shizuoka Prefecture for multi-use purposes including solid waste management, decided to operate an refuse-derived fuel (RDF) centre in 1999. In the 1990s, RDF technology became popular amongst Japanese cities. In the early stages, it was introduced as an ideal treatment that enables the production of solid fuels from waste. However, some facilities failed to efficiently produce RDF, and they stopped their service because of financial deficit. In addition, a fatal steam explosion accident happened in one facility,[16] which gave a negative impression towards RDF technology.

In the case of the Gotemba City–Oyama Town Regional Administrative Association, the centre could treat 150 tons/day and generate RDF, which was meant to reduce the treatment costs by selling the fuel to local companies (Gotemba City–Oyama Town Regional Administrative Association, n.d.). However, they faced problems producing RDF as it was difficult to maintain the quality of the waste. Also, the salt contained within the food waste was believed to have increased the amount of chlorine in RDF, which could have harmed the furnaces and other infrastructure (Unozawa, 2015). As a result, local companies hesitated to purchase RDF, so they had to seek companies outside the prefecture, which resulted in additional transportation costs. The facility was shut down in 2015, and the association ended up filing a lawsuit against the construction companies for architectural defects of the facility (Gotemba City–Oyama Town Regional Administrative Association, n.d.).

Inter-municipal cooperation functions well in certain contexts when member cities share the same purpose and work by sharing the tasks properly. Yet once they need to deal with an irregular occasion, making decisions and agreements become more complex and time consuming compared with a single municipal government. Also, it is indispensable to choose adequate technology whose costs, site conditions, and other relevant factors are all feasible.

Although the plans for regional cooperation are made by each prefecture, their implementation is still difficult. In other cases, municipalities are unable to demolish old plants because of budget shortages (MIC, 2016). As municipal cooperation accelerates, abandoned facilities increase. Given the huge costs of dismantling due to special

[16] In 2003, an RDF silo exploded in Mie Prefecture, Japan, which caused injuries and the death of two firefighters.

treatments such as those needed to prevent dioxin emissions, this process would impose additional burdens on municipalities (National Association of Chairpersons of City Councils, 2018).

Another point is the increase in transportation costs. Transportation costs for collecting waste rise as areas expand, even though the waste collection process is cost-efficient with respect to maintenance fees (Fujii, 2005). Setting up waste transfer stations would be a solution to this. In the case of Kitakyushu City, as explained earlier, the city accepts waste from neighbouring municipalities. Nogata City, one such municipality, has built a transfer facility with a waste incineration capacity of 113 tons/day (Nogata City, 2015). Combustible waste (e.g. organic waste, paper, and plastics) are collected and sent to the facility in Nogata City, and are transported by large trucks to the incineration facility in Kitakyushu City. In this way, the frequency of travel is reduced (Kitakyushu City, 2015). 'The trucks also avoid driving through urban areas in Kitakyushu using major traffic roads like highways' (Kitakyushu City, 2015, p.2).

Although regional cooperation is actively implemented to prepare for natural disasters such as floods, heavy rain, or earthquakes, some cities consider the concentration of waste facilities risky. For instance, when they comprise islands within the territory, it would be troublesome if they were not able to transport waste across bridges or on ships because of natural disasters like typhoons or big storms.[17]

3.3.3. Public–Private Partnerships

Public–private partnerships (PPP) are encouraged and some municipalities and inter-municipal organisations have introduced a plan to promote them to reduce costs and rationalise the operation through privatisation. One of the characteristics in Japan is that DBO is the most common way for PPPs, whereas PFI methods such as build–transfer–operate (BTO) or build–own–operate (BOO) are less often implemented. In DBO, a municipality possesses the facility and prepares the funds, whilst entrusting the private sector to design, build, and operate the facility. In many municipalities, DBO appears to be more feasible, since it would be more preferable and persuasive for the assembly and citizens to have a municipal government take on initiatives rather than pushing

[17] Onomichi City, Hiroshima Prefecture, has lots of small islands in its territory. The city decided not to merge its waste treatment facilities in order to avoid the risk of natural disasters. Waste is transported from the islands by crossing bridges. If a bridge is closed and waste cannot be transported, space to keep the waste is limited on the islands, meaning that it must be kept at small-scale plants (MIC, 2016).

responsibility onto private companies (Arai, 2014).

The following example is a case of a PPP in a Japanese municipality that chose a BOT concession agreement instead of setting up an organisation for inter-municipal cooperation.

Case 1: PPP for regional cooperation on MSW (Minami-izu Town)

Minami-izu Town, Shizuoka Prefecture, had initially planned to organise a partial affairs association together with four neighbouring municipalities in 2013. But the discussion did not go well, as they could not agree on the distribution of administrative roles and the allocation of human resources (Cabinet Office, 2018a). As a result, the town decided not to form an association and instead entrusted the construction of facilities to a private company by introducing a BOT concession and having other municipalities entrust the treatment to the company (Cabinet Office, 2018a). The town plans to start its operations in 2023 (Cabinet Office, 2018b).

A BOT concession is expected to reduce the municipal administrative burdens, equalise expenses, and have value for money from other municipalities entrusted in the treatment (Cabinet Office, 2018b). The national government encourages BOT concessions especially for small municipalities that cannot afford wide-area cooperation or for those planning to cooperate in the future for whom the timing of plant closure does not match (Cabinet Office, 2018b). As seen in the case of Minami-izu, if each municipality agrees with the concessionaire, there is no need to establish a formal regional government body or to put the burden onto one municipality.

Another example is outsourcing to private enterprises. In Japan, outsourcing of intermediate treatment is rare but quite common in final disposal (Kurishima, 2004). Approximately 17% of municipalities do not own final disposal sites but entrust the treatment to private companies (MoE, 2019b). Amongst them, some prefectures cannot find the space for landfill sites within their regions so that waste, mostly post-incineration ash, is transported outside the territories to be disposed of by private companies. The total amount of solid waste transported externally in the fiscal year 2017 reached about 258,000 tons, 6.7% of the whole amount of final disposal in Japan (MoE, 2019b). Approximately 75% of this amount originated from the prefectures located in the Kanto region, where the population is dense.

Case2: Outsourcing of sanitary landfill outside of a municipality (Saitama prefecture)

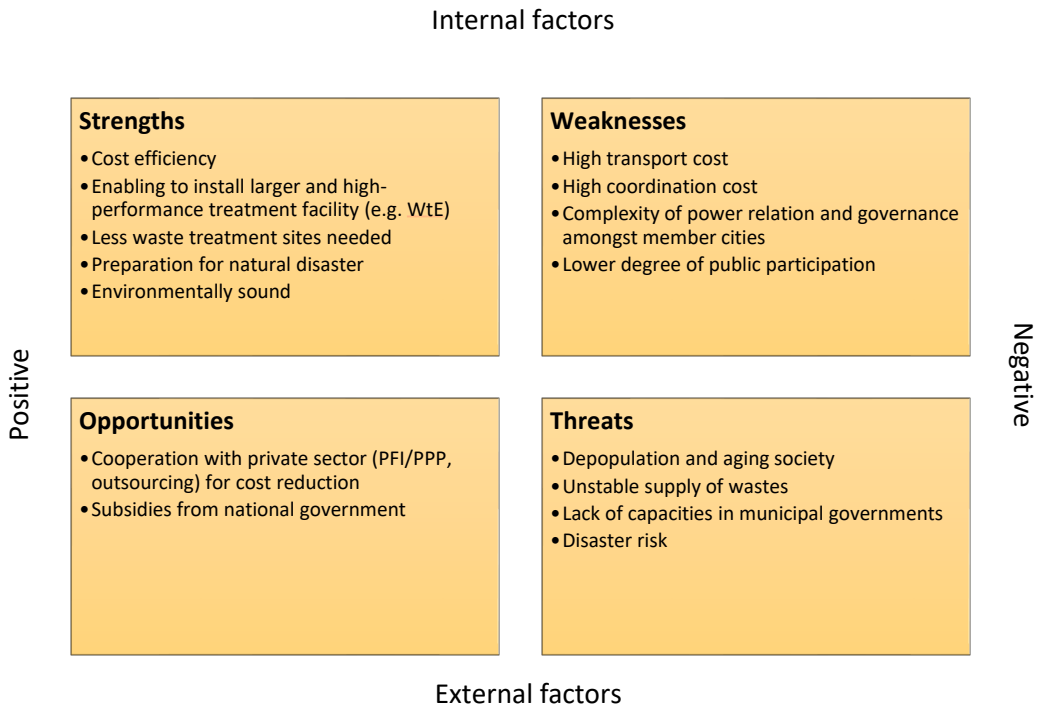
Saitama Prefecture, with a population of 7.3 million, is one of the prefectures that makes up the Greater Tokyo Area. Especially for densely populated cities close to Tokyo, it is difficult to afford a space for sanitary landfill. As the territory does not face the sea, it cannot reclaim land like the wards in Tokyo. Therefore, the prefecture has relied heavily on the landfill sites outside its territory. In 2017, the total amount of waste for final disposal was 99,772 tons and 56.5% was transported outside the prefecture (Saitama Prefecture, 2019). The amount of waste outsourced externally has exceeded 50% annually from 2011 to 2017 (Saitama Prefecture, 2019). Although the percentages are not specified, waste is transported not only to neighbouring prefectures but also to further regions. This amount ranges from 10,000 to 50,000 tons and is transported to the northern part of the country (Hokkaido and Tohoku), which can range in distance from around 300 kilometres to over 1,000 kilometres (MoE, 2019b).

When a city is densely populated and it is physically and financially difficult to find a waste disposal site, outsourcing to private companies outside the territory is often a feasible option. However, with respect to related costs, including outsourcing and transportation, municipalities need to analyse feasibility carefully. At the same time, having far-away disposal sites can make citizens (and even public officers) feel indifferent about the issues of waste reduction (Kurishima, 2004).

2.4. SWOT Analysis on Inter-municipal Cooperation on MSW Management in Japan

This chapter has discussed the current issues and challenges of inter-municipal cooperation in MSW management in Japan. Collaborative arrangement helps to decrease the burden of a respective municipality and contribute to the efficient management of waste. Yet challenges remain, such as high coordination costs, increased transportation costs, and issues of governance. Based on such situations, Figure 3.2 illustrates the SWOT analysis of inter-municipal cooperation on MSW management.

Figure 3.2. SWOT Analysis of Inter-municipal Cooperation on MSW Management in Japan



SWOT = strengths, weaknesses, opportunities, threats; PFI = private finance initiative, PPP = public–private partnership; WTE= waste-to-energy.
Source: Compiled by author (Hiratsuka-Sasaki).

As explained earlier, cost-efficiency is the main driver of cooperation. In the way of strengths, a municipality can afford to build a larger facility with high-performance technology for more efficient and environmentally sound treatment by working together. In such a case, fewer waste treatment sites are needed, and fewer disputes for site selection arise. In the way of opportunities, a municipality can also select to cooperate with the private sector and reduce administrative costs. The municipality can use several subsidies aimed for enhancement of regional cooperation as well as promoting PPP via, e.g. PFI.

On the contrary, high transportation costs and coordination costs need to be considered. Moreover, political power relations amongst the member cities might hinder smooth and efficient administration and management. Proximity to the citizens would also be lower, which might make consensus building difficult compared with a single municipal government (Sasao, 2019). Depopulation, an aging society, and a lack of human resources in MSW could serve as large incentives for inter-municipal cooperation. Waste reduction is important, but conversely, a large-scale incineration plant requires a stable supply of

waste for optimal use and energy generation. This is important, considering that a population decrease would cause an unstable waste supply. With respect to natural disasters, although inter-municipal cooperation functions in the context of preparation, concentration of waste facilities could be considered a risk as well.

2.5. Implications to ASEAN countries

Inter-municipal cooperation varies in composition, scope, and degree of organisational integration depending on the needs and capabilities of municipalities. Cities can cooperate by establishing a separate organisation or simply making agreements. This chapter has focused on the cases under the purpose of waste management, but cooperation can have multi-purpose functionality. With respect to composition, higher-level governments (prefectural governments in the case of Japan) can also be considered as actors in building a vertical cooperation (Hulst, et al., 2009). In Japan, the role of prefectures is limited to offering technical support when requested by municipalities under the Waste Management and Public Cleansing Act (MIC, 2016). However, multi-dimensional support and cooperation between municipalities and prefectures might mitigate the burdens of municipalities. It is important to choose the most suitable approach and cooperation type for a respective municipality. Here, we state short implications to ASEAN countries on the basis of the main points of this chapter.

Compared with Japan, ASEAN countries have a limited legal basis to form associations of local government for waste management, whereas partial affairs associations on waste management are common in Japan as shown in this chapter. To promote inter-municipal cooperation, legal bases and guidelines to form such associations should be developed in each country. Central governments should also provide financial incentives to establish regional waste management.

It was observed that most of the municipalities in Japan use incineration facilities. With respect to the costs, many local governments in ASEAN countries, especially the small ones, would not be able to afford to introduce incineration technologies without subsidies or international aid. However, if several municipalities could cooperate, it would enhance the economic performance enabling the installation of better technology for waste facilities such as WTE. Increases in external costs, such as transportation, as a result of regional cooperation also need to be dealt with by setting up transfer stations. On the other hand, as shown in the case of the joint association between Gotemba City and Oyama Town, inadequate use of technology like RDF would lead to economic inefficiencies and high coordination costs amongst member municipalities. Local

governments need to investigate the optimal scale of operation and the selection of technology in initial-stage planning.

Also, inter-municipal cooperation would enhance PPP as it would foster the projects that small, single municipalities within the private sector cannot. Although DBO is dominant in Japan, PFI methods could be considered in ASEAN countries if several cities were able to cluster. Outsourcing to private enterprises outside a territory is another option, especially for large cities.

Lastly, issues of governance and public participation need to be considered. When cooperating with several municipalities, they need to build mutual trust to have stable power relations amongst the member cities to operate more sustainable MSW facilities. Public participation in the early stages in the process of building facilities enhances building trusts amongst citizens and municipalities. Although several issues need to be addressed, inter-municipal cooperation would be a means to enhance sustainable MSW management.

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（南伊豆町）

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Chapter 4

Cost Efficiency of Regional Waste Management and Contracting Out to Private Companies

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Abstract

The chapter examines cost efficiency of regional waste management (RWM) and contracting out to private companies, considering each stage of waste management: collection, intermediate, and final disposal. First, it presents existing studies on this subject to evaluate the evidence and controversial issues. Then, the study uses a Japanese cross-sectional dataset to estimate the average costs for each stage of waste management, focusing on RWM and contracting out to private companies. Finally, the chapter discusses possible RWM in Southeast Asia, based on a simple empirical analysis using a dataset from the Philippines.

Keywords: regional waste management, economies of scale, contracting out to private companies, cost efficiency

4.1. Introduction

The proper treatment of generated waste is necessary, particularly in developing countries. However, solid waste management imposes a heavy burden on municipal finances. According to Kaza, et al. (2018), this line item alone comprises nearly 20% of low-income countries' municipal budgets. This means that cost efficiency in waste management is an extremely important issue.

Regional waste management (RWM) and contracting out to private companies are expected to contribute to a more efficient management of municipal solid waste (MSW). As further explained in section 4.2, most studies in the current literature were conducted

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in developed countries and focus on waste collection costs by examining the total cost of waste management.[19] Actually, RWM increases not only the amount of waste disposed but also expands the collection area. Therefore, RWM may not actually contribute to its cost reduction, because simple economies of scale do not apply. This suggests that it is important to examine not only the collection and transport of MSW but also its disposal costs in order to analyse RWM's cost efficiency.

However, there are still controversial issues regarding RWM's economies of scale and the cost efficiency of contracting out to private companies, as shown in section 4.2. Therefore, this chapter aims to clarify which condition will best attain cost savings in waste management, considering each of its three stages: collection, intermediate disposal, and final disposal.

This chapter proceeds as follows. Section 4.2 reviews the existing literature regarding this issue, including a presentation of the related evidence and controversial issues. Section 4.3 conducts a simple econometric analysis to estimate the determinants of waste management costs, using a Japanese cross-sectional dataset. Section 4.4 discusses the possibility of RWM in Southeast Asia, after conducting a straightforward econometric analysis using a Philippine cross-sectional dataset. Finally, Section 4.5 offers concluding remarks.

4.2. Literature on Cost Analyses of Regional Waste Management and Contracting Out to Private Companies

4.2.1. Economies of Scale in Waste Management

Many studies have examined waste management costs using econometric methods. Most have focused on the cost of waste collection by examining the total cost of waste management. Here our first research question is presented—do economies of scale exist in waste management or not?

There are supposed to be two types of economies of scale in the general sense (Bel and Warner, 2015; Callan and Thomas, 2001; Sasao, 2019). One type is economies of density and the other type is economies of scale. The former represents the percentage increase in costs for every 1% increase in population or household density. If it is less than one, economies of density exist. The latter represents the percentage increase in costs for every 1% increase in the amount of waste. If it is less than one, economies of scale exist. For economies of density and scale, several studies confirmed that economies of density

[19] This seems to be due to lack of available data.

exist in waste collection, while other studies indicated that they were not found.

Stevens (1978) used a cross-sectional dataset for 340 United States (US) cities during the 1974–1975 period to examine collection costs in waste management. He indicated that economies of scale were observed up to a population of approximately 20,000 inhabitants. Dubin and Navarro (1988) also used a cross-sectional dataset for 261 US cities during the 1974–1975 period in order to examine collection costs. They demonstrated that economies of household density were observed. Carroll (1995) used a cross-sectional dataset of 57 Wisconsin, US cities with kerbside recycling programmes in 1992 to estimate recycling costs. He indicated that economies of household density were observed, although they were not observed for recycling. Callan and Thomas (2001) used a cross-sectional dataset for 110 Massachusetts, US cities and towns during the 1997–1998 period to separately estimate disposal costs (other than recycling) and recycling costs. They also indicated that economies of household density were observed, although economies of scale were not observed for disposal types other than recycling. In contrast, they indicated that for recycling, economies of scale were, in fact, observed even though economies of density were not. On the other hand, they suggested that there were economies of scope and that joint provision of disposal and recycling services is more efficient than providing either one by itself.[20]

Ohlsson (2003) analysed a cross-sectional dataset of 430 municipalities in Norway to examine the effect of inter-municipal cooperation (IMC). He suggested that while IMC would increase overall waste collection cost per inhabitant, the increase in the population being served would contribute to establishing economies of scale for each individual municipality. He also indicated that an increase in ownership concentration would reduce user fees and costs. Usui (2007) used a panel dataset for 2,592 municipalities and inter-municipalities in Japan from 1998 to 2002 to estimate the total cost of MSW management. He showed that economies of scale were observed more remarkably in individual municipalities with 50,000 residents or less, although in some cases they were also observed in municipalities with over 50,000 inhabitants. In addition, Usui (2007) indicated that IMC for the final disposal stage would contribute to cost savings, although employing IMC for the intermediate disposal stage might increase management costs. Lombrano (2009) collected a cross-sectional dataset for Italian regions for the years of 2002 through 2004 in order to analyse the relationship between the average cost of collection and transport with population and waste management type. He indicated that a negative

[20] Economies of scope exist if the cost of one municipality providing both disposal and recycling is lower than if each of the two municipalities specialised in only one of these services for the residents of respective municipalities (Callan and Thomas, 2001).

relationship existed between average cost and population.

Bel and Warner (2015) surveyed the literature on cost savings under IMC and established that varied results might be caused by differences in the average populations of municipalities and the governance of cooperative arrangements amongst countries. Actually, several studies provided significant insights regarding the conditions under which economies of scale could and could not be observed. Dijkgraaf and Gradus (2005) used a cross-sectional dataset of 453 municipalities in the Netherlands in 2002 to estimate waste collection costs. They showed that there was no significant difference in cost between collection by an inter-municipality and by a municipality itself. Bel and Costas (2006) used a cross-sectional dataset of 186 municipalities in Catalonia, Spain in 2000 to estimate the total cost of waste management, including collection, transport, disposal, and elimination. They demonstrated that although economies of scale were observed for municipalities below 10,000 residents, they were not observed in municipalities with populations of 20,000 or more. In contrast, population density did not significantly affect total costs, that is, economies of density were not observed. Bel and Mur (2009) collected a cross-sectional dataset for 56 municipalities that featured over 1,000 inhabitants in Aragon, Spain in 2003 in order to calculate waste management costs. They indicated that IMC reduced costs in municipalities with populations below 10,000 inhabitants. In contrast, there was no significant relationship between population density and cost. Bel and Fageda (2010) collected a cross-sectional dataset for 65 municipalities in Galicia, Spain in 2005 to analyse MSW service costs. They showed that economies of scale specifically existed in waste collection costs for municipalities with less than 50,000 inhabitants. Consequently, they suggested that cooperation between small municipalities could promote cost savings. Bohm, et al. (2010) used a cross-sectional dataset for 1,021 municipalities in the US in 1997 to estimate cost functions for waste collection and disposal services and kerbside recycling programmes. They demonstrated that economies of scale were present in both types of waste management. However, they indicated that the average total cost of recycling was minimised at the rate of 13,200 tons of material recycling per year, which corresponds to approximately 80,000 inhabitants.

Yamamoto (2009) used a cross-sectional dataset for 1,844 Japanese municipalities in 2005 to estimate waste collection and disposal costs. He established that no economies of scale in waste collection were observed in large municipalities (for which the collected amount was more than 45,000 tons per year), although they were observed in the average costs of waste collection and disposal. He further suggested that economies of household density in waste collection existed. Greco, et al. (2015) collected a cross-sectional dataset

for 67 Italian municipalities in 2011 to analyse collection costs for each type of waste. They indicated that economies of scale could be observed particularly in the waste collection of undifferentiated waste. They also suggested that economies of density existed for heavy multi-material waste (glass, plastic, and metal). Chifari, et al. (2017) employed a cross-sectional dataset of 1,724 Japanese municipalities in 2010 to estimate cost elasticities of the three waste treatment stages (collection, intermediate disposal, and final disposal). They showed that collection costs were less elastic than were disposal costs, despite the fact that economies of scale were observed in all three of the treatment stages. Soukopová, Vaceková, and Klimovský (2017) collected a cross-sectional dataset of 2,065 municipalities in the Czech Republic to analyse different forms of local waste collection services. They discovered that IMC promoted cost savings, particularly in smaller municipalities that featured populations consisting of less than 500 inhabitants. Ishimura and Takeuchi (2018) used a pooled panel dataset for all Japanese municipalities for the years 2006 to 2015 in order to estimate the total cost of waste management. They demonstrated that IMC promoted cost savings on average and that higher savings were found in smaller municipalities. They also observed economies of scope, that is, IMC in recycling and landfilling, as well as incineration, contributed to cost reduction.

The main results of the above studies are summarised in Table 4.1.[21] Based on the existing literature, many study results suggest that economies of scale exist in waste management. However, most indicate that such economies of scale were observed particularly in smaller municipalities.

[21] As for economies of scale for waste disposal facilities, Matsuto and Ohara (2010) demonstrated that economies of scale for landfill sites (scale to the power of 0.5 or 0.6) in Japan existed, although they did not use any econometric methods. Sasao (2019) examined construction costs for 77 incinerators in Japan. He showed that economies of scale existed for incinerators with less than 428 tons per day capacity.

Table 4.1. Literature of Economies of Scale and Contracting out to Private Companies in Waste Management

	Economies of Density	Economies of Scale	Contracting out to Private Companies
Collection	[Observed] Dubin and Navarro (1988) Carroll (1995) Yamamoto (2009) [Not observed] Greco et al. (2015)	[Observed] Stevens (1978) Lombrano (2009) Yamamoto (2009) (<45000 tons) Bel and Fageda (2010) Bohm et al. (2011) Zafra-Gómez et al. (2013) Greco, et al. (2015) Soukopova, Vaceková, and Klimovský (2017) [Not observed] Carroll (1995) Antonioli and Filippini (2002) Dijkgraaf and Gradus (2005) Yamamoto (2009) (>45000 tons)	[Observed] Dijkgraaf and Gradus (2005)[*1] Yamamoto (2009) [*2] Soukopova Vaceková, and Klimovský (2017) (big cities) [Not observed] Dubin and Navarro (1988)[*3] Ohlsson (2003)[*4] Bel and Fageda (2010)[*1] Zafra-Gómez, et al. (2013)[*4] Greco, et al. (2015) [*4,5] Ishimura and Takeuchi (2017)
Collection and disposal	[Observed] Callan and Thomas (2001) Ishimura and Takeuchi (2017) [Not observed] Bel and Mur (2009)	[Observed] Bel and Costa (2006) Usui (2007) Bel and Mur (2009) Chifari, et al. (2017) Ishimura and Takeuchi (2017) [Not observed] Callan and Thomas (2001)	[Observed] Usui (2007) [Not observed] Bel and Costas (2006) Bel and Mur (2009)

PPP = public–private partnership.
Note: [*1] PPP increases cost.
[*2] Except for only one private company.
[*3] Private organisation is more expensive than contract organisation.
[*4] Public is cheaper.
[*5] Privatisation is cheaper for organic waste collection.
Source: Compiled by the author.

4.2.2. Privatisation and Contracting Out to Private Companies of Waste Management

This chapter's second research question is – does the privatisation or contracting out to private companies of waste management contribute to cost savings? Regarding this question, several studies indicate that the privatisation or the contracting out to private companies of waste collection did promote cost savings, while other studies indicated that doing so did not, in fact, reduce costs.

Stevens (1978) demonstrated the fact that a private monopolist proved to be more efficient than a public monopolist. Carroll (1995) also showed that the municipal collection of waste was more expensive than private collection. Dijkgraaf and Gradus (2005) indicated that waste collection by public firms was as cost efficient as private collection, although private collection was cheaper than collection by municipalities. They suggested that maintaining a sufficient level of competition was rather important for promoting cost reduction in this industry. Usui (2007) indicated that public collection was more expensive than contracting out to private companies. Yamamoto (2009) also indicated that contracting out to one monopolistic company increased collection costs, although contracting out to private companies promoted a reduction in costs. In addition, Chifari, et al. (2017) indicated that private companies, through public tender and the coordination of adjacent municipalities, or IMC, led to cost reductions. Soukopová, Vaceková, and Klimovský (2017) showed that contracting out promoted cost savings regardless of population size, although public–private partnerships (PPPs) increased collection costs in small municipalities.[22]

In contrast, Dubin and Navarro (1988) demonstrated that waste collection by private organisations was more expensive than collection by contracted organisations. Bel and Costas (2006) and Bel and Mur (2009) also indicated that there was no significant difference in the costs observed of private and public waste management services. In addition, Lombrano (2009) suggested that no correlation was found between privatisation and cost efficiency. Bel and Fageda (2010) also established that private collection was not necessarily cheaper than public service. Zafra-Gómez, et al. (2013) used a panel dataset to evaluate the efficiency of waste collection services in 923 Spanish local authorities with populations of less than 50,000 inhabitants. They showed that although private management did not promote cost savings for small and medium-sized local

[22] Sasao (2019) also showed that the adoption of the Private Finance Initiative (PFI) raised construction costs contrary to a priori expectations. He noted that 'in case of PFI, private companies tend to execute a bulk contract to build incinerators, including their operation, with municipalities. Some companies set off the operation costs against the higher construction costs while they manage to operate at lower prices' (Sasao, 2019, pp.10–11). In addition, a government subsidy for siting incinerators might increase construction costs.

authorities, inter-municipal public management did, in fact, achieve cost savings. Greco, et al. (2015) also showed that no significant difference between private and public services were observed, except in the case of organic waste collection.

The main findings of the above studies are also summarised in Table 4.1. Based on the existing literature, it is still considered a controversial issue if privatisation, or contracting out to private companies, contributes to cost savings or not. It should be noted that sufficient competition plays a key role in the promotion of cost savings, as some studies have pointed out.

4.3. Econometric Analysis of RWM's Cost Efficiency and Contracting Out to Private Companies

4.3.1. Data and Methodology

This section conducts a simple econometric analysis using ordinary least squares (OLS) regression to clarify differences in waste management costs between municipalities and inter-municipalities and its determinants, taking each stage of waste management (collection, intermediate disposal, and final disposal), into consideration. The study uses a cross-sectional dataset for all municipalities and inter-municipalities conducting each stage of waste management in Japan in 2017, which are available from the Expenses of Municipal Waste Management and the Outline of Municipal Waste Management by the Ministry of the Environment in Japan (MOE).[23] The total observations during the data collection stage were 1,594 (1,459 municipalities and 135 inter-municipalities).[24] The total observations for the intermediate disposal stage were 1,474 (1,080 municipalities and 394 inter-municipalities). The total observations for the final disposal stage were 1,245 (942 municipalities and 303 inter-municipalities).

First, the study estimates the average cost of waste management, based on the pooled data for all municipalities and inter-municipalities. Second, it estimates costs, based on grouped data that separates municipalities that independently conduct waste management from inter-municipalities. The details of each model are provided in the following sub-section.

[23] Both are available from the website of the MOE, http://www.env.go.jp/recycle/waste_tech/ippan/h29/index.html, in Japanese.

[24] One municipality, Iidate village, is removed because most inhabitants are still evacuated out of the village due to radioactive contamination from the Fukushima Daiichi nuclear power station disaster.

Pooled Models

The dependent variables are the two types of average costs: cost per ton and cost per capita. The independent variables are divided into four categories: demographic determinants and amount of waste (in tons), whether municipalities conduct waste management independently or have IMC agreements, service level and waste management technology, and geographic determinants.

For demographic determinants and waste amounts, registered population or total amount of treated waste, rate of foreigners (ratio of registered foreigners to total population), and waste amount per day per capita are considered. An increase in population and total amount of treated waste is expected to reduce both average cost per ton as well as cost per capita due to economies of scale. An increase in the rate of foreigners may raise average costs because of an increase in non-separated waste if foreigners are unfamiliar with Japanese-style waste separation. An increase in waste amount per day per capita can reduce the average cost per ton if economies of scale exist. In contrast, an increase in waste amount per capita is also likely to raise the average cost per capita proportionally. The variables for registered population, total amount of treated waste, and waste amount per capita are log transformed to capture elasticity in the estimations.

The independent variables are selected considering differences in the dependent variables and the various stages of waste management. For service level and technology, the study considers the collection frequency of burnable, plastic packaging, and organic waste; the recycling rate; and items of separated waste. An increase in the collection frequency of burnable, plastic packaging, and organic waste can raise the average collection costs as well as intermediate disposal costs due an increase in these types of waste. In contrast, an increase in the collection frequency of burnable waste and plastic packaging waste can reduce the average cost of final disposal due to reducing the residue brought into landfill sites, although an increase in collection frequency of burnable waste can increase final disposal costs. The recycling rate, excluding ash recycling after incineration, is considered at the collection stage, and when it is included is considered at the intermediate and final disposal stages. An increase in the recycling rate and items of separated waste can raise both average collection and intermediate disposal costs, while it may reduce those of final disposal. In addition, for the collection sector, the rate of outsourced management to private companies for household waste is considered. In the intermediate disposal stage, the study calculates the rate of directly incinerated waste and the rate of residue after incineration and after treatment. An increase in these rates

can raise the average cost of intermediate disposal. In the final disposal stage, the rate of direct landfilled waste and the rate of residue after incineration and after treatment are considered. An increase in these rates can increase the average cost of the final disposal stage.

Whether municipalities conduct waste management independently or share waste management through inter-municipality agreements is considered a dummy variable that equals one if there is inter-municipal waste management organisation and zero if there is not. Inter-municipal organisation is expected to promote cost savings if economies of scale exist.

Regarding geographic determinants, the area, if it is an isolated island or not, and whether municipalities include isolated islands or not are considered as dummy variables. An expansion in the area can increase the average cost of collection, although it is difficult to expect the possible effects on intermediate and final disposal *a priori*. The area is log transformed to capture elasticity in the estimation. The variable for isolated islands, represented by 'Islands,' is a dummy variable that equals one when the whole municipality is located on an isolated island and zero when it is not. The variable for municipalities that include isolated islands, represented by 'Municipalities including islands,' is a dummy variable that equals one when a municipality or inter-municipality contains isolated islands and zero when it does not. Waste collection costs are supposed to be higher in the municipalities and inter-municipalities that feature isolated islands due to the necessity of transporting waste on ships, for example. On the other hand, it is unknown what the cost effects of this variable are on the intermediate and final disposal stages.

Tables 4.2, 4.3, and 4.4 tabulate the descriptive statistics of the variables considered in the analysis and the *a priori* expectations for effect of the independent variables on the dependent variables (average cost per ton and per capita). The correlation coefficients indicate that the relationship between the independent variables is negligible.

Table 4.2. Descriptive Statistics of Municipalities and Inter-Municipalities for Waste Collection in Japan

Variables	Mean	Median	SD	Max	Min	*a priori* effect
Average costs per ton (¥)	16,851	14,011	15,998	439,820	1	
Average costs per capita (¥)	4,531	3,813	4,775	144,678	0	
Population (person)	81,679	31,437	193,728	3,738,759	152	−
Rate of foreigners (%)	1.2	0.8	1.3	19.6	0.0	+?
Total amount of treated waste (tons)	23,541.3	8,683.0	56,791.8	950,301.0	50.0	−
Waste amount per day per capita (grams)	909.8	884.7	260.4	4,436.3	297.9	−/+
Dummy of inter-municipalities	0.1	0.0	0.3	1.0	0.0	−
Recycling rate (excluding recycling after treatment) (%)	18.7	17.3	9.0	82.0	0.6	+
Collection frequency of burnable waste (times per week)	2.0	2.0	0.6	5.0	0.0	+
Collection frequency of plastic waste (times per week)	1.9	2.0	1.7	5.0	0.0	+
Collection frequency of organic waste (times per week)	0.8	0.0	2.1	7.0	0.0	+
Items of separated waste	13.7	14.0	5.1	38.0	2.0	+
Rate of outsourced collection (%)	84.1	99.9	30.7	100.0	0.0	−
Area (km^2)	257.2	139.0	319.1	2,762.7	3.5	+
Dummy of islands	0.04	0.00	0.18	1.00	0.00	+
Dummy of municipalities including islands	0.06	0.00	0.24	1.00	0.00	+

km^2 = square kilometres, SD = standard deviation.
Source: Author's calculation.

Table 4.3. Descriptive Statistics of Municipalities and Inter-Municipalities for Intermediate Disposal in Japan

Variables	Mean	Median	SD	Max	Min	*a priori* effect
Average costs per ton (¥)	15,533	11,500	23,367	54,783	0	
Average costs per capita (¥)	5,224	3,939	7,795	14,051	0	
Population (person)	119,214	48,240	333,233	9,384,987	310	−
Rate of foreigners (%)	1.3	0.9	1.3	19.6	0.0	+
Total amount of treated waste (tons)	40,114.6	16,065.5	115,082.4	3,270,934.0	67.0	−
Waste amount per day per capita (grams)	913.1	890.3	261.0	4,436.3	67.7	−/+
Dummy of inter-municipalities	0.267	0.000	0.443	1.000	0.000	−
Recycling rate (including recycling after treatment) (%)	22.0	19.1	12.9	99.7	0.0	+
Rate of directly incinerated waste (%)	73.6	80.8	21.7	99.4	0.0	+
Rate of residue after incineration (%)	6.3	6.8	4.9	74.2	0.0	+
Rate of residue after treatment (%)	1.6	0.8	3.5	67.6	0.0	+
Collection frequency of burnable waste (times per week)	2.0	2.0	0.6	5.0	0.0	+
Collection frequency of plastic waste (times per week)	2.0	2.0	1.7	5.0	0.0	+
Collection frequency of organic waste (times per week)	0.8	0.0	2.1	7.0	0.0	+
Items of separated waste	14.2	14.0	5.1	45.0	2.0	+
Dummy of islands	0.03	0.00	0.17	1.00	0.00	+
Dummy of municipalities including islands	0.07	0.00	0.26	1.00	0.00	+

SD = standard deviation.
Source: Author's calculation.

Table 4.4. Descriptive Statistics of Municipalities and Inter-Municipalities for Final Disposal in Japan

Variables	Mean	Median	SD	Max	Min	*a priori* effect
Average costs per ton (¥)	3,451	1,573	6,365	62,597	1.0	
Average costs per capita (¥)	1,166	515	2,172	22,863	0	
Population (person)	121,900	47,046	366,520	9,384,987	310.0	–
Rate of foreigners (%)	1.3	0.9	1.3	19.6	0.0	+
Total amount of treated waste (tons)	40,939	15,247	123,916	3,270,934.0	67.0	–
Waste amount per day per capita (grams)	921.4	900.1	254.8	4,436.3	297.9	–/+
Dummy of inter-municipalities	0.243	0.000	0.429	1.000	0.000	–
Recycling rate (including recycling after treatment) (%)	21.4	18.9	12.4	99.7	0.0	–
Rate of directly landfilled waste (%)	0.0	0.0	0.1	0.9	0.0	+
Rate of residue after incineration (%)	0.1	0.1	0.0	0.7	0.0	+
Rate of residue after treatment (%)	0.0	0.0	0.0	0.7	0.0	+
Collection frequency of burnable waste (times per week)	2.0	2.0	0.6	5.0	0.0	+
Collection frequency of plastic waste (times per week)	2.0	2.0	1.7	5.0	0.0	–
Collection frequency of organic waste (times per week)	0.8	0.0	2.1	7.0	0.0	–
Items of separated waste	14.0	14.0	5.1	45.0	2.0	–
Dummy of islands	0.035	0.000	0.185	1.000	0.000	+
Dummy of municipalities including islands	0.075	0.000	0.264	1.000	0.000	+

SD = standard deviation.
Source: Author's calculation.

Grouped Models

The dependent variables are the two types of average cost – cost per ton and cost per capita. The independent variables are divided into the same four categories as with the pooled models. For the grouped models, the number of constitutional municipalities rather than the dummy variable for inter-municipalities is considered for inter-municipalities. An increase in the number of constituent municipalities can increase management costs because of the increasing administrative costs due to the combination of additional municipalities into inter-municipality groups. The other independent variables are similar to those used in the pooled models.

Tables 4.5,4.6, and 4.7 show the descriptive statistics of the variables for each group: municipalities that conduct waste management independently and those that have inter-municipality agreements. The tables show that both average cost per ton and per capita for inter-municipalities are cheaper than those for municipalities that independently conduct waste management for the collection and final disposal stages, while they are more expensive for the intermediate disposal stage. This phenomenon will be discussed in section 4.3.2 with the discussion on the estimation results. The correlation coefficients indicate that the relationships between dependent variables are negligible for both groups.

Table 4.5. Descriptive Statistics of Municipalities and Inter-Municipalities for Collection in Japan

Variables	Municipalities					Inter-Municipalities				
	Mean	Median	SD	Max	Min	Mean	Median	SD	Max	Min
Average costs per ton (¥)	17,697	14,480	16,267	439,820	7	7,707	5,945	8,454	37,383	1
Average costs per capita (¥)	4,775	3,994	4,881	144,678	2	1,899	1,312	2,065	11,558	0
Population (person)	77,835	28,608	197,971	3,738,759	152	123,218	83,545	133,528	713,797	1,473
Rate of foreigners (%)	1.2	0.9	1.3	19.6	0.0	1.2	0.8	1.3	10.6	0.2
Total amount of treated waste (tons)	22,474.4	8,025.0	57,922.5	950,301.0	50.0	35,071.9	24,379.0	41,131.3	215,794.0	491.0
Waste amount per day per capita (grams)	913.9	888.4	267.6	4,436.3	297.9	865.7	865.9	156.3	1,316.6	370.1
Number of constituent municipalities						3.3	3.0	1.6	10.0	2.0
Recycling rate (including ash recycling) (%)	21.6	18.8	13.2	99.7	0.6	21.2	18.2	12.3	78.5	4.3
Recycling rate (excluding ash recycling) (%)	18.8	17.4	9.2	82.0	0.6	17.6	17.2	7.0	39.2	4.3
Collection frequency of burnable waste (times per week)	2.0	2.0	0.6	5.0	0.0	2.0	2.0	0.4	3.0	0.0
Collection frequency of plastic waste (times per week)	1.9	2.0	1.8	5.0	0.0	1.8	2.0	1.4	4.3	0.0
Collection frequency of organic waste (times per week)	0.8	0.0	2.1	7.0	0.0	0.6	0.0	1.7	7.0	0.0
Number of separated waste	13.8	14.0	5.1	38.0	2.0	12.8	12.8	4.4	30.0	4.4
Rate of outsourced	83.9	100.0	31.2	100.0	0.0	85.4	98.7	24.7	100.0	0.0

collection (%)										
Area (km^2)	221.2	125.6	255.6	2,177.6	3.5	647.7	492.6	575.2	2,762.7	14.7
Dummy of islands	0.04	0.00	0.19	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Dummy of municipalities including islands	0.07	0.00	0.25	1.00	0.00	0.02	0.00	0.15	1.00	0.00

km^2 = square kilometres, SD = standard deviation.
Source: Author's calculation.

Table 4.6. Descriptive Statistics of Municipalities and Inter-Municipalities for Intermediate Disposal in Japan

Variables	Municipalities					Inter-Municipalities				
	Mean	Median	SD	Max	Min	Mean	Median	SD	Max	Min
Average costs per ton (¥)	14,978	10,504	20,869	358,425	2	17,056	13,989	29,114	547,831	5
Average costs per capita (¥)	5,130	3,565	7,800	127,365	1	5,480	4,591	7,787	140,508	1
Population (person)	94,726	35,564	226,498	3,738,759	310	186,336	107,635	518,834	9,384,987	1,473
Rate of foreigners (%)	1.3	0.9	1.3	19.6	0.0	1.3	0.8	1.2	10.6	0.1
Total amount of treated waste (tons)	31,937.3	11,813.5	76,492.4	1,154,890.0	67.0	62,529	34,406	181,350	3,270,934.0	528.0
Waste amount per day per capita (grams)	922.9	894.9	289.7	4,436.3	67.7	886.2	878.9	154.8	1,893.5	370.1
Number of constituent municipalities						3.5	3.0	2.2	23.0	2.0
Recycling rate (including ash recycling) (%)	22.4	19.5	13.3	99.7	0.0	20.9	18.7	11.6	95.8	2.3
Rate of directly incinerated waste (%)	0.7	0.8	0.2	99.4	0.0	0.8	0.8	0.2	93.9	0.0
Rate of residuals after incineration (%)	0.1	0.1	0.1	74.2	0.0	0.1	0.1	0.0	46.6	0.0
Rate of residuals after treatment (%)	0.0	0.0	0.0	67.6	0.0	0.0	0.0	0.0	48.4	0.0
Collection frequency of burnable waste (times per week)	2.0	2.0	0.6	5.0	0.0	2.0	2.0	0.4	3.5	0.0
Collection frequency of plastic waste (times per week)	2.0	2.0	1.7	5.0	0.0	1.8	2.0	1.4	4.7	0.0
Collection frequency of	0.9	0.0	2.2	7.0	0.0	0.7	0.0	1.5	7.0	0.0

organic waste (times per week)										
Items of separated waste	14.4	14.0	5.3	45.0	2.0	13.7	13.3	4.3	30.0	4.3
Dummy of islands	0.04	0.00	0.19	1.00	0.00	0.01	0.00	0.11	1.00	0.00
Dummy of municipalities including islands	0.07	0.00	0.26	1.00	0.00	0.07	0.00	0.26	1.00	0.00

SD = standard deviation.
Source: Author's calculation.

Table 4.7. Descriptive Statistics of Municipalities and Inter-Municipalities for Final Disposal in Japan

Variables	Municipalities					Inter-Municipalities				
	Mean	Median	SD	Max	Min	Mean	Median	SD	Max	Min
Average costs per ton (¥)	3,884	1,720	7,086	62,597	2	2,105	1,252	2,835	22,155	1
Average costs per capita (¥)	1,325	576	2,426	22,863	0	674	400	877	7,245	0
Population (person)	98,191	36,388	225,256	3,738,759	310	195,606	102,916	622,942	9,384,987	1,473
Rate of foreigners (%)	1.3	0.9	1.4	19.6	0.0	1.3	0.8	1.2	10.6	0.2
Total amount of treated waste (tons)	33,144.5	11,980.0	74,893.2	1,154,890.0	67.0	65,169.4	32,673.0	212,121.7	3,270,934.0	528.0
Waste amount per day per capita (grams)	932.4	907.8	276.9	4,436.3	297.9	887.3	879.4	163.9	1893.5	370.1
Number of constituent municipalities						3.7	3.0	2.7	26.0	2.0
Recycling rate (including ash recycling) (%)	21.8	19.3	12.5	99.7	0.0	20.2	17.9	11.8	95.8	2.3
Rate of directly landfilled waste (%)	3.6	0.0	10.8	92.2	0.0	1.9	0.0	6.4	58.5	0.0
Rate of residuals after incineration (%)	6.3	6.8	5.0	74.2	0.0	7.1	7.7	4.7	46.6	0.0
Rate of residuals after treatment (%)	1.7	0.7	3.9	67.6	0.0	1.8	1.1	3.4	48.4	0.0
Collection frequency of burnable waste (times per week)	2.0	2.0	0.6	5.0	0.0	2.0	2.0	0.4	3.0	0.0
Collection frequency of plastic waste (times per week)	2.0	2.0	1.8	5.0	0.0	1.8	2.0	1.4	4.7	0.0
Collection frequency of	0.9	0.0	2.3	7.0	0.0	0.7	0.0	1.5	7.0	0.0

organic waste (times per week)										
Items of separated waste	14.2	14.0	5.3	45.0	2.0	13.5	13.0	4.5	30.0	4.3
Dummy of islands	0.04	0.00	0.20	1.00	0.00	0.02	0.00	0.14	1.00	0.00
Dummy of municipalities including islands	0.08	0.00	0.27	1.00	0.00	0.06	0.00	0.23	1.00	0.00

SD = standard deviation.
Source: Author's calculation.

4.3.2. Results

Tables 4.8, 4.9, and 4.10 show the estimation results of the collection, intermediate disposal, and final disposal stages in the pooled models, respectively. The tables demonstrate the results in the case in which only significant independent variables at the 10% significance level are included. Models 1-1 and 1-2 regress the average cost per ton, and Models 2, 2-1, and 2-2 regress those per capita. The models that end with '1' represent the models considering the dummy variable Islands, and those that end with '2' represent the models considering the dummy variable Municipalities including islands. However, only the results for Model 2 are shown in Table 4.8 because both dummy variables were not statistically significant.

Table 4.8: Estimation Results of Average Costs of Waste Collection in Japan

Variables	Model 1-1	Model 1-2	Model 2
Population (log)	-0.145***	-0.151***	
	(0.0150)	(0.0145)	
Rate of foreigners			0.616*
			(0.343)
Total amount of treated waste (log)			-0.131***
			(0.0140)
Waste amount per day per capita (log)	-0.424***	-0.415***	0.509***
	(0.109)	(0.108)	(0.105)
Inter-municipalities (D)	-1.656***	-1.649***	-1.641***
	(0.177)	(0.177)	(0.172)
Recycling rate (excluding ash recycling)	0.00709***	0.00719***	0.00603**
	(0.00267)	(0.00268)	(0.00261)
Collection frequency of burnable waste	-0.112***	-0.106***	-0.0935***
	(0.0354)	(0.0355)	(0.0336)
Collection frequency of plastic waste	0.0467***	0.0478***	0.0425***
	(0.0116)	(0.0117)	(0.0115)
Items of separated waste	-0.0115***	-0.0122***	-0.0120***
	(0.00392)	(0.00390)	(0.00385)
Rate of outsourced collection	-0.186***	-0.191***	-0.164**
	(0.0648)	(0.0647)	(0.0642)
Area (log)	0.0375*	0.0348*	
	(0.0193)	(0.0193)	
Islands (D)	0.313***		
	(0.115)		
Municipalities including islands (D)		0.191**	
		(0.0902)	
Constant	7.135***	7.146***	-0.647
	(0.730)	(0.730)	(0.716)
Observations	1,594	1,594	1,594
AIC	4,213.00	4,214.57	4,166.77
R-squared	0.287	0.286	0.281

AIC = Akaike Information Criterion.
Notes: *** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses. (D) represents a dummy variable.
Source: Author's calculation.

Table 4.9: Estimation Results of Average Costs of Intermediate Disposal in Japan

Variables	Model 1-1	Model 1-2	Model 2-1	Model 2-2
Waste amount per day per capita (log)			1.075***	1.088***
			(0.207)	(0.206)
Inter-municipalities (D)	0.705***	0.661***	0.732***	0.690***
	(0.0851)	(0.0853)	(0.0852)	(0.0852)
Recycling rate (including ash recycling)	0.00761*		0.00813*	
	(0.00419)		(0.00428)	
Rate of directly incinerated waste	-0.689***	-1.074***	-0.665***	-1.070***
	(0.247)	(0.192)	(0.248)	(0.192)
Rate of residue after treatment	2.108**	1.703*	2.137**	1.706*
	(0.904)	(0.944)	(0.912)	(0.954)
Collection frequency of plastic waste	0.0600**	0.0590**	0.0613**	0.0605**
	(0.0279)	(0.0281)	(0.0280)	(0.0281)
Items of separated waste	-0.0246***	-0.0293***	-0.0242***	-0.0286***
	(0.00919)	(0.00920)	(0.00922)	(0.00926)
Islands (D)	1.722***		1.709***	
	(0.175)		(0.178)	
Municipalities including islands (D)		0.843***		0.832***
		(0.165)		(0.168)
Constant	2.196***	2.725***	-6.270***	-5.806***
	(0.281)	(0.203)	(1.487)	(1.427)
Observations	1,474	1,474	1,474	1,474
AIC	5,726.60	5,744.60	5,727.26	5,745.28
R-squared	0.083	0.071	0.109	0.097

AIC = Akaike Information Criterion.
Notes: *** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses. (D) represents a dummy variable.
Source: Author's calculation.

Table 4.10: Estimation Results of Average Costs of Final Disposal in Japan

Variables	Model 1-1	Model 1-2	Model 2-1	Model 2-2
Population (log)	-0.248***	-0.253***		
	(0.0317)	(0.0303)		
Total amount of treated waste (log)			-0.244***	-0.249***
			(0.0319)	(0.0304)
Waste amount per day per capita (log)			1.228***	1.208***
			(0.192)	(0.189)
Rate of directly landfilled waste	2.851***	2.848***	2.846***	2.855***
	(0.335)	(0.334)	(0.343)	(0.343)
Rate of residue after incineration	3.021***	3.034***	3.057***	3.082***
	(0.856)	(0.849)	(0.851)	(0.844)
Rate of residue after treatment	3.247***	3.244***	3.266***	3.266***
	(0.910)	(0.908)	(0.910)	(0.907)
Collection frequency of plastic waste	0.105***	0.109***	0.104***	0.108***
	(0.0256)	(0.0257)	(0.0257)	(0.0258)
Items of separated waste	-0.0168**	-0.0172**	-0.0170**	-0.0174**
	(0.00848)	(0.00830)	(0.00851)	(0.00835)

Islands (D)	0.346**		0.352**	
	(0.171)		(0.178)	
Municipalities including islands (D)		0.354***		0.359***
		(0.115)		(0.119)
Constant	2.600***	2.633***	-5.799***	-7.015***
	(0.369)	(0.352)	(1.183)	(1.254)
Observations	1,245	1,245	1,245	1,245
AIC	4,488.30	4,485.50	4,487.41	4,484.60
R-squared	0.147	0.149	0.168	0.173

AIC = Akaike Information Criterion.
Notes: *** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses. (D) represents a dummy variable.
Source: Author's calculation.

In the collection stage, population is negatively significant on the average cost per ton in Models 1-1 and 1-2. A 1% increase in the population increases the average cost per ton by approximately 0.15%. The total amount of treated waste is also negatively significant on the average costs per capita by Model 2. A 1% increase in the total amount of treated waste increases the average cost per ton by approximately 0.13%. These results suggest that economies of scale in the collection stage do exist, similar to *a priori* expectations. The waste amount per capita decreases the average cost per ton significantly, although it increases the average cost per capita. Inter-municipality is negatively significant on both the average costs per ton and per capita. Considering that the variable is a dummy variable, inter-municipality waste management lowers the average cost per ton and per capita by 65–66% and 64%, respectively, compared with municipalities that conduct waste management independently. This suggests that IMC promotes the reduction of both the cost per ton and the cost per capita, similar to *a priori* expectations. On the other hand, the recycling rate and collection frequency of plastic waste are positively significant on both the average costs per ton and per capita. This indicates that the promotion of recycling increases the average cost of waste collection, similar to *a priori* expectations. In contrast, an increase in items of separated waste decreases the average cost of waste collection. Although this is contrary to our *a priori* expectation, it is likely that most municipalities collect recyclables efficiently despite having more items of separated waste to collect. For example, it is supposed that waste collectors pick up different recyclable types at the same time. The collection frequency of burnable waste is also negatively significant. This might be resulting from a reduction in the number of waste collection trips. In contrast, the collection frequency of plastic waste is positively significant. In addition, the increasing rate of outsourced collection to private companies is negatively significant for both the average cost per ton and per capita. A 1% increase in the rate of

outsourced collection lowers average cost per ton and per capita by approximately 0.19% and 0.16%, respectively. This suggests that outsourcing during the collection stage specifically promotes the cost reduction, similar to *a priori* expectations. For the geographic determinants, the area is positively significant on the average costs per ton although it is not significant for the cost per capita. A 1% increase in the collection area raises the average cost per ton by approximately 0.03–0.04%. This indicates that increasing the area weakens the cost reductions attributable to IMC, though only slightly. Both dummy variables for isolated islands are positively significant on average cost per ton, though it is not significant for the cost per capita. Waste collection costs tend to be higher in the municipalities and inter-municipalities with isolated islands, similar to *a priori* expectations.

In the intermediate disposal stage, the waste amount per capita increases the average cost per capita significantly, although the population and total amount of treated waste do not affect the average cost per ton or per capita. A 1% increase in the waste amount per capita raises the average cost per capita by 1.1%, contrary to *a priori* expectations. Because the study focuses on management costs rather than construction costs, economies of scale seem not to be observed in the disposal stage. IMC is positively significant on both average cost per ton and per capita. Although this is contrary to *a priori* expectations, it is similar to the results obtained by Usui (2007). This phenomenon might be attributable to the fact that municipalities that originally had high costs tend to constitute IMC arrangements. IMC is supposed to establish cost savings due to promoting intensive disposal facilities. This should be observed in the siting of disposal facilities, such as incinerators, although it seems to be difficult to perform cost savings in the disposal management stage.[25] On the other hand, a higher rate of directly incinerated waste reduces both average cost per ton and per capita. It should be noted that intermediate disposal treatments include not only incineration but also compaction of bulky waste, composting, the creation of refuse-derived fuel, and recycling. Therefore, the phenomenon in which higher rates of directly incinerated waste reduce average costs might indicate that treatments other than incineration cause higher costs. Actually, a higher rate of recycling (including ash recycling) slightly increases the average cost per ton despite a 10% significance level, although it is not significant for the average cost per capita. A higher rate of residue after treatment increases both the average cost per ton and per capita despite a 10% significance level for the latter. This indicates that additional residue requires additional costs for further disposal. The collection frequency of plastic

[25] For example, Sasao (2019) suggested that economies of scale did exist for siting incinerators.

waste is positively significant on both the average cost per ton and per capita, although items of separated waste are negatively significant. This suggests that recycling plastics requires additional disposal costs, whilst waste separation at the source by households reduces disposal costs. For the geographic determinants, the dummy variables for isolated islands are positively significant for both the average cost per ton and per capita, and the impact of either a whole municipality or an inter-municipality being located on an isolated island are stronger than those of municipalities and inter-municipalities including islands.

In the final disposal stage, population is negatively significant on the average cost per ton in Models 1-1 and 1-2. The total amount of treated waste is also negatively significant on the average cost per capita in Models 2-1 and 2-2. These results suggest that economies of scale exist in the final disposal stage, similar to *a priori* expectations. In contrast, the waste amount per capita increases the average cost per capita. IMC is not significant for both the average cost per ton and per capita. On the other hand, a higher rate of directly landfilled waste and residue after incineration and treatment increase both the average cost per ton and per capita. This phenomenon indicates that more landfilled waste and residue require additional costs for final disposal, similar to *a priori* expectations. The collection frequency of plastic waste is positively significant on the average cost per ton and per capita, again, although items of separated waste are negatively significant on the average cost per ton and per capita. For the geographic determinants, in both cases – a whole municipality being located on an isolated island and a municipality or inter-municipality including isolated islands—are positively significant for both average cost per ton and per capita, and the impact is similar in the two cases. These are similar to *a priori* expectations.

Grouped Models

The estimation results for grouped models are shown in Tables 4.11, 4.12, and 4.13. These tables show the results for case of including only significant independent variables at the 10% significance level. Only the results of Models 1 and 2 are shown for inter-municipalities because both dummy variables for isolated islands were not significant. Notations for each model are the same as those in the pooled models.

Table 4.11. Estimation Results of Average Costs of Waste Collection in Japan

Variables	Municipalities				Inter-Municipalities	
	Model 1-1	Model 1-2	Model 2-1	Model 2-2	Model 1	Model 2
Population (log)	-0.0984***	-0.103***			-1.089***	
	(0.0126)	(0.0123)			(0.124)	
Rate of foreigners						
Total amount of treated waste (log)			-0.0796***	-0.0828***		-0.922***
			(0.0122)	(0.0119)		(0.112)
Waste amount per day per capita (log)	-0.365***	-0.341***	0.493***	0.490***		
	(0.0876)	(0.0870)	(0.0884)	(0.0881)		
Recycling rate (excluding ash recycling)	0.00917***	0.00934***	0.00828***	0.00849***		
	(0.00230)	(0.00234)	(0.00222)	(0.00223)		
Collection frequency of burnable waste	-0.0784**	-0.0816***	-0.0644**	-0.0609**		
	(0.0307)	(0.0311)	(0.0297)	(0.0301)		
Collection frequency of plastic waste	0.0299***	0.0316***	0.0258***	0.0270***	0.363***	0.299***
	(0.0100)	(0.0101)	(0.00989)	(0.00991)	(0.0983)	(0.0978)
Items of separated waste	-0.00958***	-0.00999***	-0.00961***	-0.00987***		
	(0.00325)	(0.00326)	(0.00324)	(0.00324)		
Rate of outsourced collection	-0.209***	-0.204***	-0.183***	-0.184***		
	(0.0570)	(0.0565)	(0.0567)	(0.0566)		
Area (log)	0.0286*					
	(0.0162)					
Islands (D)	0.365***		0.212**			
	(0.112)		(0.108)			
Municipalities including islands (D)		0.253***		0.196***		
		(0.0681)		(0.0663)		
Constant	6.221***	6.242***	-1.080*	-1.044*	12.45***	8.118***
	(0.572)	(0.582)	(0.585)	(0.587)	(1.356)	(1.050)

Observations	1,459	1,459	1,459	1,459	135	135
AIC	3,150.55	3,152.51	3,122.90	3,120.43	545.48	539.39
R-squared	0.108	0.105	0.079	0.081	0.303	0.283

AIC = Akaike Information Criterion.
Notes: *** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses. (D) represents a dummy variable.
Source: Author's calculation.

Table 4.12. Estimation Results of Average Costs of Intermediate Disposal in Japan

Variables	Municipalities				Inter-Municipalities	
	Model 1-1	Model 1-2	Model 2-1	Model 2-2	Model 1	Model 2
Population (log)					-0.501***	
					(0.0545)	
Rate of foreigners					8.182**	10.21**
					(3.853)	(4.332)
Total amount of treated waste (log)						-0.462***
						(0.0520)
Waste amount per day per capita (log)			1.205***	1.228***		0.944**
			(0.238)	(0.244)		(0.388)
Number of constituent municipalities					0.0754***	0.0700***
Recycling rate (including ash recycling)	0.0208***	0.0254***	0.0213***	0.0258***		-0.00881*
	(0.00382)	(0.00435)	(0.00391)	(0.00444)		(0.00518)
Rate of residue after incineration	2.157*	2.301*		2.260*		
	(1.176)	(1.202)		(1.196)		
Rate of residue after treatment	3.134***	3.320***	3.097***	3.276***		
	(1.017)	(1.010)	(1.038)	(1.034)		
Collection frequency of plastic waste	0.0914***	0.0901***	0.0927***	0.0916***		
	(0.0331)	(0.0330)	(0.0331)	(0.0330)		
Collection frequency of organic waste					0.0437*	0.0674**
					(0.0227)	(0.0262)
Items of separated waste	-0.0219**	-0.0257**	-0.0207*	-0.0243**		-0.0303*
	(0.0105)	(0.0104)	(0.0106)	(0.0105)		(0.0173)
Islands (D)	1.971***		1.863***			
	(0.195)		(0.203)			
Municipalities including islands (D)		1.249***		1.212***		
		(0.168)		(0.173)		

Constant	1.272***	1.059***	-8.064***	-8.433***	7.720***	-0.180
	(0.184)	(0.228)	(1.667)	(1.716)	(0.576)	(2.724)
Observations	1,080	1,080	1,080	1,080	394	394
AIC	4374.77	4380.87	4376.16	4382.10	1,184.46	1,179.67
R-squared	0.069	0.065	0.098	0.095	0.186	0.208

AIC = Akaike Information Criterion.
Notes: *** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses. (D) represents a dummy variable.
Source: Author's calculation.

Table 4.13. Estimation Results of Average Costs of Final Disposal in Japan

Variables	Municipalities				Inter-Municipalities	
	Model 1-1	Model 1-2	Model 2-1	Model 2-2	Model 1	Model 2
Population (log)	-0.230***	-0.223***			-0.488***	
	(0.0336)	(0.0340)			(0.0717)	
Rate of foreigners					10.16**	11.33**
					(4.458)	(4.452)
Total amount of treated waste (log)			-0.234***	-0.226***		-0.457***
			(0.0340)	(0.0346)		(0.0730)
Waste amount per day per capita			1.439***	1.356***		0.952**
(log)			(0.217)	(0.223)		(0.406)
Number of constituent					0.0782**	0.0733**
municipalities					(0.0332)	(0.0331)
Recycling rate (including ash	0.00762*	0.00847*	0.00823*	0.00881**		
recycling)	(0.00439)	(0.00441)	(0.00448)	(0.00448)		
Rate of directly landfilled waste	3.063***	3.018***	2.972***	2.963***	1.779**	1.969***
	(0.370)	(0.362)	(0.382)	(0.374)	(0.719)	(0.742)
Rate of residue after incineration	3.805***	3.775***	3.771***	3.755***		
	(0.946)	(0.949)	(0.945)	(0.947)		
Rate of residue after treatment	3.852***	3.817***	3.800***	3.786***		
	(1.046)	(1.030)	(1.054)	(1.035)		
Collection frequency of plastic	0.107***	0.112***	0.110***	0.114***		
waste	(0.0292)	(0.0293)	(0.0294)	(0.0295)		
Items of separated waste	-0.0303***	-0.0281***	-0.0294***	-0.0276***	0.0237*	
	(0.00975)	(0.00976)	(0.00978)	(0.00979)	(0.0130)	
Municipalities including islands (D)		0.374***		0.355**		
		(0.134)		(0.140)		
Constant	2.376***	2.219***	-8.775***	-8.357***	4.867***	-3.239
	(0.409)	(0.423)	(1.471)	(1.484)	(0.829)	(2.871)

Observations	942	942	942	942	303	303
AIC	3471.02	3468.95	3472.14	3470.61	999.01	995.64
R-squared	0.150	0.154	0.180	0.183	0.149	0.150

AIC = Akaike Information Criterion.
Notes: *** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses. (D) represents a dummy variable.
Source: Author's calculation.

In the collection stage, the results for municipalities that conduct waste management independently are similar to those in the pooled models. In contrast, for inter-municipality arrangements, the only significant variables are population in Model 1 and total amount of treated waste in Model 2. Population is negatively significant for the average cost per ton, and the total amount of treated waste is also negatively significant for the average cost per capita. A 1% increase in population reduces the average cost per ton by approximately 1.09%. A 1% increase in the total amount of treated waste reduces the average cost per capita by approximately 0.92%. These results, again, suggest that economies of scale do exist in the collection stage, and they are similar to *a priori* expectations. The collection frequency of plastic waste is positively significant for inter-municipalities similarly to municipalities that conduct waste management independently. No other significant variables were observed for inter-municipalities, whilst several other variables were significant for municipalities that conduct waste management independently, similar to cases using pooled models. This indicates that population and total amount of waste are important factors in the collection stage of RWM.

In the intermediate disposal stage, the results for municipalities that conduct waste management independently and inter-municipalities show different results. Population and the total amount of treated waste are negatively significant for inter-municipalities, although they are not significant for municipalities that conduct waste management independently. A 1% increase in population reduces the average cost per ton by approximately 0.5% for inter-municipalities. A 1% increase in the total amount of treated waste reduces the average cost per ton by approximately 0.46% for inter-municipalities. These results suggest economies of scale exist in the intermediate disposal stage only in inter-municipalities. The rate of foreigners is positively significant for inter-municipalities although it is not significant for municipalities that conduct waste management independently. Foreigners' lack of familiarity with Japanese waste separation in municipalities can raise the rate of unseparated waste, and consequently this may increase disposal costs at the intermediate disposal stage, similar to *a priori* expectations. However, the reason why this phenomenon is observed only in inter-municipalities is not clear. On the other hand, an increasing number of constituent municipalities increase disposal costs for inter-municipalities. A 1 increase in the number of constituent municipalities raises the average cost per ton or per capita by approximately 0.07% or 0.08%. This might result from an increase in administration costs due to the combining of more municipalities, although the impacts are slight, similar to *a priori* expectations. A higher rate of recycling (including ash recycling) slightly increases both the average cost per ton and per capita for municipalities that conduct waste management independently, although it is not significant for the average costs per ton and negatively significant for

per capita despite a 10% significance level for inter-municipalities. The collection frequency of organic waste is positively significant for inter-municipalities, although it is not significant for municipalities that conduct waste management independently. Items of separated waste are negatively significant for average costs per capita despite a 10% significant level similarly to municipalities that conduct waste management independently. However, they are not significant for per ton for inter-municipalities. No other significant variables are observed for inter-municipalities, although they are observed for municipalities that conduct waste management independently, similar to pooled models.

In the final disposal stage, the results are somewhat different for municipalities that conduct waste management independently and inter-municipalities. Population and the total amount of treated waste are negatively significant in both municipalities that conduct waste management independently and inter-municipalities, similar to *a priori* expectations. A 1% increase in population reduces the average cost per ton by approximately 0.22–0.23% and 0.49% for the municipalities that conduct waste management independently and for the inter-municipalities, respectively. A 1% increase in the total amount of treated waste reduces the average cost per ton by approximately 0.23% and 0.46 % for municipalities that conduct waste management independently and inter-municipalities, respectively. The rate of foreigners is, again, positively significant for inter-municipalities, although it is not significant for municipalities that conduct waste management independently. An increasing number of constituent municipalities also increases disposal costs for inter-municipalities. A 1% increase in the number of constituent municipalities raises the average cost per ton and per capita by approximately 0.08% and 0.07%, respectively. The rate of directly landfilled waste is positively significant for both municipalities that conduct waste management independently and inter-municipalities. A 1% increase in the rate of directly landfilled waste increases the average cost per ton by approximately 3.8% and 1.8% for municipalities that conduct waste management independently and inter-municipalities, respectively. A 1% increase in the rate of directly landfilled waste increases the average cost per capita by approximately 3.0% and 2.0% for municipalities that conduct waste management independently and inter-municipalities, respectively. Items of separated waste are positively significant for average costs per ton despite a 10% significant level for inter-municipalities, although they are negatively significant for municipalities that conduct waste management independently. However, the reason for this is not clear.

4.4. Possible Applications for Developing Countries in Asia

As presented in Section 4.2, most existing cost analyses on waste management were conducted in developed countries. There are no empirical studies of waste management costs targeted at developing countries. Therefore, this section conducts a simple econometric analysis to clarify whether economies of scale are also observed in Asian developing countries or not. Here, we analyse MSW management costs in the Philippines as a case study. If economies of scale are also observed in the Philippines, RWM can be expected to contribute cost savings to waste management in other developing countries in Asia.

4.4.1. Data and Methodology

The study uses a dataset from the Survey of Solid Waste Management Cost in the Philippines prepared by Environweave Integrative Environmental Research (2019). The available number of municipalities for the study is 119 (including 22 cities) out of 1,634 municipalities. The study considers the total budget for MSW management with cost as a dependent variable. It should be noted that the total budget is not the average cost unlike the analysis in the previous section.[26] It considers population density (based on registered population), total amount of waste generation, rate of recyclables, number of *barangays* (the smallest unit of local government in the Philippines), and the number of materials recovery facilities (MRF) as the independent variables.[27] The cost, population density, and total amount of waste are transformed using logarithms in order to capture elasticity. If a 1% increase in population density raises costs by less than 1%, economies of density exist. A 1% increase in the amount of waste raises costs by less than 1%, economies of scale exist. The rate of recyclables represents the percentage of recyclables in the total amount of waste generated. An increase in the rate of recyclables can increase management costs due to increasing recyclables while it might decrease management costs due to material sales. An increase in the number of *barangays* might increase management costs because of the increasing administrative costs such as additional municipalities in inter-municipality groups. An MRF is a location or facility where MSW is separated or processed using mechanical and manual methods. MRFs are owned by *barangays* in general. An increase in the number of MRFs can increase management costs due to increasing

[26] Although the author also regressed the average cost instead of the total budgets, independent variables except for population density was not significant. Therefore, this section focuses on the total budget.
[27] Population density rather than population and area is considered in this case study unlike the analysis in the previous section because the study regresses the total cost rather than average cost. The total cost is assumed to be proportional to population and area.

recyclables while it might decrease management costs due material sales, similar to the rate of recyclables.

Table 4.14 tabulates descriptive statistics of the variables considered in the analysis. The correlation coefficients indicate that the relationships between the independent variables are negligible. Three combinations of different independent variables are regressed using the OLS method.

Table 4.14. Descriptive Statistics in the Philippines

Variables	Mean	Median	SD	Max	Min
Cost (total budget) (PHP)	35,900,000	3,312,000	85,200,000	606,000,000	3541.25
Average cost (PHP/ton)	1,720.32	923.54	2,856.81	21,622.86	0.3972603
Population density (person/km^2)	2,852.73	514.65	7,097.57	36,272.73	24.2915
Total amount of waste (tons)	24,505.27	5,489.34	56,308.69	361,606.60	134.685
Rate of recyclables	0.2187	0.2135	0.1151	0.5371	0.000318
Number of *barangay*	27.49	20	26.21	188	5
Number of MRF	9.11	0	25.98	142	0

km^2 = square kilometres, MRF = materials recovery facilities, SD = standard deviation.
Note: PHP100 (Philippine peso) = $2.13 (in 2015).
Source: Author's calculation.

4.4.2. Estimation Results

The estimation results of the three models are listed in Table 4.15. The results only include independent variables that are significant at the 5% significance level, which are shown in the column labelled Model 1. The results include only significant variables at the 10% significance level; the rate of recyclables and the number of MRF are shown in the columns labelled Model 2 and Model 3, respectively.[28] The model specification is the most suitable for Model 2 amongst the three models because the Akaike Information Criterion (AIC) is lowest in Model 2. Therefore, the following discussion is based on Model 2's results.

[28] In the case of including MRF rather than the rate of recyclables, MRF was not significant.

Table 4.15. Estimation Results of Waste Management Costs in the Philippines

Variables	Model 1	Model 2	Model 3
Population density (log)	0.335**	0.407**	0.404**
	(0.147)	(0.168)	(0.171)
Total amount of waste (log)	0.684***	0.638***	0.637***
	(0.152)	(0.163)	(0.164)
Rate of recyclables		-1.748*	-1.821*
		(0.954)	(0.958)
Number of *barangay*	0.0110**	0.0151**	0.0130**
	(0.00443)	(0.00604)	(0.00648)
Number of MRF			0.00554*
			(0.00320)
Constant	6.973***	7.264***	7.318***
	(0.608)	(0.598)	(0.585)
Observations	119	95	95
AIC	432.04	358.83	360.11
R-squared	0.551	0.541	0.545

AIC = Akaike Information Criterion, MRF = materials recovery facility.
Notes: *** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses. (D) represents a dummy variable.
Source: Author's calculation.

A 1% increase in population density raises costs by 0.41%. This indicates that economies of density are observed in the Philippines. A 1% increase in the amount of waste raises costs by 0.64%, which indicates that economies of scale are observed in the Philippines as well. A 1% increase in the rate of recyclables reduces costs by 1.75%, although at the 10% significance level. This indicates that a high rate of recyclables can promote cost savings due to material sales. This result is in contrast to the results obtained in the previous section. On the other hand, an increase in the number of barangays raises costs by 1.3%. An increasing number of barangays might raise transaction costs.

4.5. Concluding Remarks

This study focused on two controversial issues: economies of scale in RWM and the cost efficiency of contracting out to private companies. We conducted simple empirical analyses to clarify the factors that contribute to cost savings at each stage of waste management: collection, intermediate disposal, and final disposal in Japan. The estimation results suggest that economies of scale exist in the collection stage, and indicate that RWM promotes cost savings at the stage as well. However, policymakers should take note that there is an increase in collection costs due to an increasing area. In contrast, economies of scale or cost savings in RWM were not observed at the

intermediate and final disposal stages. As shown in Sasao (2019), economies of scale for disposal facilities are expected in the context of siting facilities. In addition, municipalities that previously had high waste disposal costs due to, for example, a small population, may tend to organise inter-municipalities. On the other hand, the results of the grouped models indicate that an increase in population and total amount of treated waste promotes cost savings at the intermediate and final disposal stages in inter-municipalities. The impact on inter-municipalities is stronger than that on municipalities that conduct waste management independently. Therefore, it is important for IMC that a fairly large amount of waste is collected, although policymakers should consider a possible increase in administrative costs.

This study also conducted a simple empirical analysis of MSW management costs in the Philippines. The results found economies of density and of scale in the Philippines. This indicates that IMC can promote cost savings in developing countries' waste management as well. In contrast, the results indicate that an increasing number of *barangays* could increase waste management costs. Policymakers should consider a possible increase in administrative costs due to an increase of the number of constituent municipalities participating in IMC.

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Chapter 5

Promoting Local Collaboration on Waste Management: Lessons from Selected Cases in the Philippines

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Abstract

Waste management has becoming more challenging especially to local government units (LGUs), considering the responsibilities entrusted to them as mandated by laws and their limitations in terms of technical and financial resources. Hence, governments have been searching for possible ways on how to deliver more efficient and quality services in terms of waste management. In recent years, the use of public–private partnerships in developing Asia has expanded which reduced the risks and responsibilities of the state, lowered fiscal costs, and widened access to quality public services (Deolalikar, Jha, and Quising, 2015). This chapter provides a brief review of solid waste management in the Philippines (Atienza, 2019), particularly on the legal bases for promoting local collaboration in waste management, the status and types of local collaboration, and the challenges and opportunities. Section 5.2 focuses on some emerging trends on public service delivery such as the promotion of public–private partnerships and their relation to waste management, amongst others. Further, it presents the rationale for promoting local collaboration on solid waste management towards more efficient and effective public service delivery. Based on the experiences of the selected case studies and key informant interviews with local officials and the private sector, this chapter identifies the facilitating and the hindering factors for local collaboration. The last part provides some possible recommendations towards effective collaboration on solid waste management.

Keywords: Local collaboration, waste management, Philippines

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5.1. Introduction

Waste management has becoming more challenging, especially to local government units (LGUs) considering the responsibilities entrusted to them as mandated by laws and their limitations in terms of technical and financial resources. Hence, governments have been searching for possible ways on how to deliver more efficient and quality services in terms of waste management. In recent years, the use of public–private partnerships (PPP) in developing Asia has expanded, which reduces the risks and responsibilities of the state, lowers fiscal costs, and widens access to quality public services (Deolalikar, Jha, and Quising, 2015).

In the Philippines, the solid waste disposal or environmental management system is one of the devolved functions to the LGUs as cited in the Republic Act 7160 (RA 7160), also known as the Local Government Code of 1991. However, despite the enactment of the Republic Act 9003 (RA 9003), also known as the Ecological Solid Waste Management Act of 2000 in 2001, the problems on managing waste remains one of the pressing concerns in the country. The records of the National Solid Waste Management Commission (NSWMC) showed that even after almost 2 decades since the RA 9003 came into force, there is still weak compliance amongst LGUs, especially in terms of constructing sanitary landfill (SLF) facilities as final disposal sites for residual waste as mandated by the law. This reveals that trying to solve the concerns on waste management by the LGUs alone seems difficult due to their limitations as cited earlier. Hence, there is a need to promote local collaboration to effectively address waste management concerns in the country.

To provide a brief background of the state of local collaboration in the Philippines particularly on waste management, this section presents the summarised version of an earlier report by Atienza (2019). As cited in the report, there are legal bases that support local cooperation or clustering in the delivery of public services such as solid waste management. Amongst the related laws and policies are the 1987 Constitution of the Republic of the Philippines, the Republic Act 7160 (RA 7160), and the Ecological Solid Waste Management Act of 2000 (RA 9003). In terms of the construction of SLF facilities, the report further reveals that there are two types of collaboration in the country: (i) the inter-government or inter-LGU partnership, and (ii) private enterprise utilised by LGUs. Both types of collaboration use a memorandum of agreement (MOA) or contract as the legal instrument for entering such kind of partnerships in delivering waste management services. Based on the experiences of the selected cases discussed in the report, the LGUs can save huge amounts through clustering, which they can utilise to deliver other public services in the community.

Therefore, the challenge now is how to promote local collaboration in waste management. Section 5.2 discusses the emergence of various strategies on delivering public services and how these could be applied to managing waste management.

5.2. Emerging Trends on Public Service Delivery and Waste Management

This section focuses on some emerging trends on public service delivery such as the promotion of public–private partnerships (PPP) and their role in improving the provision of public services. There is a large disparity in the delivery of public services in developing Asia within countries as most of its benefits 'tend to accrue disproportionately to the nonpoor' (Deolalikar, Jha, and Quising, 2015). In addition, there are large disparities between rural and urban areas in terms of access to public services (Deolalikar, Jha, and Quising, 2015). In the Philippines, this situation can also be observed in the provision of public services such as education, health, and sanitation including waste management, amongst others. Hence, there is a need to improve the access and quality of public services through collaboration between and amongst state actors as well as the private sector and other institutions.

Just like other developing countries, the Philippines continues to search for possible effective and sustainable solutions to address the various waste management concerns. Recently, the DENR Environmental Management Bureau (EMB) issued the Memorandum Circular (MC) No. 2019-008 adopting the NSWMC Resolution No. 669 Series of 2016 'Guidelines Governing the Establishment and Operation of Waste-to-Energy Technologies for Municipal Solid Waste'. The MC will serve as guide to all the EMB regional directors in providing support to LGUs and other stakeholders in the establishment and operation of the waste-to energy (WTE) facility. The guidelines include the registration and permitting requirements, standards and procedures on the establishment and operation of commercial WTE technologies utilizing municipal solid wastes. WTE refers to the 'energy recovered from waste, usually the conversion of non-recyclable waste materials into useable heat, electricity, or fuel through a variety of processes' (DENR-EMB, 2019, p.3). The establishment of WTE facilities can provide possible sustainable solutions on addressing waste management concerns. It could be an avenue for possible collaboration amongst LGUs, the private sector, and other relevant stakeholders.

Public private service delivery is 'an alliance, collaboration or agreement between a public agency and a private organization for the provision of a public service (Deolalikar, Jha, and Quising, 2015). Through PPP, the private sector can bring in the capital and experience to address the infrastructure gap (PPP Center, 2014). In the Philippines, there are many

examples of successful projects through PPP arrangements, such as in providing more efficient transportation, public markets, amongst others. To cite an example, is the establishment of the Mandaluyong City Public Market rebuilding through the build–operate–transfer (BOT) system. The old Mandaluyong Public Market was totally destroyed by fire in 1990, hence, many vendors were transferred to street sidewalks and parks. This created a burden to the local government of Mandaluyong City. It needed about ₱100 million to construct a new public market and with 20% interest, it would require a huge amount should the LGU decide to borrow the required amount. Thus, the local government entered into a PPP arrangement through BOT in building the shopping mall with a public market on the ground floor. The city government controls and supervises the public market and it leases the whole building and shopping mall to the developer, except for the public market. As incentives to the developer, it is exempt from the mayor's permit for the first 2 years of operation, from real estate tax for 40 years, and the LGU assisted in the search for prospective stockholders. Hence, through this PPP arrangement, Mandaluyong City was able to rebuild the public market without cost. Further, it generated employment, solved the problems on traffic, flooding, pollution, and more efficient waste management (PPP Center, 2014).

5.3. Rationale for Promoting Local Collaboration on Solid Waste Management

Based on the NSWMC database in 2015, waste generation is 40,000 tons/day at the national level, and 9,000 tons/day in Metro Manila. Waste generation per capita ranges from 0.32–0.71 kilogram/day at the national level, with 0.71kg/day in Metro Manila. In terms of waste collection efficiency, it ranges from 40% to 85% at the national level, with 85% in Metro Manila (NSWMC database, 2018). Sometimes, the lack of capacity at the local level hinders the ability to reap the full benefits of decentralisation and local officials may not fully exploit other opportunities to deliver a better service (Deolalikar, Jha, and Quising, 2015). This chapter provides two reasons for promoting local collaboration on waste management in the country: (i) recognition of the limitation of the local government in terms of capacity and resources to provide more efficient and effective public service delivery; and (ii) recognition of the advantages of collaborative approaches between and amongst local governments or through PPP. Attracting the corporate sector and involving them as key stakeholders can facilitate increased access to human resources, funding, and technical expertise for the local government and the communities (Cardinal, 2018).

5.4. Facilitating and Hindering Factors for Local Collaboration

Based on the record of the NSWMC DENR-EMB as of September 2018, there were only 141 operational SLF facilities and 30 SLF facilities under construction amongst the total 1,634 cities and municipalities in the country (NSWMC-EMB, 2018). This data show that there is still weak compliance in the RA 9003 especially in terms of constructing SLF facilities as final disposal sites for residual waste. Although there are some initiatives amongst LGUs to form clusters in constructing SLF facilities, there are some of challenges or hindering factors for such collaboration such as political and social issues on the terms of office of local government officials, the difficulty of finding a host LGU due to the 'not-in-my-backyard' syndrome, amongst others.

Cases of Local Collaboration on Solid Waste Management

The next section lifts selected cases of local collaboration on waste management as cited in the earlier report (Atienza, 2019). Based on their experiences and key informant interviews with local officials and the private sector, it will identify the facilitating and the hindering factors for local collaboration. The first two cases are examples of inter-LGU cooperation; and the next cases are examples of privately-managed SLF facilities being utilised by the LGUs.

The Surallah Cluster SLF, South Cotabato Province

One of the success stories of inter-LGU collaboration is the Surallah Cluster SLF in South Cotabato. This was initiated by the provincial office of South Cotabato since the financial resources needed to construct an SLF facility was too high for an LGU, the consolidated efforts amongst LGUs is a more feasible option. The MOA for the Surallah Cluster Sanitary Landfill for Sustainable Solid Waste Management between the Province of South Cotabato represented by the governor and the six member municipalities represented by their mayors, was signed in 2009 and the facility became operational in 2011. The Municipality of Surallah is the host LGU for the common SLF facility and it receives residual waste generated from the member LGUs. It is a 6-hectare cluster SLF facility, has a capacity of 75,000 cubic metres, and is estimated to last for 14 years (until 2024). It is located kilometres from Surallah town proper and has its own leachate treatment facility by pond method. This cluster SLF facility was a recipient of the Galing Pook Award in 2014 (Municipality of Surallah 10 Year Solid Waste Management Plan: 2015–2024). The MOA for the Surallah Cluster SLF facility was renewed in 2016 with the addition of two member municipalities.

In terms of economies of scale, it reveals that it is more economical for a cluster SLF rather than for an individual SLF. In the scenario, the required investment would be ₱54,000,000 from the six LGUs, where they would have to build their own SLF facility, excluding manpower, equipment, and operational costs. But with the cluster SLF, the investment needed is only ₱15,000,000 with the capacity of 30 tons per day excluding manpower, equipment, and operational costs. Thus, with the cluster SLF, the LGUs can save huge amount which they can utilise to deliver other public services in the community (Balucanag, n.d.).

Alburquerque Cluster SLF, Bohol Province

The Alburquerque Cluster SLF is another example of inter-LGU cooperation in the province of Bohol. The cluster SLF is a 6.9-hectare facility located about 12 kilometres from the capital city of Tagbilaran. It became operational in 2017, about 15 years after the Tourism Infrastructure and Enterprise Zone Authority (TIEZA) and the local government unit of Alburquerque signed an MOA in 2011. TIEZA (presently the Philippine Tourism Authority or PTA) provided the P300 million for the construction and development of the facility (Obedencio, 2017). Based on the MOA, Alburquerque, as the host ensures the establishment and operation of the SLF facility in accordance with the law, allows continuous access of garbage vehicles of cluster LGUs and their private entities, and continuously complies with regulatory maintenance requirements. The cluster LGUs on the other hand, provide their own transport equipment, materials recovery facility, and transfer station; comply with the disposal schedule and procedures established by the board; and pay a tipping fee to the Alburquerque LGU through automatic allocations (Alburquerque SLF, 2012).

Privately managed SLF facilities being utilised by LGUs

Currently, the common type of partnership on solid waste management in the Philippines are the privately managed or operated SLF facilities, which are being utilised by a group of LGUs. Examples of this kind of cooperation are the Navotas SLF facility in the National Capital Region and the Rodriguez Rizal SLF facility in Rizal Province that receive waste from the LGUs in Metro Manila; the Pilotage SLF facility in San Pedro, Laguna which receives waste from the LGUs in Laguna Province, including San Pedro, Sta. Rosa, Los Banos, and Carmona, amongst others.

The 40-hectare Navotas SLF facility is the first engineered SLF facility in Metro Manila privately managed by the Phil Ecology Systems Corporation. It accommodates 1,500 tons per day of municipal solid waste from various cities in the National Capital Region and

uses landing craft transport barges to transport waste from the transfer station to the SLF site (Phil Ecology Systems Corporation, 2019). The Rodriguez Rizal SLF facility is privately operated and owned by the International Solid Waste Integrated Management Specialist Inc. The Pilotage SLF facility is a 12-hectare facility operated by the Pilotage Trading and Construction located in San Pedro, Laguna.

Facilitating and Hindering Factors for Local Collaboration

Based on the experiences of the selected cases above, and through the conduct of key informant interviews with local officials and the private sector, this study identifies the facilitating and the hindering factors for local collaboration on solid waste management:

Facilitating Factors

1) The stricter enforcement of the RA 9003, which mandates the LGUs to implement the law and where they can be sanctioned for non-compliance. Section 52 of the RA 9003 cited that any citizen may file a suit against LGU officials for failing to implement the law. In 2016, the NSWMC filed with the Office of the Ombudsman complaints against 50 LGUs and more than 500 officials for failing to comply with the RA 9003. Hence, local officials are obliged to find ways to implement the laws such as through local collaboration.
2) The limitation of the LGUs to construct waste management facilities by themselves due to huge resources required, and hence, the need to either become a part of an inter-LGU partnership or enter into a contract with the private sector that is providing waste management services.
3) Another driving factor for LGUs is the inclusion of the compliance to the RA 9003 as one of the parameters to receive awards or recognitions such as the Seal of Good Local Governance and other innovative programmes from the national, provincial, and/or regional agencies.
4) Political will of the local leaders to enter into an agreement through this kind of collaboration or clustering. The signing of an MOA amongst member LGUs provides clear guidelines on attaining the agreed purposes of such kind of collaboration. For cluster SLF facilities between and amongst LGUs, the important sections of the MOA includes the core principles in entering into the collaboration; the obligations of the host LGU and of other member LGUs; the creation of the board and its functions, credit financing, dispute resolution, effectivity and pre-termination clause, amongst others.

5) For privately-managed SLF facilities utilised by LGUs, the contract includes, amongst others, the obligations of the private sector such as receiving or accepting residual waste from the partner LGUs, and processing of the waste in accordance with the RA 9003 and its implementing guidelines. On the other hand, the obligations of the local government is to ensure that waste generated will be hauled and dumped only at the facility owned by the partner organisations. Normally, a host LGU or the provincial or city government where the facility is located, transact with other LGUs that are dumping their waste at the facility, whilst the host LGU enters the agreement with the private sector who owns and operates the facility.

Hindering Factors

1) Term of the local chief executives and the long process of establishing local collaboration particularly for the cluster SLF facility. In the Philippines, the term of a local chief executive is 3 years per term with a maximum of 3 terms. In entering this kind of collaboration, it usually takes many years from the planning until the operation of the facility. To cite an example, the Surallah Cluster SLF started with the inclusion of the establishment of the cluster SLF facility in their 10-year solid waste management plan around 2005, but the MOA between the province of South Cotabato and the six member municipalities was signed in 2009. The facility became operational in 2011. In the case of the Alburquerque Cluster SLF facility in Bohol Province, the provincial Ecological Solid Waste Management Board was created and the Technical Working Group was reconstituted in 2002–2004; the 11 LGUs signed MOAs to form a cluster in 2005–2007, followed by a series of meetings and dialogues with officials and other stakeholders in 2008–2010, and finally phase 1 of the SLF facility was completed in November 2008 (Alburquerque Cluster SLF Meeting, 25 November 2011). The facility became operational in 2017 (Obedencio, 2017). Hence, it is difficult to enter into this kind of collaboration or to sustain it, especially when there is a change of leadership. This condition also discourages many LGUs to enter into this kind of partnership arrangement.
2) The difficulty of finding a host LGU due to strong resistance of the community or the not-in-my-backyard (NIMBY) phenomenon. In any government programmes or projects, the acceptance of the community matters to many local government officials because continuing a programme without social acceptance seems like ‘political suicide’ for them.

3) Lack of political will and initiatives of the local government officials. As mentioned in 2) above, entering into this kind of agreement without addressing the resistance of the people may have a negative impact on their political career. It takes strong awareness campaigns to change the perception and behaviour of the people in understanding this kind of initiative in addressing waste management problems. Further, the complexities in terms of the division of labour, cost and benefit sharing, and the possible loss of power or control over its own locality discourage some officials to enter into this kind of collaboration.

4) From the side of the private sector, some of the hindering factors for entering into this kind of collaboration are the lack of assurance for the sustainability of operation due to limited volumes of waste generation, the lack of assurance that the partner local government units will allocate funds for the provision of waste management services, and other political issues that could deter the partnership agreement.

5.5. Towards Effective Collaboration on SWM: Lessons Learned from Selected Cases

This last section provides some possible recommendations on how to reduce the hindering factors and to strengthen the facilitating factors towards more effective and sustainable collaboration on solid waste management. In discussing the delivery of public services such as waste management, the provider of the services cannot be excluded. Hence, governance plays a significant role in the delivery of public services. It is always a challenge on how 'to improve the quality of public services, which is intricately linked to the larger issue of dysfunctional governance systems, including, among other things, lack of accountability and responsiveness, corruption, leakage of public funds meant for service delivery, and rent-seeking by public providers' (Deolalikar, Jha, and Quising, 2015, p.152).

In relation to the above discussion on the facilitating and hindering factors for collaboration, the following can be the possible recommendations on how local collaborations can be promoted:

1) Strengthening the promotion of local collaboration through policy support including the provision of both technical and financial assistance from the national or provincial government. In the case of the Surallah Cluster SLF facility, the provincial government of South Cotabato provides the technical and financial assistance for the improvement of the access road from the national highway to the SLF site,

assists the host LGU in developing and maintaining the facility, in securing necessary permits, and in monitoring the performance of the cluster and host LGUs in fulfilling the obligations cited under the cluster agreement.

2) Conduct strong information, education, and communication campaigns to ensure social acceptance. In the experience of the Surallah Cluster SLF facility, Elbe Balucanag (supervising environment management specialist and chief, Provincial Environment Management Office, Environment Management Division) cited that the provincial LGU of South Cotabato provides capacity building and information campaigns to ensure social acceptability of the clustering scheme (Telephone Interviews, Balucanag, 2018; 2020).
3) Strengthen commitment of LGU officials and other parties to ensure the sustainability of the collaboration. The LGU must exhibit strong commitment to share part of its resources to the partnership or collaboration. In a clustered SLF, it is cited in the MOA that the member LGUs must allocate budget for paying their obligations to the host LGU such as the tipping fees, amongst others.
4) Conduct field visits to the successful cases of collaboration. The exposure and lessons that can be gained through this activity will encourage LGU officials and other sectors on the benefits and or advantages of local collaboration. It can also provide practical and proven solutions on addressing waste management through actual experiences from other LGUs.
5) Partnering with other sectors such as nongovernment organisations, academe, and research institutions, amongst others. The LGUs do not need to carry the burden alone. Although the RA 9003 mandates the LGUs to be the main implementer of the law, it also encourages participation of other stakeholders (RA 9003, Section 5q).
6) Other initiatives from the national government such as inter-agency forums and multi-stakeholder consultation to provide an avenue for the different sectors to discuss the concerns and issues on waste management and to provide possible practical solutions such as the promotion of local collaboration and public–private partnerships towards attaining more effective and sustainable waste management.

As adapted from Besley and Ghatak (2007) the five ‘Ms’ – mobilise, mission, match, motivate, and monitor can be used to harness public–private partnerships and in selecting appropriate delivery mechanisms (As cited in Deolalikar, Jha, and Quising, 2015). Mobilise – the state can mobilise potential private sector partners by providing the required legal and administrative framework for this kind of arrangement such as passing the BOT laws,

capacity building of state agencies on soliciting and evaluating bids, and in monitoring and regulating performance (ADB, 2008 as cited in Deolalikar, Jha, and Quising, 2015). Mission – refers to the organisational goals. Match is the process of matching the organisational goals to the type of public service; Motivate is the mechanism to motivate private sector partners through the provision of pecuniary or non-pecuniary incentives, or both. Monitor is the performance of the partners (Deolalikar, Jha, and Quising, 2015). In the Surallah Cluster SLF facility, the provincial LGU provides assistance in securing necessary permits and in monitoring the performance of the cluster and host LGUs in fulfilling the obligations cited under the cluster agreement.

Recognising the limitations of local government in terms of capacity and resources to provide more efficient and effective public service delivery; and the advantages of collaborative approaches between and amongst local governments or through PPPs provide strong justification to promote local collaboration on waste management.

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Chapter 6

Internal and External Factors in the Development of Regional Waste Cooperation in the Greater Bandung Region

Enri Damanhuri[30]

Abstract:

The development of spatial and residential areas, especially in urban areas, results in an increase of municipal solid waste (MSW) that cannot be managed by individual districts or cities. In Indonesia, the cooperation between districts and cities as an aspect of regional autonomy aims to accelerate the realisation of people's welfare goals by improving services and community empowerment. The West Java province began the implementation of regional MSW management in 2006 with the operation of the Sarimukti regional landfill (TPK–Sarimukti) facility for three districts and cities. The West Java provincial government established an institution to manage this sharing facility, namely the Regional Waste Management Agency (BPSR) as a structural institution in the province. The tasks of the BPSR were then extended beyond managing the TPK–Sarimukti to those in other locations in the province. One of them was the Waste Treatment and Final Processing Legok Nangka (TPPAS Legok Nangka) facility for the Greater Bandung Region (Bandung City, Cimahi City, Bandung District, West Bandung District, Garut District, and Sumedang District). This chapter is a continuation of a previous paper entitled 'Waste Management in the Prospective Cooperation between Local Governments in Indonesia'. This chapter focuses on the results of a SWOT analysis on the effectiveness of the role and function of the BPSR as a regional waste management initiative, and how the TPPAS Legok Nangka will later play a role as a joint waste management facility in the region. The results of the SWOT analysis will be considered to maintain the sustainability of regional cooperation. The strategy to be implemented by the West Java provincial government will determine the factors involved in the sustainability of this sharing facility.

Keywords: solid waste management, regional cooperation, internal-external factors, SWOT analysis

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6.1. Introduction

Cooperation between districts and cities as part of regional autonomy in Indonesia aims to accelerate the realisation of people's welfare through service improvement and community empowerment. Some of the common problems related to public services are their low quality, unclear standards, and low accountability. Regional autonomy provides an opportunity for the respective regions to improve people's welfare by exercising the authority to regulate their own regions. In the context of municipal solid waste (MSW) management, Law No. 18/2008 encourages collaboration between regional governments when addressing waste problems, especially in the construction and operation of joint facilities that function as final treatment and disposal facilities.

This chapter is a continuation of a previous paper entitled 'Waste Management in the Prospective Cooperation between Local Governments in Indonesia *(*Damanhuri, 2019). This chapter focuses on the results of a SWOT analysis on the effectiveness of the role and function of the Regional Waste Management Agency (BPSR) and how the TPPAS Legok Nangka will later play a role as a joint waste management facility in the region. The institutional development of the BPSR is required to anticipate developments in the regional waste management system in West Java province.

The BPSR is the coordinator in regional waste management in the Greater Bandung Region and was formed by the West Java provincial government due to the use of the Sarimukti landfill facility. It functions as an institution for coordinating the use of the Sarimukti facility by Bandung City, Cimahi City, and West Bandung District. West Java has taken a coordinating role in regional waste management cooperation in several other regions since. The BPPSR institution was further developed to manage the waste treatment and final processing (TPPAS) Legok Nangka, which will be developed as a joint facility after the Sarimukti landfill site is closed.

6.2. West Java Province

West Java is a province in Indonesia that consists of nine cities and 18 districts. The capital is Bandung City. West Java is in the western part of Java Island. It is bordered by the Java Sea to the north, Central Java to the east, the Indian Ocean to the south, and Banten Province and Special Capital Region (DKI) Jakarta Province to the west (Figure 6.1).

The total population of West Java in 2016 was 48.6 million, including those living in urban areas, which accounted for as much as 66% of the total population. The population distribution by district and/or city varies from the lowest at 0.41% in Banjar City to the highest at 11.08% in Bogor District.

Figure 6.1: West Java Province

Source:https://gor.wikipedia.org/wiki/Jawa_Barat#/media/Berkas:Map_of_West_Java_with_cities_and_regencies_names.png

The north coast region consists of lowlands in the middle of a mountain range, which is part of a series of mountains stretching from west to east Java. The highest point is Ciremay Mountain, which is located southwest of Cirebon City. Citarum River and the Cimanuk River are important rivers that flow into the Java Sea. The climate in West Java is tropical, with temperatures of 9°C on the summit of Mount Pangrango and 34°C on the north coast. The rainfall averages 2,000 millimetres per year, but in some mountainous regions can reach between 3,000 and 5,000 millimetres per year. The main characteristic of West Java is the volcanic island arc (active and inactive), which runs from the northern tip of the island of Sumatra to the northern tip of the island of Sulawesi. The land can be

distinguished by the steep mountains in the south with an altitude of more than 1,500 metres above sea level.

According to Government Regulation (GR) No. 26/2008 concerning National Spatial Planning, the Greater Bandung Region consists of five cities and districts:

1. Bandung District
2. Bandung City
3. Sumedang District
4. Cimahi City
5. West Bandung District

6.3. Greater Bandung Region

GR No. 26/2008 on the National Spatial Planning stated that the Greater Bandung Region is one of the National Activity Centres (PKN) in the province of West Java. The PKN functions as an urban area with service coverage on an international, national, and multi-provincial scale. Following up the GR No. 26/2008, the Government of West Java Province issued West Java Regulation No. 22/2010 regarding the West Java Spatial Planning. According to this regulation, the Greater Bandung Region consists of five districts and cities: Bandung City, Cimahi City, Bandung District, West Bandung District, and parts of the Sumedang District.

The West Java Provincial Government strengthened the existence of the development of a regional waste treatment and final processing site (TPPAS) in accordance with the projected population growth, and the associated development of urban and economic activities. The development of the regional TPPAS system as planned by the West Java government in Legok Nangka will later manage the treatment and final disposal of waste from all districts and cities in the Greater Bandung Region plus Garut District because the TPPAS Legok Nangka is located on the border of Garut District.

6.4. TPK Sarimukti

Since 2005 when a landslide occurred at the Leuwigajah Cimahi landfill site, the Greater Bandung Region still uses the Sarimukti landfill as an 'emergency' site for final waste disposal. This landfill facility is the only regional landfill facility in the Greater Bandung Region, which is shared by Bandung City, Cimahi City, and West Bandung District for waste disposal. Bandung District, Garut District, and Sumedang District did not want to dispose of their waste there and prefer to use landfill facilities within their administrative areas.

The Sarimukti landfill facility is located in Sarimukti village, West Bandung District. The Sarimukti landfill area is 25.2 hectares in total consisting of 21.2 hectares owned by the Indonesia State Forest Enterprise (PERHUTANI) Unit III West Java Banten and 4 hectares owned by the city of Bandung and the city of Cimahi. The Sarimukti landfill facility has been operating since 28 May 28 2006 and offers waste disposal facilities for Bandung City, Cimahi City, and West Bandung District.

The incoming waste is dominated by organic matter, which has a potential for composting that has been applied since the beginning of this landfill site. However, based on interviews with local officials, not all organic waste can be processed directly into compost, especially if it has been mixed with other types of waste. Therefore, the only organic waste that can be processed into compost is waste transported from several traditional markets in the city of Bandung. The potential for composting in the Sarimukti landfill facility reaches 7 tons per day and compost is used by the PERHUTANI to fertilise its plantation areas.

The Sarimukti landfill site procurement was based on a memorandum of understanding between West Java and PERHUTANI. This agreement was made due to West Java's need for land to dispose of their waste and PERHUTANI's need for compost for its forests. Based on this agreement, the main function of the Sarimukti site was as a location for composting processes, so it was named Sarimukti Compost Processing Site (TPK Sarimukti). In fact, the waste transported to the Sarimukti site was sizable and not all of it could be processed into compost. Currently, only about 5–10% of the total waste entering the site can be processed into compost, and the rest is managed using a controlled landfill system.

The Sarimukti landfill facility is also equipped with leachate and methane gas processing. Of the landfill area, 60% is divided into three active zones to dispose of incoming waste.

Based on the memorandum of understanding between the West Java provincial government and PERHUTANI mentioned above, the Sarimukti landfill site could be used until 2017. After the Sarimukti landfill site had been used up, the final waste processing site for the Greater Bandung Region will move to the waste treatment and final disposal area at TPPAS Legok Namgka. However, the TPPAS Legok Nangka has not yet become operational, so that the TPK Sarimukti is still being used by three local governments.

The West Java Provincial Government has proposed an extension to the use of the TPK Sarimukti until 2023 to PERHUTANI.[31] According to PERHUTANI, the cooperation

[31] (https://news.detik.com/berita-jawa-barat/d-4419537/operasional-tpa-sarimukti-akan-diperpanjang-hingga-2023)

agreement with the West Java Provincial Government has expired since January 2018.[32] PERHUTANI is aware that the existence of this site is a solution for Bandung Raya before the TPPAS Legok Nangka is operated. PERHUTANI has submitted an application for approval from the Ministry of Environment and Forestry to extend the use of Sarimukti.
The largest amount of waste dumped in the Sarimukti landfill site comes from Bandung City at 68%, or 1,310 tonnes per day (tpd), while Cimahi City contributes 270 tpd (14%,) West Bandung District as much as 140 tpd (8%), and Bandung District around 200 tpd (10%). Based on data obtained from BPSR, the amount of waste that enters the Sarimukti landfill site stands at 1,816 tpd.

6.5. BPSR as a Cooperative Regional Waste Management Facility

In 2003, the Ministry of Public Works and the West Java provincial government agreed to implement the West Java Environmental Management Program as a staged response to the regional waste problem in West Java. To implement the programme, two collaborative efforts were held between districts and cities in West Java:

1. **Jabodetabek Waste Management Cooperation**

   This cooperation agreed on regional waste management for Bogor City, Bogor District, and Depok City. The agreed landfill sites are located in Nambo village Bogor District. TPPAS Nambo has a land area of around 55 hectares with 40 hectares belonging to the West Java-Banten Regional Office of PERHUTANI and 15 hectares belonging to Bogor District.

2. **Bandung Waste Management Cooperation**

   This is a type of cooperation that has agreed to regional waste management in the Greater Bandung Region. Initially, the West Java provincial government and the District/City Government agreed that two landfill sites could serve the Greater Bandung Region, namely the Leuwigajah landfill site in Cimahi City and the Legok Nangka landfill site in Bandung District. The scope of services has been divided into two zones, with the Leuwigajah landfill site serving the western zone of Bandung City, Cimahi City, and West Bandung District, whilst the Legok Nangka site will serve the eastern zone of Bandung District, Garut District, and Sumedang District. However, based on the results of a feasibility study, the Leuwigajah landfill site can no longer function due to surrounding social conflict, so the development of a

[32] (https://pojoksatu.id/news /national-news/2019/11/07/Perhutani-correct-status-agreements-agreements-tpas-sarimukti-status-quo/)

landfill facility for the Greater Bandung Region has been agreed at the Legok Nangka landfill site for now.

During the implementation of this framework of cooperation, the West Java Waste Management Center was formed. The establishment of this institution is regulated by Governor Regulation Number 31/2007. In 2009, the West Java Waste Management Center was upgraded to the Regional Technical Implementation Unit under the BPSR.
The BPSR became a regional waste management coordinator in 2006 and has evolved to deal with the expansion of services beyond the Greater Bandung Region. Some questions have arisen including:

- Is the BPSR able to provide the management required in accordance with the needs of the regency/city being served?
- Is the participation of the regency/city in collaboration with the BPSR based on system needs or coercion, because there are no other landfill sites that comply with statutory regulations?
- Is it appropriate to develop the duties and functions of the BPSR as a regional facility manager in West Java province?

For this reason, a study was conducted to evaluate the BPSR as a management coordinator of waste facilities in West Java province, and to develop its tasks and functions according to regional service needs based on the authority determined by law.
A group of respondents were chosen that represented institutions from the central government, the West Java provincial government, local government, private parties, and experts from universities who understand the problem of MSW in Indonesia.
Summaries of questions asked are as follows:

Regulatory aspects:

- adequacy of laws and regulations to accommodate the operational needs of regional waste management;
- adequacy of laws and/or activity program plans to regulate the duties and functions of the BPSR as a regulator or operator; and
- the need for changes in legislation and/or the formulation of new legislation in support of the institutional development of the BPSR.

Human resources aspects:

- availability and competence of the human resources possessed by the BPSR to manage regional waste disposal operations;
- availability and competence of human resources possessed by the BPSR should institutional development be required; and
- the need for changes in legislation and/or the preparation of new laws and regulations in the context of providing more competent and professional human resources.

Funding mechanism aspects:

- adequacy of the current financing mechanism to accommodate the operational needs of regional waste management;
- adequacy of the financing mechanism currently being implemented to regulate the duties and functions of the BPSR as regulator and operator; and
- the need for and/or preparation of new financing mechanisms to finance a professional, environmentally friendly, and sustainable regional waste management system.

Technical aspects of operations:

- expert respondents' perceptions of the operational and technical conditions at the TPK Sarimukti.

The results of interviews revealed that 75% of the respondents believed existing laws and regulations were sufficient to organise regional waste management institutions. However, it was also noted that more detailed and technical regulations of institutional waste management were needed at both the central and regional levels. Only 25% of the respondents said that new regulations were needed in addition to the regulations mentioned earlier.

From a human resources perspective, 50% of the expert respondents stated that the current conditions in the BPSR were sufficient to meet the human resource needs of the existing regional waste management system. However, it would not be adequate if institutional development was implemented. The remaining respondents stated that human resources at the BPSR were inadequate, primarily related to their poor ability to use waste processing technology. Furthermore, the potential for developing the quality of human resources through existing collaborations with various parties should be considered, including universities and research institutions in relevant ministries.

When asked about finance, 75% of the respondents thought that existing funding mechanisms could not meet the operational needs of the regional final disposal site (TPA) because it still uses government financing, which is constrained by limited resources, time, and model of accountability. The remaining 25% of respondents stated that the financing mechanism was sufficient to accommodate the operational needs of the regional waste disposal facility, because it was supported by a cooperative agreement that regulates the division of tasks between the providers and users of the TPK–Sarimukti services. Another opinion was that the current financing mechanism was sufficient to implement its function as a regulator, but not adequate for an operator's role. A budget was needed to support operations every day, throughout each month of the year. The current mechanism for funding operational costs was constrained at the start of the fiscal year because there was no budget for operations at the beginning of the year.

As the only regional landfill facility in the Greater Bandung Region, 50% of respondents believed that the operation of the TPK–Sarimukti was not yet optimal. The reasons provided by respondents included:

- The capacity of each operational unit was inadequate for the amount of waste that must be managed.
- The application of the sanitary landfill method was not yet optimal due to budget sufficiency, operational consistency, and maintenance of facilities and infrastructure.
- Existing operation and maintenance standards have not been implemented optimally.
- 50% of other expert respondents thought that TPK–Sarimukti operations were sufficient because there was a fairly good role sharing system between stakeholders that supports a more functional landfill system than in other regions.

The initial SWOT matrix can be seen in Table 6.1. Going forwards, this can be used for developing strategies to optimise the role and function of the BPSR in regional waste management.

Table 6.1. Internal–external Analysis the Role of BPSR

Internal Factors Analysis (IFAS)	External Factors Analysis (EFAS)
Strengths	*Opportunities*
• Regulations for implementing waste management • Regulations of authority for waste management	• Support from experts in drafting and/or changing regulations • Potential development of human resource capabilities through cooperation and partnership

Internal Factors Analysis (IFAS)	External Factors Analysis (EFAS)
• Possibility of drafting and/or changing regulations • Flexibility of employment status • Wage flexibility • Regulation of financial management flexibility • Cooperation agreement with related district/city government • Has compiled a SOP for waste management in TPK Sarimukti • Request for regional TPPAS service needs *Weaknesses* • Difficulties in procuring goods according to operational needs • Procedure for drafting and/or changing regulations • Non-governmental personnel as annual contract workers • KJP payment by transfer between regional cash accounts • There is no clarity on the function of BPSR as a regulator or operator • Weaknesses in the implementation of the sanitary landfill operating system	• Potential sources of cross-government financing • Private sector interest in cooperating with the management of regional TPPAS • Availability of waste processing technology *Threats* • An incorrect perception of the role of the provincial government in waste management remains • District/city government perceptions of the quality of human resources • Limited capacity and/or priority of government funding • Inaccurate information about private party financing • Community/environmental activist resistance to the implementation of waste processing technology

SOP = standard operating procedure, KJP = services compensation fee, TPK = composting processing site, TPPAS = waste treatment and final processing site at Legok Nangka.
Source: Perdana (2016).

According to Table 6.1, it could be concluded that the institutional development of the BPSR is required to anticipate developments in the regional waste management system in West Java. Various internal and external factors indicate that there are strengths, weaknesses, opportunities, and challenges that must be considered when developing the tasks and functions of the BPSR, including:

— The lack of clarity about the function of the BPSR as a regulator and operator was the weakness most highlighted by respondents in addition to human resource factors and institutional forms.

- The flexibility of financial management and employment status were internal strengths that must be optimised. At the same time, the process of procurement of government goods and services was a weakness that must be overcome in financing regional operational facilities.
- The private sector's interest in cooperating with the management of regional landfill sites is an opportunity that has to be exploited, while an incorrect perception of the role of the West Java provincial government in regional waste management remains a threat that must be minimised.
- Aspects of waste management were strongly influenced by non-technical factors. An institution that can manage various non-technical problems including human resource capacities and policymaking mechanisms should be developed.
- A system for increasing human resource capacities is required to ensure that career development can be adjusted to meet institutional development needs in terms of workload and use of technology.

6.6. TPPAS Legok Nangka

The BPSR as the coordinator of regional waste management in the Greater Bandung Region was formed by the West Java provincial government due to the use of the Sarimukti TPA (BPSR West Java Province, 2009). It functions as an institution coordinating the use of the Sarimukti facilities by Bandung City, Cimahi City, and West Bandung District. West Java has since taken a coordinating role in regional waste management cooperation in several other regions. The BPSR institution was further developed to manage the Legok Nangka TPPAS, which will be developed as a joint facility after the Sarimukti landfill site is closed. The cities and districts involved will be wider: Bandung City, Cimahi City, West Bandung District, Bandung District, Sumedang District, and Garut District.

On 4 April 2014, Cooperation Agreement No. 658.1/62/ot.daksm/2014 on the management of waste treatment and final processing at the Legok Nangka site in the Greater Bandung Region and the surrounding area was signed between the government of West Java and those six cities and districts. The TPPAS Legok Nangka is organised and operated by the government of West Java to facilitate regional needs as one waste management solution because the process of providing landfill sites in accordance with Law No. 18/2008 in each region will not be easy, and requires a lot of funding. Collaboration between regions in waste management is expected to reduce the 'personal' interests of each region and prioritise the interests of the Greater Bandung Region as a whole.

Some important points agreed in the cooperation agreement are related to (West Java Province, 2017):

- treatment and final processing of regional waste;
- construction of facilities and procurement of TPPAS Legok Nangka equipment;
- operation and maintenance of regional sewage treatment systems;
- arrangements for transporting waste from the district/city area in the Greater Bandung Region to the location of the Legok Nangka TPPAS;
- institutional management of TPPAS Legok Nangka;
- finance management system at the TPPAS Legok Nangka;
- negative impact compensation fee (KDN); and
- cooperation with business entities.

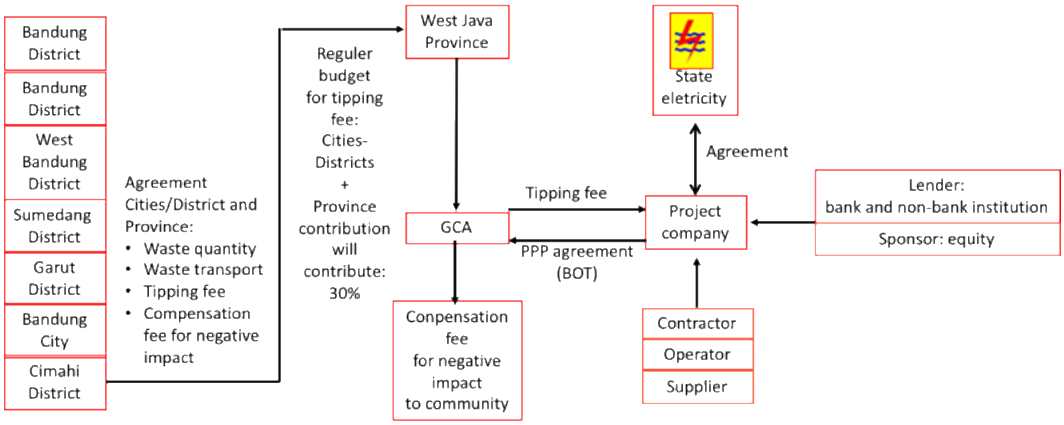
In 2018, the President of Indonesia enacted a regulation to accelerate the development of the waste-to-energy (WTE) programme through President Regulation (PR) No. 35/2018. The central government selected twelve cities under this regulation, including Bandung city. The West Java provincial government was given responsibility for the programme's execution and will manage the waste generated from Greater Bandung Region. This facility is located in Legok Nangka village, as mentioned above.

The six districts and cities in the Greater Bandung Region 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

This cooperation stipulates how districts and cities in the Bandung area should act as users of the Legok Nangka TPPAS facility for disposing and processing the MSW generated daily by their respective regions. The private sector is the third party that will process the MSW that enters the Legok Nangka TPPAS. The linkage of West Java Province with cooperating districts and cities is presented in Figure 6.2.

Figure 6.2. Scheme Cooperation for Waste-to Energy Development in TPPAS Legok Nangka



BOT = build–operate–transfer, transfer, GCA = government corporate agency, PPP = public-private partnership.
Source: Modified from West Java Province (2016).

TPPAS Legok Nangka has been planned with a clear division of roles between stakeholders. It acts as a regulator, a service provider, supervises the cooperation between regions, and also organises partnerships with the private sector. Each district/city uses the TPPAS Legok Nangka facility as a place for processing and final processing of waste generated from each region. The private sector here is a partner of the West Java provincial government BPSR, which acts as the waste processing operator.

The main infrastructure development of TPPAS Legok Nangka is funded by the central government budget and expenditure (APBN), while the West Java province regional revenue and expenditure budget (APBD) finances land acquisition and the development of supporting infrastructure. Districts and cities are obliged to pay a service compensation fee (KJP) and a negative impact compensation fee (KDN) to their respective district/city APBDs for waste management services. The private sector partner will invest fully in waste management and is responsible for the construction of waste treatment facilities and infrastructure. These conditions indicate that the capital funding for developing TPPAS Legok Nangka originates from the provincial government, while the contract with the investor is for waste processing technology only. It is expected that each district/city government will transport its waste to the TPPAS Legok Nangka and pay compensation fees for waste management.

To understand the problems that occur with regional waste management in West Java, it is necessary to identify the internal and external inter-regional cooperation factors that lead to opportunities and threats that affect the sustainability of waste management cooperation at TPPAS Legok Nangka. The important question was ‘does the regional waste

management cooperation in TPPAS Legok Nangka suit the needs of districts and cities in the Greater Bandung Region?'

A group of respondents were selected who represented agencies from the central government, the West Java provincial government, and local governments involved in the development of the Legok Nangka TPPAS. The issues raised were related to:

- regulation and policy
- organisation and institutional matters
- technical and operational matters
- financing
- community and private involvement
- environmental issues

The questions respondents were asked included:

- What is the role of the central government in waste management practices in districts/cities following the implementation of Law Number 18 Year 2008?
- What are the district/city targets in the waste sector?
- How does the division of authority between the central government and regional governments (provincial, district, city) organise waste management cooperation at TPPAS Legok Nangka?
- What proportion of the APBN supports the construction of infrastructure facilities and the operationalisation of the TPPAS Legok Nangka?
- Do you think the concept of waste management cooperation between districts/cities in Greater Bandung will run effectively?
- What is the history of the development of cooperation between local governments in Bandung Raya?
- Who originally proposed the idea of implementing this collaboration?
- What are the roles of the central government, provincial government, and district/city governments in the implementation of this cooperation?
- What proportion of the APBN and APBD of West Java province is allotted to waste management in TPPAS Legok Nangka?
- Does the provision of TPPAS Legok Nangka fulfil the BPSR's vision of final waste processing that is environmentally friendly, sustainable, and independent?
- What cooperation arrangements exist between districts/cities in Greater Bandung that will jointly use TPPAS Legok Nangka during the final stage of waste management?

- What has to be arranged to implement cooperation between waste management districts/cities in the Legok Nangka TPA?
- What process determines sanctions for regions that violate agreements?
- How are conflicts that can occur between districts/cities mediated?
- If there is a force majeure condition (for example, the district/city government is unable to meet its obligations to implement cooperation), how to overcome it?
- What efforts are being made to anticipate any negative impacts on the environment around the Legok Nangka TPA?
- What types of waste treatment technology will be built at TPPAS Legok Nangka?
- Is there a partnership waste management plan with the private sector in TPPAS Legok Nangka?
- What is the form of financing (tipping fee) that must be paid by the West Java provincial government to the private party that processes waste in the Legok Nangka TPPAS? What is the percentage increase in tipping fees per year?
- How much does the region pay to bring its waste to the TPPAS Legok Nangka?
- What is the division of tasks and authority for each district /city involved in this collaboration?
- Is the concept of cooperation in district/city waste management in the Legok Nangka TPA in accordance with the wishes of each district/city?
- What motivates the area to participate in waste management cooperation at TPPAS Legok Nangka?
- Have the regions been actively involved in discussions or meetings related to decision making such as the maturation of the technical concept of waste management in a landfill?
- Are efforts being made to anticipate any negative impacts on the environment around the Legok Nangka TPPAS?
- What compensation costs are applied to waste management at TPPAS Legok Nangka? Do you agree with the fee amount?
- How much will it cost to overcome negative impacts?
- What is the condition of the landfill owned by the region? Can it accommodate the mandate of Law Number 18 of 2008? If not, what will the local government do to overcome the problem?
- Are there any efforts being made by local government to reduce waste at source before the waste is disposed of at the landfill?

The description below makes some important points about the study results:

1. Respondents from two districts stated that the dissemination by the BPSR was only conducted during preparation, after that the districts were not always involved until the agreement was signed. It seems that the cooperation agreement was a decision-making process at the relevant regional head level, so cooperation would be a commitment only.
2. The six districts and cities in the Greater Bandung Region already had local regulations that supported solid waste management in accordance with established norms, standards, procedures, and criteria.
3. Each district/city already had a waste management institution in accordance with regulations.
4. The motives for cooperating with waste management at TPPAS Legok Nangka were not the same. Interview results stated:
   - for two local governments the limited land for landfill meant the cooperation became an urgent need;
   - for the other four local governments the motive for cooperation was based on a commitment that had been agreed between their district and city heads and the provincial governor.
5. In this cooperation, the role and authority of the parties were determined as follows, namely the BPSR acting as a waste service provider and simultaneously as a regulator that also coordinates the cooperation between six districts and cities, and partnerships with the private sector. Meanwhile, districts and cities participate as users. The BPSR is an extension of the government of West Java province, which will invite the regionally-owned enterprises (of West Java province.
6. The technological concept that will be applied to the Legok Nangka TPPAS is processing waste to energy. The waste capacity transported by each city/regency is regulated by this cooperation agreement. Each region is required to reduce their waste in their respective areas so that the waste transported does not exceed the quota.
7. In the cooperation agreement, the stipulated service compensation fee (KJP), which is the amount paid by each district and city must be budgeted (APBD) by each related district and city. At the time this research was conducted (2016), the amount of KJP was Rp.123,000/ton. Interviews found that four local governments disagreed with this amount, while the other two regional governments agreed.

8. In addition to KJP, the districts and cities have agreed to provide a KDN with a 10% proportion of the total KJP, which will be given to Bandung District (TPPAS location) and Garut Regency (which borders the TPPAS location) to compensate people who are negatively affected.
9. Transporting waste from each district and city to the Legok Nangka TPPAS is the responsibility of each district and city government. Interviewees stated that several districts felt the distance to the TPPAS location was further than before, thus requiring a reallocation of funds for transportation vehicles and fuel.

The SWOT matrix in Table 6.2 forms the basis for developing the strategies needed to optimise the TPPAS Legok Nangka.

Table 6.2: Internal-external Analysis of TPPAS Legok Nangka Cooperation

Internal Factors Analysis (IFAS)	External Factors Analysis (EFAS)
Strengths • Processing and final processing of waste at Legok Nangka uses thermal processes and sanitary landfill sites. • Thermal processes can produce electricity. • BPSR manages sanitary landfill sites directly. • The land at Legok Nangka belongs to the government • Development activities at Legok Nangka have been completed with environmental permits. • BPSR is experienced at managing regional scale waste at Sarimukti landfill.	*Opportunities* • District/city regulations support cooperation between regions. • There are SKPD waste/cleanliness managers in each district /city. • The development of the Legok Nangka site infrastructure is supported by central and provincial government budgets • The operation and processing of waste is conducted in partnership with the private sector. • Community involvement with the formal workforce was conducted at Legok Nangka.
Weaknesses • Not all districts and cities participated in preparing cooperation plans. • The effectiveness of processing waste by thermal processing depends on the amount of waste supply entering each day. • The amount of waste that can be transported to the Legok Nangka is	*Threats* • The effectiveness of KDN distribution depends on the decision of the Heads of Bandung District and Garut District. • Four district and city governments object to the amount of KJP and KDN. • Lack of waste management budget in the district and cities.

Internal Factors Analysis (IFAS)	External Factors Analysis (EFAS)
determined in the cooperation agreement	• Estimated distance to Legok Nangka requires larger transportation budgets.

BPSR = Agency for Regional Waste Management, KJP = services compensation fee, KDN = negative impact compensation fee, SKPD = regional work unit.
Source: Farahdiba (2016).

6.7. Conclusion

The results of this study could be used as a reference for improving regional waste management institutions in other regions in Indonesia since the problems faced are similar. However, it will be necessary to review the culture of cooperation between provincial and district and/or city governments that may have different characteristics.

The cooperation between districts and cities in the Greater Bandung Region in TPPAS Legok Nangka has been motivated by the limited land available for landfill. The commitment of each regional head to realising sustainable regional waste management is very important.

It is expected that sustained cooperation in managing inter-district and/or city waste disposal at the Legok Nangka facility will develop into an example of good regional cooperation in Indonesia. Cooperative waste management between districts and cities in the Greater Bandung Region is also expected to develop new sustainable waste management solutions.

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Chapter 7

The Effect of Local Government Separation on Public Service Provision in Indonesia: A Case of Garbage Pickup Services in Urban Areas

Takayuki Higashikata[33]

Abstract

This chapter estimates the correlation effect of creating smaller local governments in Indonesia on the provision of public goods, using a household panel dataset covering the years 1993 to 2014. During this time period, the number of second-tier local governments increased from 290 to 514, with most of the increase occurring after the introduction of decentralisation in 2001. Such a splitting of administrations can lead to more efficient provision of public goods, although the literature on the topic suggests mixed results. We examine the effects of district splitting on public garbage collection service in urban areas of more than 100,000 people and population density over 1,500 persons per square kilometre, on the assumption that garbage pickup needs are essentially the same in all such areas. Our simple estimation finds that urban residents living in local governments that have recently experienced a separation have a lower probability of access to public garbage collection services.

Keywords: garbage collection, Indonesia, proliferation, decentralisation, urbanisation

7.1. Introduction

The World Bank estimates that the percentage of urban residents in low-and middle-income countries was 50% in 2018, up from 36% in 1990.[34] As the urban population continues to explode in developing countries, the role of local governments becomes more important, as urban dwellers need appropriate public goods and services such as

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[34] World Bank Open Data. https://data.worldbank.org/ (accessed on 17 January 2020).

safe drinking water, a sewage system, and solid waste management (UN-HABITAT, 2016). As home to the world's second-largest megacity, Jakarta (Demographia, 2018), Indonesia has experienced a relatively high pace of urbanisation, with its percentage of urban residents skyrocketing from 31% in 1990 to 55% in 2018. Using household survey data (Susenas) and community-level census data (PODES) from 1999 to 2017, Higashikata (2019) showed how, during this period, Indonesia improved its citizens' access to safe drinking water, basic sanitation, and solid waste management. Nationally, the share of people with access to safe water services increased from 39.5% in 1999 to 70.8% in 2017, and the percentage with basic sanitation services rose from 30.4% in 1999 to 60.6% in 2016. The share of households with safe drinking water and basic sanitation has grown not only in urban districts (*kota*) but also in rural ones (*kabupaten*).

On the other hand, progress was slower with regard to access to garbage collection, as the percentage of Indonesians receiving this service grew only from 21.9% in 1999 to 31.6% in 2014. The difference in the rate of progress appears to be related to particular characteristics of those services. As Higashikata (2019) explained, the main sources of safe drinking water and basic sanitation, respectively, are retail bottled water and septic tanks, both of which are available privately. In contrast, garbage collection is provided predominantly by local governments. According to the fifth wave of the Indonesian Family Life Survey (IFLS), conducted in 2014–2015 and covering 311 communities, 154 of the surveyed communities used a collection service as their primary means of garbage disposal, and 84.4% of these indicated that the service was at least partly managed by government.

In Indonesia, local governments have become responsible for providing public services since the introduction of decentralisation in 2001. In addition, many local districts have been divided. Indonesia had 290 districts in 1993; as of 2019, there were 514. This type of local government proliferation can bring about a preferable resource allocation, in which each of the newly created local government provides public goods efficiently for its residents. This improvement in resource allocation is partly due to the greater similarity of preferences for public goods in smaller localities, although there have been few studies of this mechanism or evaluations of its effects (Grossman and Lewis, 2014). There exist many studies on instances of local government amalgamation in the Organisation for Economic Co-operation and Development (OECD) countries, where such mergers are expected to achieve cost efficiencies in local administration. But studies of the effect of the size of local governments on residents' social welfare have yielded inconsistent results. For example, Andrews and Boyne (2009) reported on the achievement of economies of

scale through amalgamation in England, but Blom-Hansen, et al. (2016) suggested that after Danish municipal mergers, the cost savings gained in some areas were offset by higher spending in other areas.

This chapter examines whether the creation of smaller local governments can provide public goods to residents and respond to their needs more effectively. To do so, we analyse information on garbage collection in urban areas of Indonesia. We define urban areas as having a total population of more than 100,000 people as well as high population density (at least 1,500 people per square kilometre [km]). We assume that residents living in urban areas have similar preferences with regard to the public goods they wish to receive from local governments. We identify the correlation effect of changes in local government size on residents' welfare by means of a comparison between districts affected by proliferation and those that have not divided. Our analysis shows that households living in districts that participated in a separation had a lower probability of access to public garbage pickup services.

The next section of this chapter explains the background of urbanisation and decentralisation in Indonesia. Section 7.3 presents the household-level panel data we used for our analysis and describes our benchmark estimation results. It also contains a check of the robustness of our benchmark estimation. Section 7.4 summarises our conclusions.

7.2. Urbanisation and Decentralisation in Indonesia

7.2.1. Urban Areas in Indonesia

The literature on urbanisation in Indonesia traditionally uses dichotomous information identifying areas as either urban or rural, as constructed by the Indonesian statistics office (BPS). Indonesia has about 80,000 administrative communities (*desa/kelurahan*). BPS classifies these communities as either urban (*perkotaan*) or rural (*pedesaan*) based on calculated scores related to population density, share of agricultural households, and access to public facilities such as schools, hospitals, markets, and hotels. If the aggregate total score is 10 or more, the BPS identifies the community as urban.

Hashiguchi and Higashikata (2016) analysed urbanisation trends based on this BPS definition, finding that the average total score for urbanisation increased from 6.2 points in 2002 to 7.5 points in 2011. The difference of 1.3 points was explained primarily by the decrease in the share of agricultural households (0.7 points), followed by increased access to public facilities (0.5 points). The contribution attributable to change in population

density was only 0.1 points. Their paper suggests that the publicly available urban variable provided by BPS does not appropriately reflect the actual agglomeration of Indonesia's population.

It is expected that the demand for garbage collection services will increase with urbanisation, because it becomes difficult for urban dwellers to dump their trash into nearby holes or burn it. To examine the impact of urban growth on garbage issues, we use an urban area panel dataset based on population agglomeration information constructed by Higashikata and Hashiguchi (2017). They used population census data from 2000 and 2010 as well as community-level Geographical Information System data to construct their urban area panel dataset, following a definition from OECD (2012). They calculated community-level population density first and then identified contiguous and densely inhabited areas with population density of over 1,500 people/km^2 where the total population was greater than 100,000.

According to the urban area dataset, which covered 97% of all communities in the country, Indonesia had 76 urban areas in 2000 and 86 in 2010. As our analysis covers the period from 1993 to 2014, we assumed that the communities counted as urban areas in both 2000 and 2010 also belonged to densely populated clusters before 2000.

7.2.2. Decentralisation in Indonesia

Indonesia introduced a radical decentralisation process in 2001 as part of its democratisation following the fall of Soeharto in 1998. Under the Law on Regional Governance (No.22/1999) and the Law on Fiscal Balance between the Central Government and the Regions (No.25/1999) enacted in 1999, all authority except the responsibility for the oversight of religion and military power were devolved to districts (Hofman and Kaiser, 2006). Along with the implementation of decentralisation, as already noted, Indonesia also experienced a great number of district splits, which caused the total number of local administrations to expand from 290 in 1993 to 514 as of 2014. Fitrani, Hofman, and Kaiser (2005) suggested that the proliferation of districts after 2001 was especially common in regions that were large in area, with ethnic diversity among their sub-districts.

These decentralised governments with smaller jurisdictions were expected to provide public goods and services more efficiently through electoral accountability, especially after the implementation of direct elections of local heads in 2005. District heads would face difficulty winning re-election if the local electorate was not satisfied by the provision of public goods, as demonstrated by a study conducted in Brazil (de Janvry, Finan, and

Sadoulet, 2012). But the literature on the effects of decentralisation in Indonesia has yielded mixed results. Pepinsky and Wihardja (2011), who applied the synthetic control method, found no evidence that decentralisation had any effect on national economic development. Kaiser, Pattinasarany, and Schulze (2006), relying on household survey data, showed that respondents perceived improvement in decentralised services such as education, health, and administration. Pierskalla and Sacks (2017) suggested that the splitting of districts and the introduction of direct elections for district heads were negatively associated with some forms of violence; i.e. violence was less common where these changes were introduced. Meanwhile, Burgess, et al. (2012) revealed that under some conditions, such as where political jurisdictions were large enough to maintain some control over wood markets, dividing the district led to more extensive deforestation through illegal logging.

7.2.3. Access to Garbage Pickup Services for Households in Urban Areas from 1993 to 2014

Estimation strategy

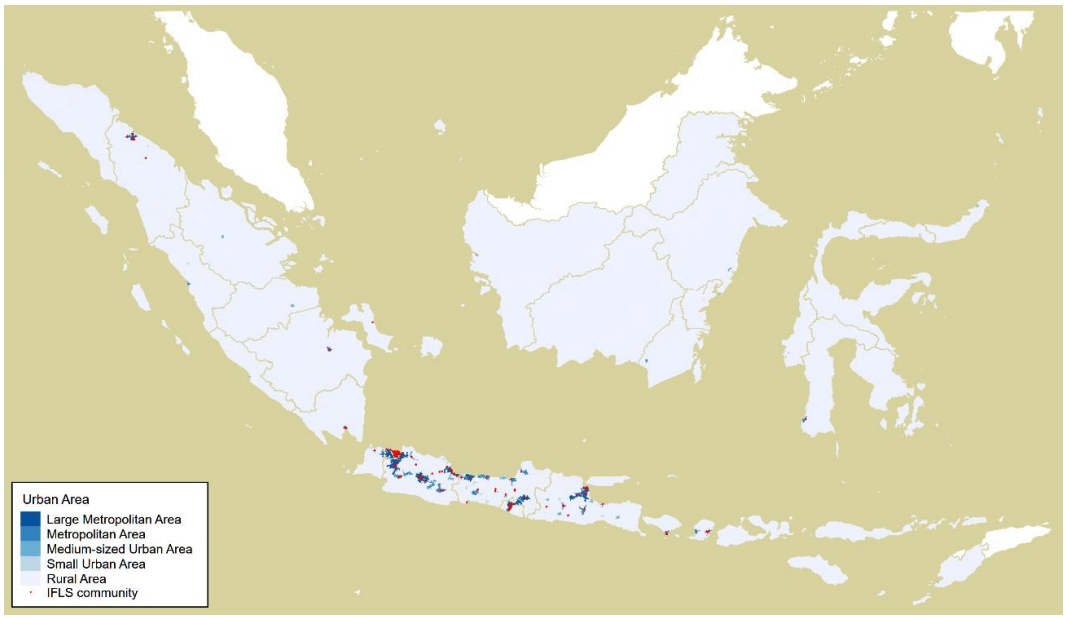
To identify the effects of district splitting on public service provision under decentralisation in Indonesia, we compared access to garbage collection services in district that had and had not experienced proliferation. We focused on residents in urban areas, where the demand for sanitation services would be greater. We employed a simple reduced-form model:

$$y_{i,k,t} = \alpha + \beta\, Decentralization_t \cdot Split_{k,t} + \delta\, Decentralization_t + \gamma Split_{k,t} + Trend_t + Household_i + Year_t + e_{i,k,t} \quad (1)$$

where $y_{i,k,t}$ is a dummy variable that takes the value of 1 if a household *i* in a district (*kabupaten/kota*) *k* during a year t has access to this service; $Decentralisation_t$ is a decentralisation dummy that takes the value of 0 up to 2001 and 1 after 2001; $Split_{k,t}$ is a variable that captures the effects of proliferation, taking the value of 1 if a region *k* has experienced a split and decreasing gradually over time. In our benchmark estimation, we assumed that the effects of district separation decrease according to the simple reciprocal function $Split_t = 1/(1 + t - t_0)$, where t_0 is the year in which the district legally split. $Trend_t$ is a variable to capture the time trend. $Household_i$ and $Year_t$ are household and year dummies, respectively, to control for household-specific and year-specific effects.

As we would like to find out the impacts of the splitting of districts under decentralisation, we are interested in the coefficient of the cross-term of $Decentralisation_t$ and $Split_{k,t}$.

Figure 7.1. IFLS Communities in Urban Areas (2000)



IFLS = Indonesian Family Life Survey.
Notes: We excluded the provinces of Papua, West Papua, Maluku, and North Maluku here because there are no IFLS communities in those provinces. The figure shows the locations of urban areas and of the IFLS communities located in urban areas. In 2000, Indonesia had seven large metropolitan areas (total population more than 1.5 million), 16 metropolitan areas (500,000 to 1.5 million), 23 medium-sized urban areas (200,000 to 500,000), and 30 small urban areas (100,000 to 200,000). Those communities that we cannot merge with the urban population data are treated as rural areas for ease of representation.
Source: Author's calculation.

Data

We used household panel data from the Indonesian Family Life Survey (IFLS), conducted by the RAND Corporation. The IFLS is designed to represent the Indonesian population. The first wave of the IFLS involved interviews with 7,224 households covering 312 communities, and 92% of these households (i.e. any member of the IFLS 1 households) were re-interviewed in the latest wave of IFLS 5, conducted in 2014–2015 (Strauss, Witoelar, and Sikoki, 2016).

We matched IFLS communities with the urban area dataset as in Higashikata and Hashiguchi (2017). We used 120 communities that were counted as urban areas in both 2000 and 2010 for our analysis. The IFLS communities that we succeeded in matching with our urban area dataset are depicted in Figure 7.1.[35]

[35] As sub-district names and codes of IFLS communities are available, we pooled community information

Figure 7.2. Descriptive Statistics: Access to Public Garbage Pickup Service by Households in Districts that did or did not Experience a Split from 1993 to 2014

HH = household.
Source: Author's calculation.

The number of sample households used for our analysis was 7,055, composed of 1,411 households over five rounds. We selected only those households who had lived in urban areas and had never migrated out of the communities where they lived in 1993. Among this group, the percentage who had access to any type of garbage collection service was 31.6% in 1993 and increased to 51.6% in 2014.

To identify those who had access to public trash pickup services, we referred to the community information in the IFLS. Since its second wave, the IFLS has asked about the organisations that manage community trash collection. The questionnaire permits respondents to choose one or more items amongst government, private entities, nongovernmental organisations, and others. In addition, the questionnaire asked in what

belonging to the sub-districts using the PODES series. Next, we identified the demographic characteristics of district heads and secretaries such as age, sex, and educational level, as well as the number of dwellers by gender and the distance from the district capital, from both the IFLS waves and the PODES series as keys to enable accurate matching. Coincidentally, IFLS waves are collected in almost exactly the same years in which BPS collects PODES information. Then we compared the community characteristics from the third wave of the IFLS (in 2000) with PODES 2000, the fourth IFLS wave (2007-2008) with PODES 2008, and the fifth IFLS wave (2014–2015) with PODES 2014. Eventually, we succeeded in matching IFLS communities with PODES villages for 120 communities. For more details, see Higashikata and Hashiguchi (2017).

year the pickup service started. We classified all households living in communities where the community survey revealed that the service was at least partly managed by government as using a public garbage collection service. As we do not have information on how garbage was collected for the first IFLS wave, we regard a community as having had access to a public trash pickup service from 1993 if a respondent of the community, when answering the question about public services in the second IFLS wave, said that they used trash services before 1993. Applying this assumption, we find that 16.3% of the sample of urban dwellers had access to this public service in 1993 and that the rate increased to 42.2% as of 2014.

Furthermore, 1,209 households (85.7% of the sample) never experienced the splitting of a district from 1990 to 2014. We compared the households without experience of proliferation and those who had experienced at least one district division during the time period of our observations; the trends of the two groups are depicted as in Figure 7.2. It appears that the group of respondents who had experienced a district separation had seen relatively slow progress toward access to garbage pickup service.

Analysis

Table 7.1 displays the ordinary least square (OLS) estimation results of the effect of a district split on the probability of urban household access to the garbage collection system using Equation (1). The first column in Table 7.1 suggests that the proliferation of districts had a negative correlation effect on households' access to garbage pickup services if they experienced a division of the district in which they lived. Compared with households in non-separated districts, the probability of access to this public service decreased, on average, by 22.2 ((−0.581+ 0.359) × 100) percentage points after 2001 if the district division had just happened. Then, in the second year after the separation, the probability of access to public garbage collection was still 11.1 percentage points ((−0.581 + 0.359) × 1/2 × 100) lower; in the fourth year after the separation, the difference between households in non-separated and separated was 5.6 percentage points ((−0.581 + 0.359) × 1/4 × 100). Meanwhile, the decentralisation dummy was positive and statistically significant even if we control time trends, so all urban households had a higher probability of access to public garbage services by 14.7 percentage points under the decentralised system.

Table 7.1. Estimation Results: All Households in Urban Areas from 1993 to 2014

	(1) All	(2) Java	(3) Java w/o Jakarta
Decentralisation * Split	−0.581***	−0.601***	−0.534***
	(0.078)	(0.084)	(0.101)
Decentralisation dummy	0.147*	0.184*	0.177*
	(0.064)	(0.071)	(0.072)
Effects of split	0.359***	0.357***	0.341***
	(0.048)	(0.048)	(0.085)
Time trend	*Yes*	*Yes*	*Yes*
Year dummy	*Yes*	*Yes*	*Yes*
Household dummy	*Yes*	*Yes*	*Yes*
Observations	7055	6040	4955

Notes: Robust standard errors clustered at community level are presented in parentheses. + significant at 10%, * significant at 5%, ** significant at 1%, and *** significant at 0.1%.
Source: Author's estimation.

Next, we select samples on the island of Java and estimate the effect of splits there. As the proliferations that occurred in Indonesia took place primarily on the outer islands and not in Java, we find a large amount of heterogeneity between Java and the outer islands. Although we have controlled for the difference amongst districts using a household-level fixed effects model, the unobservable heterogeneity might still affect the estimation results shown in column (1). The second column in Table 7.1 shows the estimation result without including households from the outer islands, and we find that the coefficients are almost the same as those in the first column. In column (3), we also exclude households from Jakarta province. Jakarta is the capital city and has special administration authority; the districts located in Jakarta province do not have the same authority as those in other districts. The estimation results in column (3) are slightly smaller in magnitude, but basically the same as those in columns (1) and (2).

Robustness check

In this subsection, we present the results of our robustness checks. First, we evaluated whether changing the definition of an urban area affects the results. We shifted the threshold from 1,500 persons/km^2 to 1,000, 2,500, and 3,500. As shown in panel A of Table 7.2, all the coefficients of the cross term except column (1) are negative and statistically significant. This may reflect the heterogeneity between Java and the outer islands that have fewer congested areas. We also find that the point estimators of the coefficients take almost the same value even if the threshold is changed from 1,500 persons/km^2 to 3,500.

Next, we assessed whether a change in how we represent the effects of district splitting leads to different estimation results. In our benchmark estimation, we assumed that the splitting effect depreciated at a rate represented by $1/(1+t-t_0)$. We adopted other depreciation rates to check robustness. First, we assumed that newly created governments do not require as much time to adjust to their new circumstances as posited in our benchmark estimation. Panel B in Table 7.2 shows the results if we adopt $Split_t = 1/(1+t-t_0)^2$. According to this estimation, it would take only 1 year for a new jurisdiction to decrease the effect of the separation by 75%, whereas in our benchmark estimation it would take 4 years to achieve the same level. Under this new assumption, the coefficients of the cross term are generally negative and statistically significant as in Panel A, and the absolute values become larger than those of Panel A.

On the other hand, Panel C shows the results under the assumption that separated districts need more time to adjust to their new situation than in the benchmark estimation. Here we adopted $Split_t = 1/(1+t-t_0)^{0.5}$, under which it would take 15 years for a district to reduce the impact of a split by 75%. Under this setting, we again have almost all negative coefficients except in column (1).

In short, changing the assumptions regarding the time needed for adjustment does not significantly affect the results. It seems that the splitting of administrations leads to negative effects on residents in congested urban areas, especially on Java, from the perspective of public garbage collection service provision.

Table 7.2: Robustness Check

Threshold for population density	1000/km²			1500/km²			2500/km²			3500/km²		
	(1) All	(2) Java	(3) Java w/o Jakarta	(4) All	(5) Java	(6) Java w/o Jakarta	(7) All	(8) Java	(9) Java w/o Jakarta	(10) All	(11) Java	(12) Java w/o Jakarta
Panel A: $1/(1+t-t_0)$												
Decentralisation * Split	−0.086	−0.391***	−0.358***	−0.581***	−0.601***	−0.534***	−0.575***	−0.610***	−0.511***	−0.564***	−0.611***	−0.498*
	(0.319)	(0.109)	(0.097)	(0.078)	(0.084)	(0.101)	(0.095)	(0.100)	(0.143)	(0.118)	(0.125)	(0.200)
Decentralisation dummy	0.110*	0.149**	0.140**	0.147*	0.184*	0.177*	0.155	0.220*	0.219+	0.187	0.268*	0.313+
	(0.048)	(0.053)	(0.052)	(0.064)	(0.071)	(0.072)	(0.095)	(0.103)	(0.115)	(0.123)	(0.132)	(0.161)
Effects of split	−0.062	0.185+	0.196*	0.359***	0.357***	0.341***	0.354***	0.352***	0.317*	0.325***	0.323***	0.273
	(0.278)	(0.100)	(0.088)	(0.048)	(0.048)	(0.085)	(0.062)	(0.062)	(0.127)	(0.076)	(0.078)	(0.172)
Panel B: $1/(1+t-t_0)^2$												
Decentralisation * Split	−0.174	−0.536**	−0.515**	−0.866***	−0.887***	−0.792***	−0.869***	−0.906***	−0.745*	−0.834***	−0.883***	−0.679+
	(0.435)	(0.184)	(0.166)	(0.133)	(0.131)	(0.211)	(0.157)	(0.156)	(0.294)	(0.184)	(0.186)	(0.390)
Decentralisation dummy	0.109*	0.145**	0.137**	0.143*	0.179*	0.174*	0.150	0.214*	0.217+	0.180	0.259+	0.311+
	(0.047)	(0.052)	(0.051)	(0.063)	(0.070)	(0.071)	(0.094)	(0.102)	(0.114)	(0.121)	(0.131)	(0.160)
Effects of split	0.024	0.369*	0.378*	0.686***	0.686***	0.625**	0.671***	0.673***	0.555+	0.619***	0.625***	0.456
	(0.437)	(0.180)	(0.161)	(0.126)	(0.118)	(0.209)	(0.141)	(0.133)	(0.288)	(0.160)	(0.154)	(0.375)
Panel C: $1/(1+t-t_0)^{0.5}$												
Decentralisation * Split	−0.023	−0.301**	−0.282**	−0.441***	−0.458***	−0.418***	−0.435***	−0.466***	−0.402**	−0.430***	−0.472***	−0.399*
	(0.278)	(0.091)	(0.085)	(0.078)	(0.083)	(0.092)	(0.097)	(0.101)	(0.120)	(0.115)	(0.120)	(0.163)
Decentralisation dummy	0.108*	0.151**	0.141**	0.148*	0.186*	0.178*	0.158	0.223*	0.219+	0.190	0.272*	0.312+
	(0.048)	(0.054)	(0.052)	(0.064)	(0.072)	(0.072)	(0.097)	(0.105)	(0.116)	(0.125)	(0.135)	(0.163)
Effects of split	−0.072	0.112	0.124+	0.226***	0.222***	0.222***	0.224***	0.216***	0.211*	0.202**	0.192**	0.185
	(0.194)	(0.075)	(0.066)	(0.042)	(0.041)	(0.061)	(0.053)	(0.054)	(0.090)	(0.062)	(0.064)	(0.121)
Time trend	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year dummy	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Household dummy	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	10075	8425	7340	7055	6040	4955	4370	3855	2770	3135	2740	1730

km² = square kilometre, w/o = without. Notes: Robust standard errors clustered at community level are presented in parentheses. + significant at 10%, * significant at 5%, ** significant at 1%, and *** significant at 0.1%.
Source: Author's estimation.

7.4 Conclusion

This chapter provides evidence on the effects of newly created smaller jurisdictions on public service provision. We focused on garbage pickup in urban areas, a service that is expected to be provided by local governments in Indonesia since the introduction of decentralisation. Using longitudinal household panel data, our benchmark analysis shows that the splitting off of districts had negative effects on urban dwellers' access to this service. We also verified the robustness of our results by testing the effects of changing the definition of urban areas or the equation used to estimate new local administration's adjustment time period. The study finds a negative relationship between the splitting of a district and the provision of public trash collection services, although we should note the possibility that after the splitting of a district, local governments might allocate more resources to providing other public goods or services, as Blom-Hansen, et al. (2016) suggested in their study of Danish amalgamations. In addition, it is difficult to evaluate whether the ongoing process of proliferation in Indonesia has been too excessive. By way of comparison, Japan still has around 1,700 local governments even after implementing a recent large-scale amalgamation of municipalities, though its population is about half of Indonesia's. Further research is needed to achieve a comprehensive understanding of the impact of decentralisation in Indonesia.

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Chapter 8

Clustering and Public–Private Partnerships: The Tools of Municipal Solid Waste Management Reformation in Thailand

Poome Petkanjanapong[36]

Abstract

Municipal solid waste (MSW) is one the main problems in Thailand. Since 2014 the government considered MSW as an urgent issue in the country. The Thai government started plans to cope with this problem. Clustering areas of municipality for MSW management and public–private partnerships (PPP) have been selected as the main tools for solving the problem of MSW in Thailand. The idea behind these policies contradicts the traditions of Thai MSW management, which is mostly governed by single local administrative organisations (LAO), and private companies only do service contracts. The Thai government encourage LAOs to cooperate as clusters for MSW management. Resources, standards, and technology are used by the central government to encourage LAOs to cluster. However, the limitations of cooperation and the centralised power of the Thai government create inefficiency in a clustering policy. Since 2014 some private companies started to undertake PPP projects in MSW management. The regulations, technology, clustering, and limitation of LAOs' budgets force LAOs and private companies to cooperate in MSW management. However, it is not convenient for small clusters to carry out PPPs. This leads to the question of whether PPPs and clustering in MSW management are suitable policies for every kind of LAO and cluster.

Keywords: Solid waste management, public–private partnership, Thailand, lustering, local government

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8.1. Introduction

8.1.1. Reformation of Municipal Solid Waste Management in Thailand

The Thai government announced municipal solid waste (MSW) as an urgent issue in Thailand in 2014. An enormous volume of untreated MSW all over Thailand is a reason why the government decided to take serious action on MSW.[37] During the Junta period of General Prayuth (2014–2019), the government created a master plan, regulations, and organisations to cope with the crisis of MSW.

Table 8.1: Important Actions of Thai Government for Municipal Solid Waste Management Between 2014 and 2019

Since	Actions	Result
2014	MSW was announced as an urgent issue of Thailand	Roadmap of MSW and hazardous waste management
2014	Reorganisation of the structure of MSW governance	Ministry of Interior became the main actor for MSW management and Ministry of Natural Resources and Environment became the planner[(i)] Committees for MSW management at national and provincial level in 2017. Committees for MSW management at district and local administrative level in 2019[(ii)]
2014	Support PPP for waste management[(iii)]	There are at least 11 new PPP projects as a result of this policy. These new PPP projects plan to operate in 2020[(iv)]
2015	Clustering local administrative organisations (LAOs) for MSW management[(v)]	Group over 700 LAOs into 324 clusters for waste management in 2018 and this number reduced to 262 cluster in 2019.
2016	National Solid Waste and Hazardous Waste Management Master Plan (2016–2021)	Promote appropriate technology for garbage and waste management – sanitary landfill, a semi-aerobic landfill, fermentation for biogas production, fermentation for fertiliser, refuse derived fuel technology, and an incineration/combustion system Promote specific law for MSW management Promote cooperation amongst LAOs for waste management
2018	Act on the Maintenance of the Cleanliness and Orderliness of the Country, B.E. 2560 (2018)	Establish MSW management committee Adjust limitation of tipping fee Guideline for subcontract and PPP for waste management

[37] In 2015, the estimated volume of MSW in Thai was around 26.85 megatons; however, around 10.46 megatons was untreated. Mover, half of the treated MSW was in improper waste treatment sites, such as open dumping areas (Pollution Control Department, 2017).

	Notification of the Ministry of Interior Municipal Solid Waste Management, B.E. 2560 (2018)	Guideline for cooperation between LAOs in MSW management

LAO = local administrative organisation, MSW = municipal solid waste, PPP = public–private partnership.
Notes: (i) Cabinet Resolution 12/05/2015, (ii) According to the Act on the Maintenance of the Cleanliness and Orderliness of the Country, B.E. 2560, Cabinet Resolution 16/06/2015, (iii), Resolution of National Council for Peace and Order 26/08/2014, (iv) Nutdanai, 2019, (v) Cabinet Resolution 16/06/2015.
Source: Prepared by author.

As shown in Table 8.1, there are several policies have been activated to cope with the problem of MSW. For the reorganisation, the Department of Local Administration, the Ministry of Interior become the main actor for waste management in Thailand because this department supervises local administrative organisations (LAOs), which are the real operators of MSW management in Thailand. The Ministry of Natural Resources and Environment became the policy planner, and the *National Solid Waste and Hazardous Waste Management Master Plan* was the first result of this reorganisation. The new committees are set by the authorities of the Act on the Maintenance of the Cleanliness and Orderliness of the Country, B.E. 2560 (2018). These committees became an important policymaker, because every high-value PPP waste management project needs to get approval from the national committee. Not only is reorganisation an important issue, but the government also promotes PPPs and clustering in MSW management as the tools to improve the situation of MSW in Thailand. These two policies were mentioned at every interview of the minister of interior (e.g. Nutdanai, 2019; Raising Funds through Green Bond, 2019), in *the National Solid Waste and Hazardous Waste Management Master Plan* (2016–2021), and in both new regulations for MSW management. Therefore, this research intends to investigate why the government is eager to promote these two tools, what are the limitations of PPPs and clustering in the case of Thailand, and finally whether these two policy methods are suitable for every area in Thailand. This research will start with a discussion about clustering, followed by a focus on PPPs.

8.2. Clustering and Municipal Solid Waste Management in Thailand

Clustering is a kind of a centralised system of MSW management. For a centralised system, multiple organisations that govern MSW in their own areas cooperate for MSW management, especially sharing waste treatment sites. This system is opposite to the decentralised system, where each organisation takes care of MSW in their own area separately. There are pros and cons of these two systems, such as operational cost,

constructional cost, and transportation cost.[38] Centralised waste treatment benefits economies of scale. Therefore, its operational cost is lower than decentralised waste treatment at the same volume. This is the main reason why several organisations prefer centralised waste treatment systems.

These days MSW management in Thailand is in a transition process to the cluster system, which is a kind of centralised waste management. The central government of Thailand motivates LAOs to group into clusters in order to manage waste together. Each cluster has a host organisation that can be the biggest LAO in the cluster or the provincial administrative organisation (PAO). These hosts need to manage their waste treatment sites. However, clustering is not a new tool for MSW management in Thailand. In the past, some areas in Thailand did practice clustering before the central government started to promote this policy in 2014. Since 2014, however, the Thai government has blamed decentralised waste treatment as a root of the MSW issues in Thailand and wants to reform MSW management. Section 8.2 will discuss the basic structure of MSW management in Thailand, the reason behind the clustering policy, and the limitation of clustering.

8.2.1. Structure of Municipal Solid Waste Operation in Thailand

LAOs are the main operators for MSW management in Thailand. LAOs can be classified into two levels, provincial level and sub-district level. At the provincial level the PAO takes care of the whole province and supports the LAOs for the services that they cannot operate. The sub-district level LAOs can be grouped into two kinds – *Thesabans* and *Tambon* administrative organisations (TAOs). *Thesabans* govern the urban areas, whilst TAOs take care of the rural areas. They are almost same but have different structures and responsibilities.[39] However, their responsibilities in waste management are similar to each other. By this way of local governance, MSW in Thailand can be classified into two ways of management:

1) **Single *Thesaban* or TAO system**: this kind of MSW management was common in the past. Each *Thesaban* or TAO manages its own MSW through the three processes of waste management – collection, shipment, and disposal. Some LAOs own waste treatment sites, but some send their MSW to private waste treatment sites. Although these days the clustering policy drives LAOs to cooperate in waste management, some LAOs resist and operate their own MSW management.

[38] For more information see Wilderer and Schreff, 2000.
[39] For more information see Funatsu, 2019.

Sometimes clustering makes it harder for LAOs to provide MSW management because the distance between the LAOs and the sites is too far, some clusters are not ready to share the waste treatment sites, or some waste treatment sites are waiting for licences from the central government. For example, in the case of Nakhon Sawan and Phichit Provinces, some LAOs did not practice MSW management of the cluster system, and the hosts of some clusters did not own their waste treatment site (State Audit Office of the Kingdom of Thailand, 2019). In the case of Phitsanulok Municipality, the central government forced the municipality to share their own waste treatment sites with nearby LAOs, but this sharing led to local resistance and the waste treatment site was shut down (Petkanjanapong, 2019).

2) **Cluster system**: In this system, LAOs cooperate with nearby LAOs for MSW management. Before 2014, some LAOs already practiced clustering MSW management, such as the waste treatment sites of Phuket Municipality, or the waste treatment sites of the Nonthaburi provincial organisation. In these two examples, each single waste treatment site receives MSW from their whole province. There are other waste treatment sites that are operated by a single municipality, but received MSW from nearby LAOs not the whole province, such as the waste treatment sites of Nakhon Ratchasima Municipality and Loei Municipality. Remarkably, for most clusters, the members cooperate only on waste treatment sites. There are a few of them that cooperate in reduce, reuse, and recycle (3R) activities or garbage collection. Since 2014, the clustering system has become a tool of MSW management that the central government wants to promote.

8.2.2. Constraints of Clustering

Clustering of MSW management in Thailand is driven mainly by the central government policy. However, there are still some LAOs who resist joining the cluster system. Therefore, the central government uses several policy tools to create conditions that motivate LAOs to join their cluster.

1) **Resources**: Economies of scale are why the central government tells the public that LAOs need to practice clustering for MSW management. Local governments are generally faced with budget shortages. In the 2006 Decentralization Plan Act, the central government promised to allocate at least 35% of the national budget to local governments; however, this plan was not successful and the goal was changed in 2007 to only 25% of the national budget. In 2019, 29.5% of the national budget was allocated to local governments, although it is higher than the goal in 2007 but still

less than the first goal in 2006 (Kovit, 2019). By this budget limitation, it is impossible for a single LAO to afford the construction fees and operational fees of MSW treatment sites without financial support from the central government. By this dependence, LAOs need to follow the policies of the central government in MSW management. Moreover, clustering can increase the size of waste treatment sites and the daily volume of MSW, which is attractive to private companies to invest in the project and reduce the financial cost of MSW treatment for LAOs.

2) **The standard of waste treatment sites**: In the past, MSW management in Thailand was purely operated by LAOs and the central government had a role as an auditor. Before 2016, there were not any standards for MSW management in Thailand (Local Administration Department, 2019). Improper waste treatment sites sometimes create negative effects to the surrounding community. This impact can reduce the quality of life, health, and economy of the local people. Negative impacts can lead to local resistance to the waste treatment sites. In 2016, there were 23 waste treatment sites that could not operate – although the construction was already finished – because of local resistance to the waste treatment sites (Pollution Control Department, 2017). Shutting down waste treatment sites is a problem because it is can create a chain negative effect. For example, in the case of Phitsanulok Province, the central government shut down multiple landfill sites of LAOs because they were below standard. These LAOs need to use the landfill sites of Phitsanulok Municipality. The sudden increase in garbage in the Phitsanulok Municipal landfill sites created severe negative impacts to the local people, such as flies, smell, and accidents. This situation led to shutting the landfill site because of local people's anger (Petkanjanapong, 2019). In order to avoid this problem, the central government set the standard for MSW treatment sites. However, the standard is also used as a tool to shut down low-standard sites and force the LAOs to use other sites of nearby LAOs. This is how clusters of MSW management have been created.

3) **Technology**: The central government prefers waste-to-energy (WTE) technology, especially incineration. One reason is because of local resistance to new waste treatment sites. Therefore, developing an incinerator over an old full landfill site can release the social pressure. Moreover, the government believes that incineration technology is more sustainable and cleaner than sanitary landfill (Secretariat of the House of Representatives, 2019). However, incineration technology requires a huge volume of daily MSW in order to keep the incinerators operating efficiently.

Therefore, clustering MSW can provide enough volume of daily MSW for incinerators.

Decentralised MSW management is blamed as a root of inefficient MSW management in Thailand. Therefore, the central government forces LAOs to group MSW management by using economic conditions, standards, and technology.

8.2.3. Limitation of Clustering for Municipal Solid Waste Management in Thailand

Today clusters of MSW management are in every part of Thailand. However, the success of the policy is still in doubt. One reason is because some LAOs refuse to join their clusters, another reason is problems of untreated waste in many waste treatment sites still exist even in the waste treatment sites of cluster systems. This research argues that there are at least two main factors that prevent success of the clustering policy – limitation in cooperation amongst members of each cluster and the centralised power of decision making by the Thai government.

1) **Limitation in cooperation**: It is clear that cooperation amongst LAOs is limited at the disposal process. Only a few clusters, such as the Rayong municipality area, the LAOs share transportation. If the LAOs can cooperate for other MSW management activities such as garbage trucks, or 3Rs, they might reduce the operational cost as well as the volume of daily garbage.
2) **Centralisation of decision making**: Although the central government allows LAOs to group clusters by themselves, the government forces LAOs to cluster and only in the same province. If any LAOs need to cooperate outside the province, they need to get approval from the central government via a long procedure. Moreover, sometimes the central government rushes LAOs to cluster because the Ministry of Interior wants to see progress. This way of clustering is inefficient because it does not go through the process of negotiation amongst LAOs. Before 2014, in contrast, the clusters of MSW management were established because each LAO considered the need for cooperation. Besides, they did not limit it by territory of province. For example, in the case of the Nonthaburi Provincial waste treatment site, MSW from some areas of Pratumthai Province are sent to the site (Petkanjanapong, 2019).

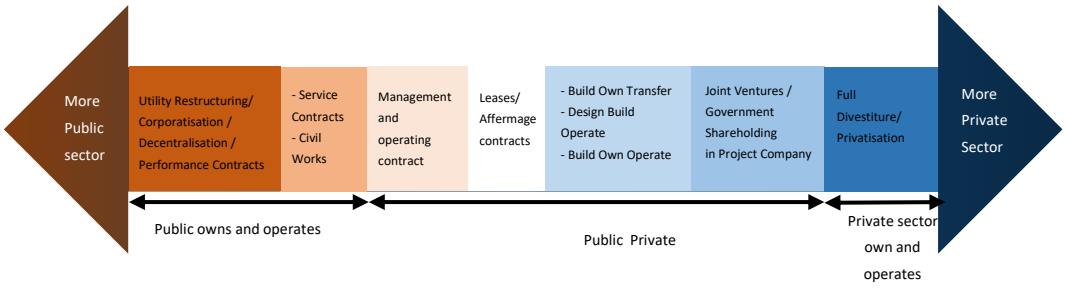
These two limitations contradict the central government policy. Whilst the government clearly promotes the process of 3Rs as a main tool for solving the problem of MSW, clustering is used only for the purpose of disposal. Moreover, the central government disregards the authority of the LAOs in MSW management, and forces LAOs to cluster. Cooperation and clustering should be established by the needs of local people and the LAOs.

8.3. Public–Private Partnerships for Thai Municipal Solid Waste Management

Clustering is not the only tool used by the Thai government to fix the urgent problem of MSW; public–private partnerships (PPP) are another tool used by the Thai government. The government believes that larger MSW management systems will attract more private companies to join the activities of MSW management. Therefore, it is fair to say that it is impossible to discuss each tool without mentioning their relationship with the other.

PPPs are a cooperative arrangement between government agencies and private companies. Generally, the arrangement is for providing any kind of public services (Caves, 2004). PPPs are a tool for funding infrastructure or services that the government face with inadequate budget. There are several ways of arrangement that count as PPPs. Different levels of PPPs are shown in Figure 8.1.

Figure 8.1. Types of Public–Private Partnership[40]



Source: Public–Private Partnership Legal Resource Center (2019); Wojewnik-Filipkowska and Wegrzyn (2019).

According to Figure 8.1, a project can be considered as a PPP project whenever the private company that operates the project, takes benefit from the public or other sources not only from the government organisations with whom make the arrangement. In the case of Thailand, the definition of PPP in the Public–Private Partnership Act, B.E. 2562 (2019) is not different from this general meaning. However, the act is only for projects that are over ฿5,000 million in value.[41] For the Thai government, PPP is a tool for funding public projects, and also a tool for transferring risk in a project to private companies because government organisations do not have the skills, technology, and labour that private companies have (Parliamentary Budget Office, 2016). However, PPPs for MSW consist of their own specific detail. In this next section, the role of the private company, conditional

[40] There is no consensus about types of PPPs. Some studies discuss levels of private involvement of each type of PPP (e.g. Public-Private-Partnership Legal Resource Center [2019]; Wojewnik-Filipkowska and Wegrzyn [2019]).

[41] The old Public–Private Partnership Act, B.E. 2556 (2013) set the minimum project value of a project at ฿1,000 million.

PPPs, and limitation of PPPs in Thai MSW management will be discussed.

8.3.1. Roles of the Private Sector in Thai Municipal Solid Waste Management

In case of MSW, there are several projects that could be considered as PPPs before 2014, such as the Phuket Municipal waste treatment site. This project, undertaken by the PJT company as a build–operate–transfer (BOT) project in 2011, used incineration technology (Vanapruk, 2017). However, centralised waste treatment systems were not common until 2014. Therefore, there are only few waste treatment sites that are large enough for PPPs. Even the Nonthaburi provincial waste treatment site which received larger volumes of daily MSW than the Phuket municipality waste treatment site also did not do PPPs during that time. Before 2014, in other words, the role of private companies in MSW management was limited to civil works and service contracts. Only large MSW management systems, such as the Bangkok Metropolitan Administration or Phuket undertook PPPs. However, after 2014, the clustering process started, and the central government motivated each cluster to conduct PPPs to reduce the financial support needed from the central government. Therefore, this next part will discuss the situation of private company in both roles – contractor and PPP operator.

1) **Service contracts**: The role of the private company is common in Thailand. Although the central government has motivated LAOs to undertake PPPs with private companies to reduce the cost of MSW management since 2014, between 2015 and 2019, LAOs have hired private companies for least 535 contracts, with a value of around B4.9 thousand million, with ฿3.9 million for disposal projects, whilst the rest is for MSW collection (Isranews, 2018).
2) **PPP**: Waste treatment is one main activity that private companies undertake with the government for MSW management. There are PPPs between private companies and every level of government – national, provincial, and sub-district level; for example, PPP Plastic – the cooperation between multiple government agencies and private companies in managing plastic waste, a PPP between the Rayong Provincial Administrative Organisation and GPSC company for a WTE incinerator, and a PPP between PJT company and Phuket municipality. Most large PPP projects relate to WTE or incinerators that the central government have promoted since 2014.

Service contractors still have important roles in private companies, although PPPs are promoted by the central government. A reason is because PPPs are more suitable for large waste management systems that can return the benefit to their investors. However, for small clusters and single LAOs service contracts are still the only way to bring private

companies to operate MSW management.

8.3.2. Public–Private Partnerships and Conditions of Thai Municipal Solid Waste Management

Thailand is still in the transition period for MSW management and PPP. There are some elements that can support PPP in MSW management, namely regulations, technology, size of waste management system, and limitation of budget.

1) **Regulation**: The Thai government has promoted PPPs since 2013 when it brought into law the Public–Private Partnership Act, B.E. 2556 (2013), and established the state enterprise policy office that supports PPPs. The government also provides clear guidelines for LAOs and private companies who want to undertake PPPs. The act provides more a convenient procedure. Moreover, the government also provided extra funds for creating a strategy plan of the project (Parliamentary Budget Office, 2016). Nevertheless, the standard of MSW management that was set by the central government after 2014 is higher than the ability of LAOs, therefore PPP is a tool of the LAOs to follow the new standards to get resources, such as budget, skills, and personnel from the private sector.
2) **Preferred technology**: According to the previous discussion about technology, the central government prefers WTE or incinerators over open dumping or landfill. WTE and incinerators require higher technology and knowledge than the PAOs can afford. Therefore, they need to undertake PPPs with private companies, and use private companies' resources to build and operate technology for MSW management.
3) **Size of waste management system**: After 2014, the Thai government motivated LAOs to cooperate as clusters for MSW management. This policy increases the size of each MSW management system, budget, and also volume of daily MSW. The bigger system of MSW management attracts private companies to invest in the MSW projects.
4) **Limitation of LAOs' budget**: As discussed in the section on clustering, LAOs have inadequate budgets compared to their duties. Therefore, investors in any kind of public service are welcome. Moreover, it is the intention of the central government that wants to reduce the budget for MSW management and transfer the cost to the private sector via PPPs (Nutdanai, 2019).

MSW management in Thailand has opened up to PPPs by regulation changes, the size of MSW management system, and the technology. However, these conditions do not suit everyone. Small LAOs and clusters have to face barriers that prevent them using PPPs for

their MSW management.

8.3.3. Limitation of Public–Private Partnerships in Thai Municipal Solid Waste Management

Although there are several new PPP projects for MSW management, there are some limitations of PPP in Thailand, and these lead to inefficient cooperation between private companies and state agencies for waste management.

1) **Complications of the Thai administrative system**: High-value PPP projects can go through a fast-track procedure because of the Public–Private Partnership Act. This fast track requires only around six steps[42] (State Enterprise Policy Office, 2015). However, the lower-value projects need a longer process. The procedure of low-value PPPs requires 14 steps[43] (Ministry of Interior, 2015). In other words, larger MSW management clusters can more easily undertake PPPs than smaller clusters. This reduces the chance of small clusters to do PPP with the private companies. Small clusters lead to small volumes of resources and are less attractive than large clusters for PPPs, but they still need to use their limited resources for dealing with the complicated process. In other words, the PPP policy of the central government benefits large clusters of MSW management.
2) **Private and public benefit**: The conflict between public and private benefits is one of the classic debates for PPPs because private companies who invest in MSW management need to worry about their own benefit over public benefit. This situation might lead to negatives impact in the surrounding community because private companies need to save the cost. Sometimes LAOs cannot audit a project well because MSW treatment is about the technology and skills. For example, in the case of Hatyai Municipality, people who live near the incinerator are negatively impacted by the waste treatment sites, such as bad smells and dust. However, it is still in operation after 4 years (Channel 7, 2020).

In order to increase numbers of PPPs, the government might need to create more convenient procedures for low-value projects. Therefore, small clusters of MSW management can use PPPs as a tool to increase their ability in MSW management. To reduce public doubt in PPPs, the central government needs to take the action on any PPP project that create negative impacts on the local people.

[42] See Appendix 1.
[43] See Appendix 2.

8.4. Conclusion

Since 2014, there have been several changes in Thailand's MSW management, such as introducing new regulations, setting up an MSW management committee, implementing a master plan, and reorganising waste management procedures. However, amongst these changes, clustering and PPPs are the most important in MSW management. PPPs and clustering policies are expected as the tools to solve one of the protracted problems in Thailand. These two policies are designed to support each other. They are based on the concern of the limitation of resources. Clustering leads to an increase in resources of LAOs, expands the size of waste treatment systems, and also reduces the operational cost by economies of scale. The larger size of MSW management systems means more resources and larger volumes of daily MSW. These two elements attract private companies to invest in MSW management. It might be too soon to evaluate if these two policies are successful. There are some cases in Thailand where PPPs and clustering can create efficient MSW management, such as the case of the Rayong PAO and Phuket Municipality. However, in the case of small clusters, it is doubtful whether these policies can create a suitable MSW management system. Small clusters do not attract private companies, and the procedure for small PPP projects are more inconvenient compared to high-value PPP projects. Moreover, some small clusters cannot even form their own clusters. It might be time for the Thai government to rethink the limitations of clustering and PPPs. These two policy tools might not be suitable for some parts of Thailand, such as small clusters or small and distant LAOs.

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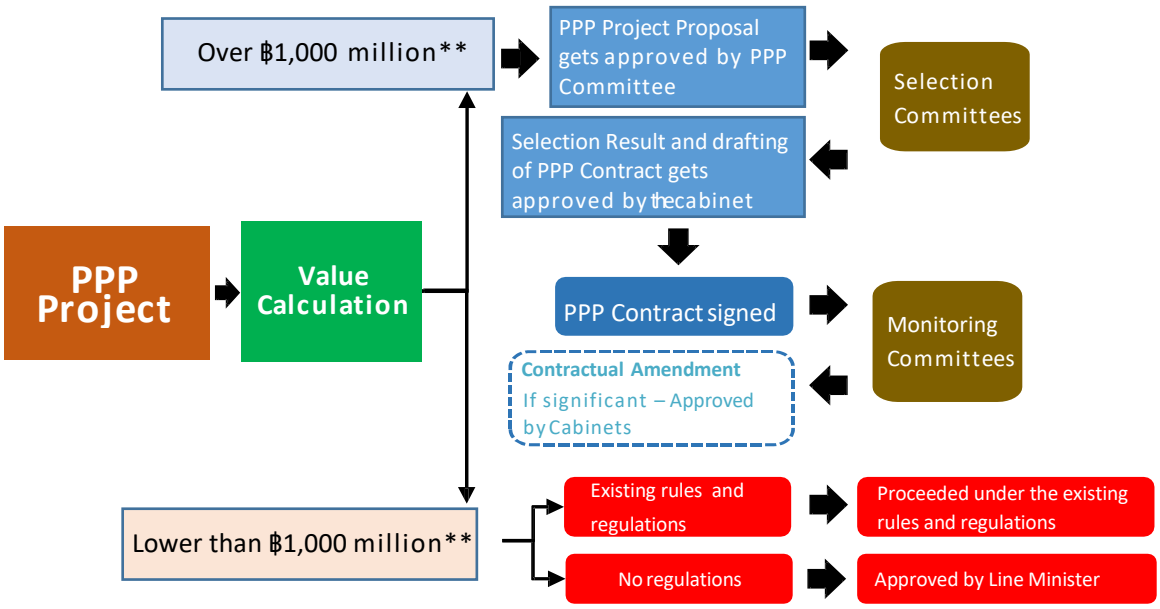
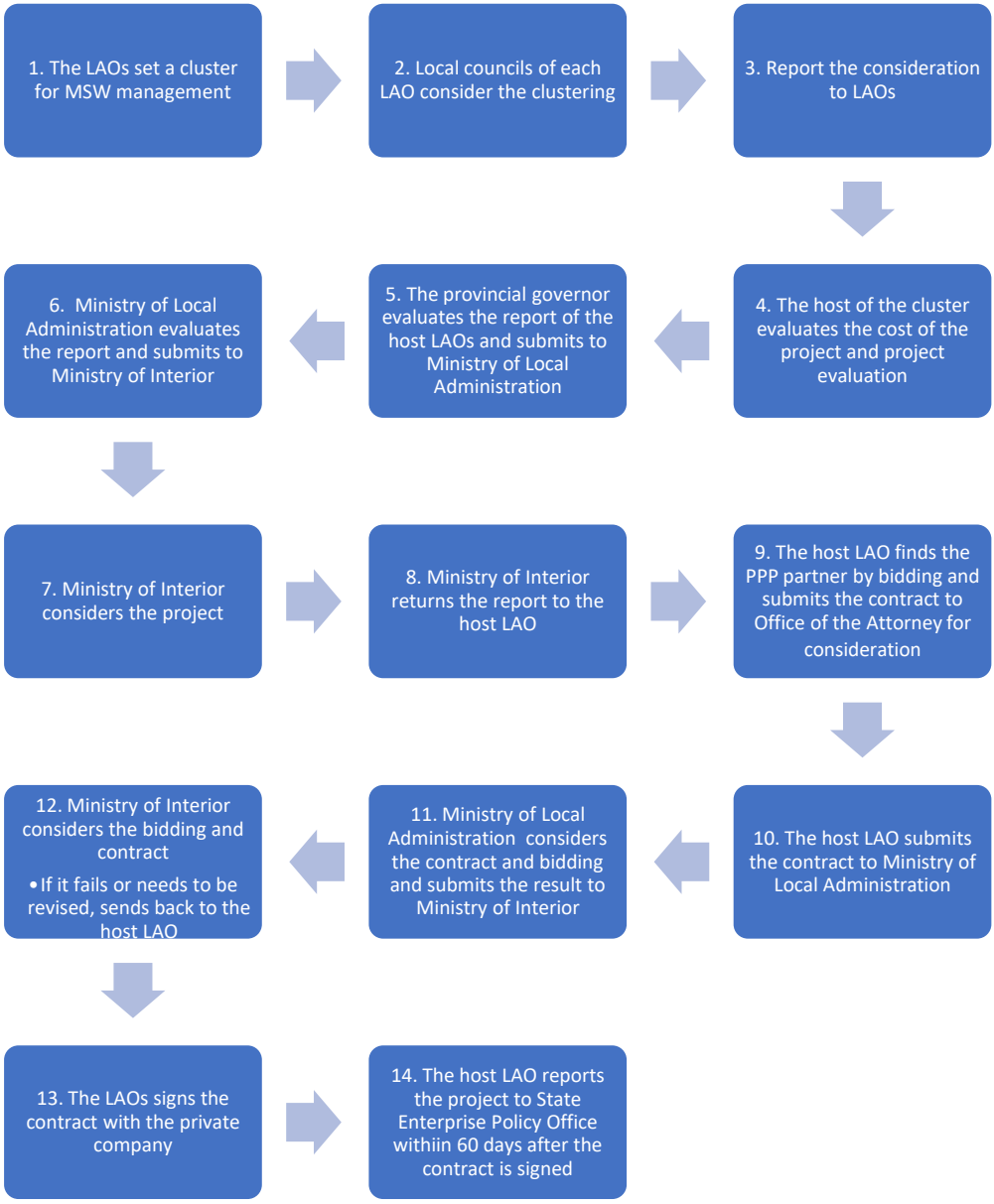
Appendix 1. Overall Procedure of PPP in Thailand (State Enterprise Policy Office, 2015; Private Investments in State Undertakings Act B.E. 2556, 2013; Public-Private Partnership Act B.E. 2562, 2019)



PPP = public–private partnership.
* This Act has been replaced by the Public–Private Partnership Act, B.E. 2562 (2019). The new law specifies limited kind of public services that will go through this procedure, and the new law also adjusted the minimum value of project.
** Public–Private Partnership Act, B.E. 2562 (2019) increases the minimum value PPP project to B5,000 million.

Appendix 2: Overall Procedure of PPP in MSW Management under ฿1,000 million (Ministry of Interior, 2015)[44]



LAO = local administrative organisation, MSW = municipal solid waste, PPP = public–private sector.

[44] Public–Private Partnership Act, B.E. 2562 (2019) increased the high-value PPP projects to B5,000 million; however the procedure for this new plan has not yet been released as of June 2020.