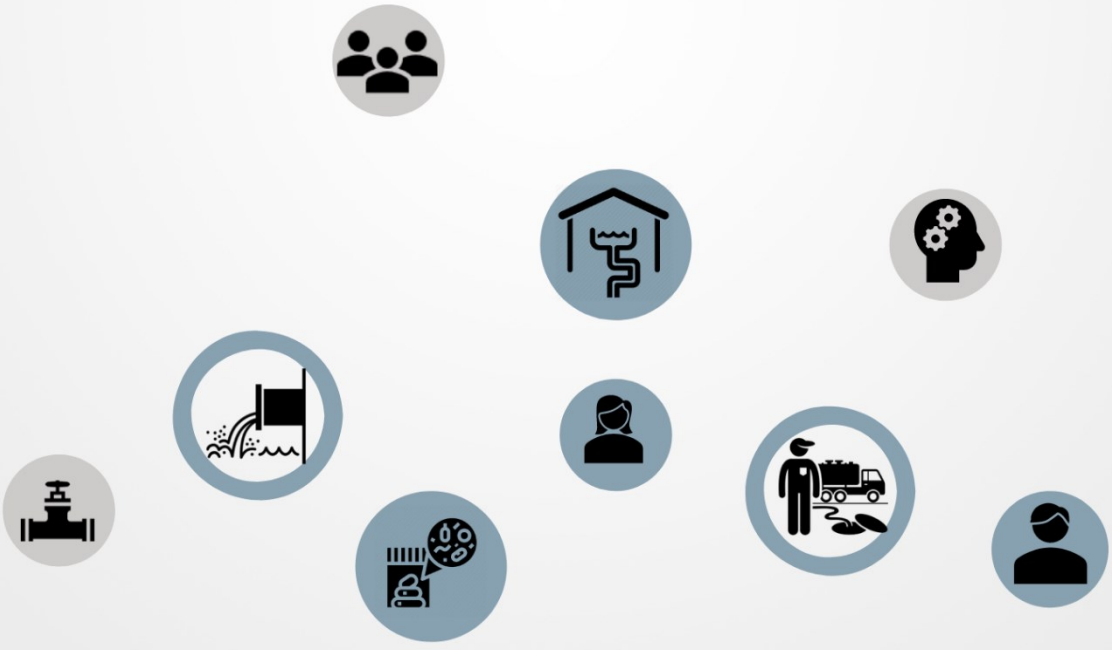
RECOGNIZING THE SANITATION 'SWAMP' IN INDONESIA



BY JULIVIUS PRAWIRA

Recognizing the Sanitation 'Swamp' in Indonesia

Master thesis submitted to Delft University of Technology

in partial fulfilment of the requirements for the degree of

MASTER OF SCIENCE

in Engineering and Policy Analysis

Faculty of Technology, Policy and Management

by

Julivius Prawira

Student number: 5133882

To be defended in public on August 30th, 2021,

at 14.00 CEST/ 19.00 WIB

Graduation committee

Chairperson	: Dr. Ir. B. Enserink, Policy Analysis Section
First Supervisor	: Dr. Ir. L.M. Hermans, Policy Analysis Section
Second Supervisor	: Dr. N. Goyal, Policy and Governance Section

Executive Summary

Sanitation should be made accessible to everyone. It is fundamental for our dignity and privacy. As centralized government has been observed to be limited in addressing complex problems, many developing countries resorted to decentralization. In theory, decentralization can improve the provision of public goods and services, including sanitation. Social and political factors are believed to be the leading cause of limiting the progress in the sanitation sector. Multiple studies have demonstrated the importance of social networks in sanitation governance. We propose to further explore interaction between actors based on key activities in sanitation sectors. We choose Jakarta, Indonesia, as our case study. Jakarta, the capital city of Indonesia, is inhabited by 10.56 million people (measured in September 2020). It is estimated that 86% of the population have not received access to properly managed domestic wastewater.

The main research question to be answered is “How do the interactions among various actors influence sanitation service provision in Jakarta?”. This thesis explores the influence of multiple key activities to contextualize the current provision of sanitation services in Jakarta, Indonesia. We use the Network of Adjacent Action Situations (NAAS) framework proposed by McGinnis (2011). To identify the action situations, we use the sanitation service delivery function categories used by Mason et al. (2020). The sanitation service systems encompass the provision of related infrastructure, namely sewer network, septic tank, vacuum truck, sewage treatment plant, and fecal sludge treatment plants.

Constitutionally, the provision of sanitation services in Indonesia are carried out by provincial and district governments. The provision started to be mandated by minimum public good and service standards in 2014. There is no sanitation law, nor it is integrated with the latest water resource law. Sanitation policies are mainly initiated on the national level. They largely came from four actors: (1) Ministry of Public Works and Housing, (2) Ministry of Health, (3) Ministry of Environment and Forestry, and (4) National Sanitation Working Group which comprise aforementioned ministries and other ministries. These three aforementioned ministries are the most active for sanitation service provision in the national stakeholders.

In the subnational government, Jakarta Province, PD PAL Jaya is the technical operator of major sanitation infrastructures in Jakarta. The DKIJ Water Resource Agency is the counterpart of PD PAL Jaya in terms of sanitation service development. The development is additionally influenced by the DKIJ Regional Development Planning Agency, the governor, and the Governor Advisory Team. The DKIJ Environmental Agency is the enforcer of the wastewater standard.

This thesis presents seven action situations (AS) constituting the NAAS of Jakarta’s sanitation service intended to describe the current sanitation governance: the National Policy AS, the Jakarta Policy AS, the National Regulation AS, the Jakarta Regulation AS, the National Financing AS, the Jakarta Financing AS, and the Jakarta Production & Provision AS. We found two leverage points where the outcome could cascade over to most other action situations. These are Jakarta Policy AS, which is mostly about planning, and the Jakarta Production & Provision AS which is concerned with implementation.

The Ministry of Public Works and Housing, PD PAL Jaya, the DKIJ Water Resource Agency, and the DKIJ Environmental Agency are found to be the most involved based on the NAAS diagram. Their capacity and knowledge would influence most of action situations.

Due to a low number of interviews conducted in the midst of COVID-19 pandemic, little can be said whether actors’ interaction in Jakarta influence the provision of sanitation service in a

positive way or a negative way. Actors' interaction is likely to delay sanitation service development in Jakarta.

We do not find conflict over value or approach between actors in our case study. We believe that they do not face conflict. Rather, executive agencies face conflict across sectors which might involve limited resource conflicts between agencies such as land, or within agencies that have to carry out multiple functions. It is worth noting that we could not assess how the consensus is reached.

To maintain engagement, we recommend to frame sanitation projects with the intention of materializing the benefit for the short-term solution and add human water cycle discourse into day-to-day conversation for the long-term solution to improve coordination of sanitation service provision.

The relevance of the present work is twofold. One, this is the first attempt implementing the NAAS framework in the sanitation sector of developing countries. Once implemented, the framework arguably would be easier to reapplied in another similar context. Different urban areas in Southeast Asia and other developing countries could benefit from applying this framework. Two, we bridge the sanitation research field and public governance research field. Even though institutional and governance issues often discussed in sanitation research field, sanitation governance knowledge body is isolated from the public governance research field.

Acknowledgment

If you are reading this, let me tell you one thing: "*you are a treasure.*" This thesis will part way with me, the author. It will have a conversation with you, a person that I might not know personally. I hope it will be a good conversation. I hope it can serve as guidance to you, whether you are a researcher, a policymaker, an advisor, a master student, or my favorite, a simply curious being. It does not mean I will avoid my responsibility. You still can reach out to me, although I might have forgotten most of the contents.

This work would not be finished without the supporting pillars. A hundred thanks to all of the supporters of this thesis. There will be no me without them, and my achievements are not only mine but also theirs.

First, I would like to thank the graduation committee, Leon Hermans, Bert Enserink, and Nihit Goyal, for supporting and giving critical feedback on this project. Without them, I think I would still be stuck in the vicious cycle of literature review and research planning.

Second, thanks to all interviewees representing various actors in the sanitation sector related to Jakarta. Their information, knowledge, and experience have really broadened my understanding.

Third, huge thanks to my editorial team: Dian Apriyadi, Rico Herzog, Sahiti Sarva, Samuel Timmers, and Thye Yoke Pean. I do not think my thesis would be digestible by other people nor myself in the future if it was written without their editing feedbacks.

Fourth, many thanks to these human beings for keeping Julivius sane. Long-distance friends who always keep in touch at random moments, Golfin, Citop, Okti, Yuni, Julya, and Andry. Boardgame friends who remind me to have a break every two weeks: Dharmawan, Astrid, and Adi. InDelftnesia 2021 committee who provide side work for me to shift my attention away: Asmita, Azza, Vivian, Dita, Kak Agung, Mas Nabriz, and Zakky. TU Delft library militants who nudge me to continue my work: Mas Ranar, Adrian, and Monica. The EPA community who accepted me and shown me the strength of international society.

Thank you to the TPM Faculty scholarship for financing my study-related costs in the EPA master program, TU Delft.

Second to last, I would like to thank my family: my father, mother, and little brother for always loves and supports me unconditionally. They do not forbid me having thought about dropping out, and it meant a lot to me.

Lastly, I want to thank Julivius for literally being there with me 24/7 through the hill and valley, thick and thin, and ups and downs.

I am incredibly grateful to receive much kindness from each of these persons. Some of our interactions might be short, but I am thankful for all those meaningful interactions that we ever had.

I also want to briefly appreciate fiction and art. Without imagination, there will be no possibility to explore. Without movies, novels, short stories, and comics, I also would not be able to get through the lightless path during my thesis work.

As a closing of this part, I would like to thank **you**, the future reader according to the current me, for reading this thesis. Having you discover the work made the work a part of the bigger picture.

Table of Contents

Table of Contents i
List of Abbreviation, Acronym, and Translation iii
List of Figures v
List of Tables vi
1 Introduction: Understanding the barriers to sanitation 1
1.1 Background: Progress in access to sanitation 1
1.2 Research gap: The influence of actor's interaction 3
1.3 Research scope: Sanitation service provision in Jakarta, Indonesia 3
1.4 Research question and structure 4
2 Literature review: Delineating sanitation governance. 7
2.1 Water supply and sanitation overview – the human water cycle 7
2.2 Theory in water and sanitation governance 8
2.3 Sanitation governance development in practice 9
2.3.1 Decentralized governance 9
2.3.2 Sanitation governance challenges in practice 10
2.4 Polycentric Governance and Network of Adjacent Action Situation (NAAS) 11
2.4.1 Action situation 11
2.4.2 Network of Adjacent Action Situations 13
2.4.3 Action situation identification method 13
2.5 Recap 14
3 Research Methodology 15
3.1 Research question 15
3.2 Research method 15
3.3 Recap – research flow diagram 17
4 Introduction to sanitation governance in Indonesia 19
4.1 Institutional overview of Indonesia 19
4.1.1 National sanitation laws and regulations 19
4.1.2 National sanitation policies 21
4.2 Indonesia sanitation formal stakeholders 22
4.2.1 National stakeholders 23
4.2.2 Subnational stakeholders 24
4.3 Recap 25
5 Getting to know sanitation actors in Jakarta 27
5.1 Actors involved in provision of sanitation services in DKI Jakarta 27
5.2 Actors who influence provision of sanitation services in DKI Jakarta 28
5.3 Recap 34

6 Action situations for Jakarta's sanitation governance 35
6.1 Action situation in Jakarta sanitation 35
6.1.1 National Policy action situation 36
6.1.2 Jakarta Policy action situation 37
6.1.3 National Regulation action situation 39
6.1.4 Jakarta Regulation action situation 41
6.1.5 National Financing action situation 43
6.1.6 Jakarta Financing action situation 44
6.1.7 Jakarta Production & Provision action situation 46
6.2 Network of Adjacent Action Situation in Jakarta sanitation 48
7 Answering research question 51
8 Reflection 55
8.1 Limitation and strength of this work 55
8.1.1 NAAS framework 55
8.1.2 Remote data collection process 56
8.1.3 Possibility of bias 56
8.2 Recommendations for future work 56
8.3 Concluding remarks 57
Bibliography 59
Appendix A. Literature Summary 70
Appendix B. Interview 72
B.1 Interview procedure 72
B.2 List of interviews 73
Appendix C. Document Summary 74
Appendix D. Action situation component variables 79

List of Abbreviation, Acronym, and Translation

APBD	*Anggaran Pendapatan dan Belanja Daerah* (Regional Budget)
APBN	*Anggaran Pendapatan dan Belanja Nasional* (National Budget)
Bappeda	*Badan Perencanaan Pembangan Daerah (Region Development Planning Agency)*
Bappenas	*Badan Perencanaan Pembangunan Nasional* (Ministry of National Development Planning)
BUMD	*Badan Usaha Milik Daerah* (Local Owned Enterprise)
BLUD	*Badan Layanan Umum Daerah* (Local Public Service Agency)
BPS	*Badan Pusat Statistik* (National Bureau of Statistics)
DLH	*Dinas Lingkungan Hidup* (Environmental Agency)
DSDA	*Dinas Sumber Daya Air* (Water Resource Agency)
DPR RI	*Dewan Perwakilan Rakyat Republik Indonesia* (Indonesian Parliament)
DPRD	*Dewan Perwakilan Rakyat Daerah* (District Parliament)
FSM	Fecal Sludge Management
IUWASH	Indonesian Urban Water, Sanitation, and Hygiene
JICA	Japan International Cooperation Agency
Kemdikbud	*Kementerian Pendidikan dan Kebudayaan* (Ministries of Education and Culture)
Kemendagri	*Kementerian Dalam Negeri* (Ministries of Internal Affairs)
KemenKeu	*Kementerian Keuangan* (Ministries of Finance)
KemenPUPR	*Kementerian Pekerjaan Umum dan Perumahan Rakyat* (Ministries of Public Works and Housing)
Kemkes	*Kementerian Kesehatan* (Ministries of Health)
KLHK	*Kementerian Lingkungan Hidup dan Kehutanan* (Ministries of Environment and Forestry)
LLTT/L2T2	*Layanan Lumpur Tinja Terjadwal* (Regular Desludging Service)
LLTTT/L2T3	*Layanan Lumpur Tinja Tidak Terjadwal* (On-call Desludging Service)
NAAS	Network of adjacent action situation
NCICD	National Capital Integrated Coastal Development
ODF	Open defecation free
PDAM	*Perusahaan Daerah Air Minum* (Municipal Drinking Water Company)
Pokja AMPL	*Kelompok Kerja Air Minum dan Penyehatan Lingkungan* (Working Group of Drinking Water and Environment Preservation)
PP	*Peraturan Pemerintah* ()

PPSP	*Program Percepatan Pembangan Sanitasi Perkotaan* (Road Map for Acceleration of Urban Sanitation Development)
RPJMN	*Rencana Pembangunan Jangka Menengah Nasional* (National Medium Term Development Plan)
SSK	*Strategi Sanitasi Kabupaten/Kota* (City Sanitation Strategy)
STP	Sludge treatment plant
STBM	*Sanitasi Total Berbasis Masyarakat* (Community-Based Total Sanitation Strategy)
TGUPP	*Tim Gubernur Untuk Percepatan Pembangunan* (Governor Advisory Team)
UPTD	*Unit Pelaksana Teknis Daerah* (Local Technical Implementation Unit)
UU	*Undang-Undang* (Law)
UUD RI 1945	*Undang-Undang Dasar Republik Indonesia 1945* (Constitution of Indonesia)
WASH	Water, sanitation, and hygiene
WWTP	Wastewater treatment plant

List of Figures

Figure 1 Share of the population with access to improved sanitation facilities in 1990 1
Figure 2 Share of the population with access to improved sanitation facilities in 2015 2
Figure 3 Human water cycle illustration 7
Figure 4 Ownership in sanitation service category (WHO, 2018) 8
Figure 5 The internal structure of an action situation (Ostrom, 2010) 12
Figure 6 Action situation adjacent to a focal action situation (McGinnis, 2011) 13
Figure 7 Research flow diagram 17
Figure 8 Indonesian typical sanitation stakeholder arrangement 23
Figure 9 Formal chart for the sanitation of Jakarta (adapted from Trieputra (2015)) 27
Figure 10 National Policy AS diagram 36
Figure 11 Jakarta Policy AS diagram 38
Figure 12 Jakarta Policy AS diagram (left picture: during master plan 1991, right picture: 2012-now) 39
Figure 13 National Regulation AS diagram 40
Figure 14 Jakarta Regulation AS diagram 42
Figure 15 National Financing AS diagram 43
Figure 16 Jakarta Financing AS diagram (left: Jakarta provincial budget, right: PD PAL Jaya budget) 45
Figure 17 Jakarta P&P AS diagram 46
Figure 18 NAAS of Sanitation in DKI Jakarta 48

List of Tables

Table 1 Summary of Indonesia sanitation law and regulation (up: general – down: technical/specific) 20
Table 2 Summary of sanitation development program in Indonesia adapted from Apriadi (Inpress) 22
Table 3 Actor mapping in Jakarta sanitation sector according to sanitation service delivery function 31
Table 4 Information checklist on sanitation NAAS 35
Table 5 Indonesia literature summary 70
Table 6 National Policy Action Situation variables (italic words: assumption) 80
Table 7 Jakarta Policy Action Situation variables 82
Table 8 National Regulation Action Situation variables 83
Table 9 Jakarta Regulation Action Situation variables 84
Table 10 National Financing Action Situation variables 85
Table 11 Jakarta Financing Action Situation variables 85
Table 12 Jakarta Production & Provision Action Situation variables 86

1 Introduction: Understanding the barriers to sanitation

"Do we not know enough by now that further justification for investing in and improving WASH should be unnecessary? Who would seriously argue against the proposition that all should enjoy safe, affordable, and reliable water and sanitation services, and the opportunity to practise good hygiene? What we need to know is how to implement effectively, cost-effectively, and above all, sustainably." (Carter, 2013)

1.1 Background: Progress in access to sanitation

Sanitation should be made accessible to everyone. Sanitation is fundamental for human dignity and privacy (UN, n.d.). Clean drinking water and sewage disposal have been recognized as the most significant advance in medical technology since 1840 (Ferriman, 2007). When it was recognized that diseases could be caused by pathogens, water and sanitation systems became essential to protect the public from water-borne disease.

Since 1977, safe water and sanitation were aimed to be available across the globe (UN, 1983). During the International Drinking Water Decade, 1981-1990, the world saw explosive progress in access to sanitation (GDRC, n.d.). By 1990, access to safe drinking water increased by over 1.2 billion people, and nearly 770 million people gained access to safe sanitation.

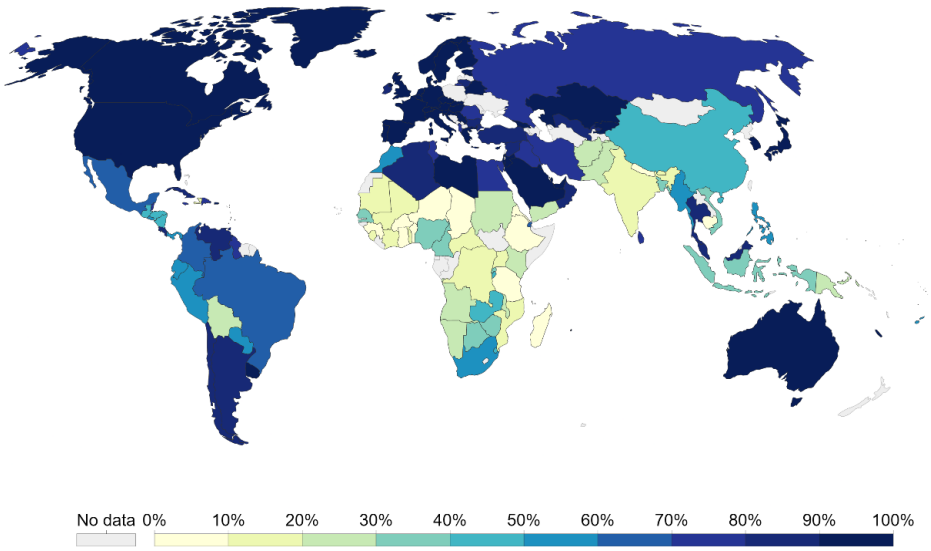


Figure 1 Share of the population with access to improved sanitation facilities in 1990

This progress has not covered everyone (Figure 1 and Figure 2). In the 2000s, it was estimated that 1.1 billion people (17% of the global population) still lacked access to safe water, and 2.4 billion people (40% of the global population) still lacked access to adequate sanitation (Castro, 2007). In 2019, 2.2 billion people (29% of the global population) lacked access to safely managed drinking water services, and 4.2 billion people (55% of the global population) lacked access to safely managed sanitation services across the globe (UN-Water, 2019).

While achieving universal access to a basic drinking water source in 2025 appears attainable, achieving universal access to basic sanitation in the same year will require an extra push (WHO, 2019). Water supply often precedes sanitation, causing water supply to receive more attention and resources (Ekane et al., 2020). Because of this unequal attention, water supply

provision is often a step ahead of the provision of sanitation facilities. This gap in sanitation service provision requires further study.

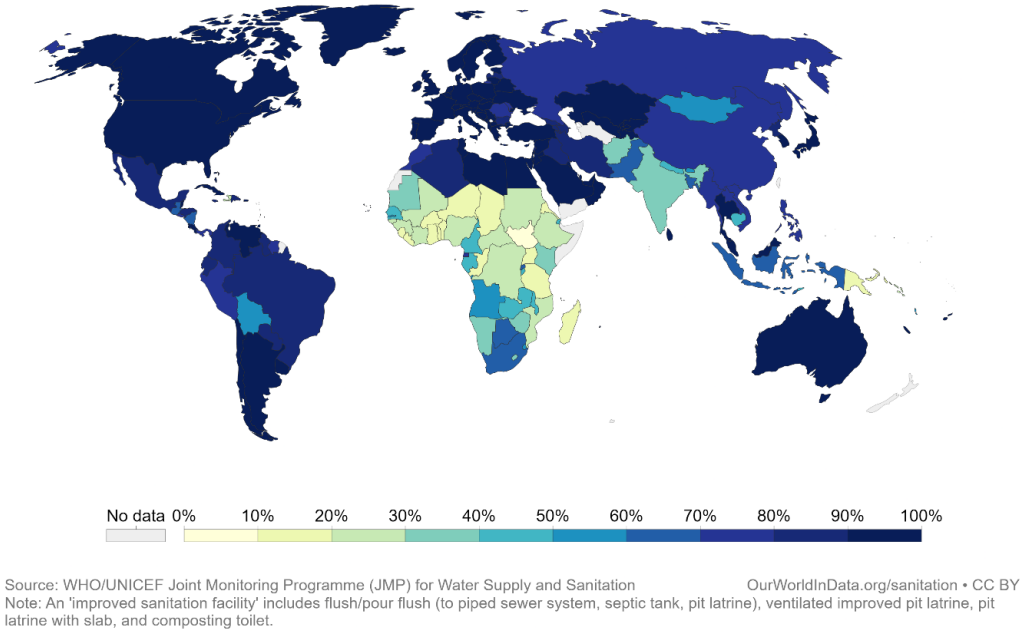


Figure 2 Share of the population with access to improved sanitation facilities in 2015

Many developing countries, including Indonesia, have tried to improve the coverage of sanitation services through decentralization (Dickson, 2006; Herrera, 2014; Herrera & Post, 2014; Laquian, 2005; Mason et al., 2020). Theoretically, decentralization can support service provision through better policy adaptation to local needs, higher levels of transparency, improved resource allocation for implementation, and better cost recovery (Herrera & Post, 2014; Mason et al., 2020; Susilo & Vidyattama, 2020). However, decentralization does not automatically improve service provision (Chong et al., 2016; Ekane et al., 2020; Mason et al., 2020; Winters et al., 2014).

Social and political issues are believed to be the leading cause of delays to progress in the sanitation sector (Bayu et al., 2020; Castro, 2007; Herrera & Post, 2014; Mason et al., 2020). Herrera & Post (2014) listed a range of factors such as the lack of citizens' confidence in governments, corruption, elite capture, and inadequate institutional design. This study will further explore these social and political issues in Indonesia.

Indonesia went through decentralization reforms in 2001. The national government transferred the responsibility of providing sanitation services and functions to local governments (Winters et al., 2014). By 2018, 74.58% of the population had access to basic sanitation, significantly higher than the 7.42% with access to safely managed sanitation (Bappenas, 2019). This number implies that three-quarters of the population used improved facilities, such as toilets, to defecate. However, only a tenth of the population safely disposed of the excreta (through sewerage or vacuum trucks).

Indonesia faced a few challenges in providing safely managed sanitation access, such as low budget allocation, low organization capacity, low demand of sanitation service, high idle capacity (36.3%) in the city-scale domestic wastewater treatment plants (WWTP), and a low number of active fecal sludge treatment plants (Bappenas, 2019). Furthermore, approximately 20% of district governments (113 out of 541) specifically appointed sanitation service operators, while the remaining district governments execute services through executive

agencies. It created overlapping tasks between executive agencies, which are a common occurrence in Indonesia (Abfertiawan, 2019; Gumilangsari, 2020). Thus, this study seeks to understand how interactions between actors in the sanitation sector influence sanitation service provision.

1.2 Research gap: The influence of actor's interaction

Governance arrangements (within and across levels of governments) on the delivery of sanitation services are recognized to play a significant role in constraining effective delivery by district governments (Chong et al., 2016). Whenever problems emerge in the context of commitment, coordination, or cooperation, stakeholders and their relationships often fail to bring the expected benefits (Mason et al., 2020). Larson et al. (2013), Narayan et al. (2020), and Mulyana & Prasojo (2020) have demonstrated the importance of social networks in water and sanitation governance in Indonesia and India. Their research has emphasized the importance of structures of relationships between actors.

We propose to explore the influence between key activities sanitation actors participate in and understand how it can describe the current situation of sanitation governance in Indonesia. By using the concept of Network of Adjacent Action Situation (NAAS), we can explain, for example, how planning eases sanitation service delivery but does not necessarily guarantee effective delivery because planning and implementation are essentially two different key activities. Institutional and governance arrangements comprise multiple key activities that influence each other. A fuller representation of actor interactions in sanitation governance will enable us to contextualize current sanitation service provision.

1.3 Research scope: Sanitation service provision in Jakarta, Indonesia

The importance of local government has been acknowledged in several research articles (Al'Afghani et al., 2019; Chong et al., 2016; Susilo & Vidyattama, 2020; Willetts et al., 2020). Susilo and Vidyattama (2020) recognized how influence from the local government determined the outcome of the rural sanitation program in eastern Indonesia. Chong et al. (2016) similarly identified the significance of local government in Sumatra. Likewise, other research studies have indicated the benefit of decentralization in terms of localized and better understanding (Al'Afghani et al., 2019; Willetts et al., 2020). We look further into subnational governments to better understand where the government provides sanitation services.

Jakarta, the capital city of Indonesia, is inhabited by 10,56 million people (measured in September 2020) (BPS Provinsi DKI Jakarta, 2021). It is estimated that 64% of the population used 'septic tanks' in 2016 (Pemprov DKI Jakarta & Kedeputian Gubernur Bidang Tata Ruang dan Lingkungan Hidup, 2017). However, the actual number of proper septic tanks remains unknown as 'septic tanks' often refer to unlined bottom pits that would absorb wastewater to the ground and contaminate the groundwater nearby (Trieputra, 2017). Unsafe disposal causes both surface water and groundwater contamination, causing fecal-borne disease (Trieputra, 2017).

Sewerage service (or off-site sanitation) covers approximately five percent of Jakarta (Trieputra, 2017). There is a sewerage system located in Setiabudi, South Jakarta, which was constructed in 1983 (World Bank Group, 1993). Sewage disposal services additionally covers almost 9% of the population (Pemprov DKI Jakarta & Kedeputian Gubernur Bidang Tata Ruang dan Lingkungan Hidup, 2017). These numbers combined leaving 86% of the population either disposed their domestic wastewater into water bodies or soaked by the ground. 17% of sewage disposal even still being dumped illegally slightly adding unsafe disposal percentage.

This thesis focuses on formal actors in Jakarta, Indonesia, such as the formal government body and the municipal enterprises. Other actors such as citizens, community, private companies, and Non-Government Organizations (NGOs) are included when involved with the formal actors. This location was chosen based on the perceived availability of data under mobility constraints.

1.4 Research question and structure

The decentralization of sanitation services has created network structures between stakeholders and brought about governance problems. Using the concept of Network of Adjacent Action Situation as the theoretical lens, we explore the influence of multiple key activities to contextualize the current provision of sanitation services. The main research question for this study is:

"How do the interactions among various actors influence sanitation service provision in Jakarta?"

This thesis is divided into eight chapters. The first chapter presents general background information, and describes the research objectives and questions.

The second chapter addresses the first research question:

1 How is sanitation governance explained from a theoretical perspective?

It lays the theoretical foundation of governance in the sanitation sector. We look into discussions about the governance of water and sanitation, challenges facing sanitation governance, and identify an appropriate theoretical framework for use in this thesis. The use of polycentric governance theory and the theoretical framework of the Networks of Adjacent Action Situations is explained. The analytical framework used in this research is explained in chapter three. The report continues to our second research question:

2 What does the formal institutional arrangement for sanitation governance in Indonesia look like?

Chapter four sets out Indonesia's formal institutional arrangement as a context to understanding Jakarta sanitation governance. We describe policies and regulations related to sanitation that have been made. We identify national stakeholders and set the first boundary for who qualifies as stakeholders in Jakarta. The answers allow us to continue to the following research question.

3 Who are the main actors and what are the functions they serve in Jakarta's sanitation service provision?

Chapter five continues to set the stage by introducing stakeholders involved in the provision of sanitation services in Jakarta and maps the actors across sanitation service delivery functions. This intermediate result allows us to enter the final stage of the study, the application of the Network of Adjacent Action Situation framework.

4 How do these actors and their functions interact in Jakarta's sanitation service provision?

Chapter six presents the findings of the application of framework and discuss the results. Since Network of Adjacent Action Situation is an interconnected action situation, every single situation will be described before being summarized into a single Network of Adjacent Action Situation diagram.

5 What recommendations can be made to improve the coordination of sanitation service provision?

Chapter seven concludes the research by answering the research questions and providing recommendations for the Indonesian government to improve coordination among stakeholders. Chapter eight closes the research by reflecting on the limitations of the study and providing recommendations for future work.

2 Literature review: Delineating sanitation governance.

This literature review presents knowledge relevant to understanding sanitation governance. It answers Research Question (RQ)1 of this thesis: "How is sanitation governance explained from a theoretical perspective?" We start by depicting sanitation systems. Sanitation governance is described through water governance theory and general discussion of sanitation governance development. A discussion on the Network of Adjacent Action Situation framework concludes this chapter.

2.1 Water supply and sanitation overview – the human water cycle

The human water cycle describes how humans meet their daily water demands and treat it safely before returning it to the ecosystem (Mitte Team, 2018) (Figure 3). The water supply sector is associated with the provision of water for human consumption (drinking, food preparation, laundry, bathing, dishwashing, and cleaning), usually via a system of pumps and pipes. It includes water intake from a water source, water treatment so that the water is ready for consumption, and water distribution to homes for human usage. The sanitation sector prevents human contact with human excreta and sewage, and additionally treats domestic wastewater so that it can be safely released back into the environment.

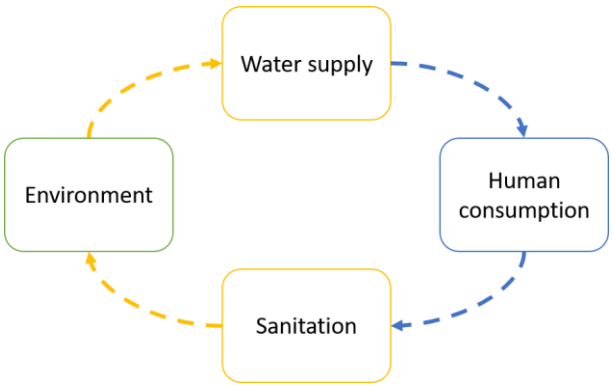


Figure 3 Human water cycle illustration

The sanitation service chain in a domestic wastewater treatment system covers the latrine to the disposal into the environment (Strande et al., 2014). Sanitation systems are typically divided into two categories based on the infrastructure deployed: centralized wastewater treatment systems and decentralized wastewater treatment systems (Wilderer & Schreff, 2000). The two differ on how the fecal is collected and transported to the treatment plant. Centralized systems transport wastewater using a sewerage network to the wastewater treatment plant whereas a decentralized system collects fecal waste in an on-site treatment, such as septic tank and then transports the fecal sludge into a septage treatment plant every 2-4 years. Figure 4 illustrates the differences.

Components commonly used to describe the sanitation service chain in fecal sludge management (Strande et al., 2014) are as follows and illustrated in Figure 4:

1. **User interface** describes which type of toilet is used by users/the population to defecate.
2. **Collection and storage** are methods or units to store the wastewater generated from the user interface. Additionally, storage often works as an on-site pre-treatment process. The septic tank is the most common collection and storage unit used.
3. **Conveyance** refers to fecal sludge collection and transportation between storage/on-site sanitation facilities to the fecal sludge treatment plant.

4. **Treatment** is concerned with how collected fecal sludge is treated. Fecal sludge can be treated in a specific fecal sludge treatment plant, a wastewater treatment plant, or a solid waste composting site.
5. **End use and disposal** are the last actions taken to ensure safe management. Treated fecal sludge can be used as energy source or can be disposed as soil.

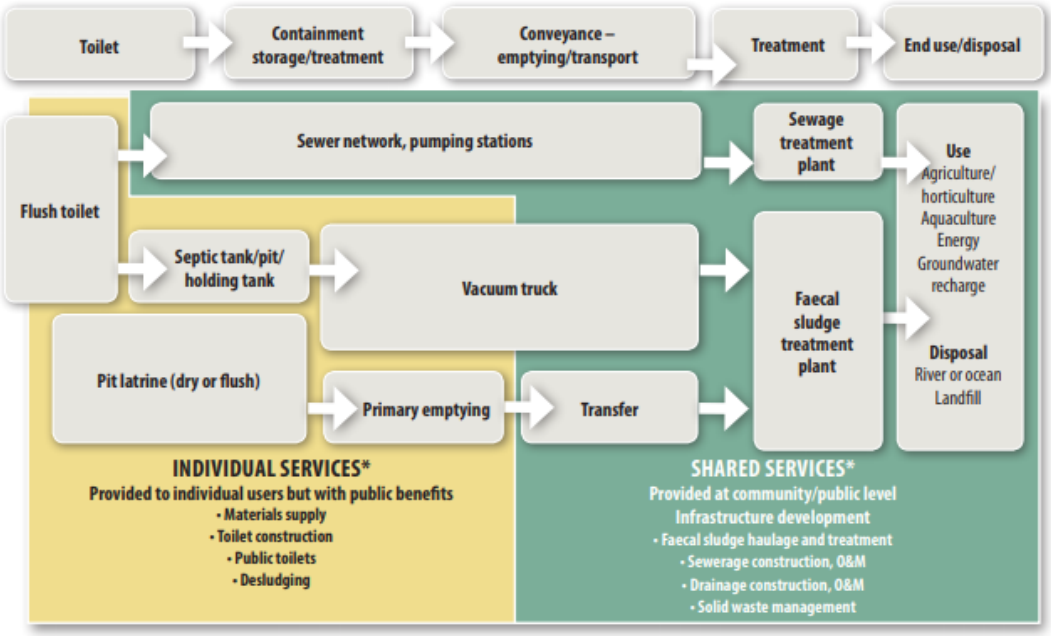


Figure 4 Ownership in sanitation service category (WHO, 2018)

In this thesis, we limit the sanitation service discussions to the provision of related infrastructure. Referring to Figure 4, we cover containment storage/treatment, conveyance – emptying/transport, and treatment phase.

2.2 Theory in water and sanitation governance

Sanitation often becomes a second priority to water supply because water supply is a prerequisite for sanitation (Ekane et al., 2020). We find fewer governance discussions in sanitation sector compared to the water supply sector or water, sanitation, and hygiene (WASH) sector. Due to this reason, we look into both water and sanitation governance.

Governance has been recognized as one of the essential elements in providing public goods and services (Dye, 2008). The notion of governance aims to provide a more comprehensive form of understanding government compared to the dichotomy of traditional state hierarchies and market systems (Castro, 2007). Governance accounts the internal dynamics within organizations that market versus state concepts did not account for (Ostrom, 2010).

There are various ways to conceptualize water and sanitation governance. Water and sanitation can be seen as two components, as public goods that have to be provided by the government, or as part of natural resources where water is the resource and sanitation is the attempt to recover the resource. Several articles are explained in subsequent paragraphs, and important elements of water and sanitation governance are derived.

OECD defines water, water supply, governance as “the set of administrative systems, with a core focus on formal institutions (laws, official policies) and informal institutions (power relations and practices) as well as organizational structure and their efficiency” (Romano &

Akhmouch, 2019). Water governance is seen as a means to an end and considered “good” if water problem can be tackled.

Pahl-Wostl (2009) captured dimensions in the water governance research field from a natural resource perspective. They characterized water governance into four major dimensions: (1) formal and informal institutions, (2) the role of state and non-state actor groups, (3) the nature of multi-level interactions on different levels and across administrative boundaries, and (4) the mode of governance of bureaucratic hierarchies, markets, and networks. A few components are deemed to be beneficial if it exists, such as a balance between formal and informal institutions and more diverse modes of governance without strong dominance from either hierarchies, markets, or networks. These characteristics allow governance regimes to be more adaptive.

Cisneros (2019) showcased how different structural characteristics of water, natural resources, governance result in different collaborative outputs and outcomes. These structural characteristics determine resilience towards regulatory changes.

Governance recognizes the complexity of regulatory processes and their interactions (Pahl-Wostl, 2009). “Governance in water, sanitation, and hygiene for development, especially in urban sanitation, is complex and commonly involves a number of stakeholders interacting across administrative levels, sectors, and demographics” (Strande et al (2014) in Narayan et al, 2020 pg 2). The importance of structure of actors and their relation have been increasingly recognized in WASH systems. Social network analysis (SNA) and stakeholder analysis have been increasingly deployed for research in WASH sector (Narayan et al., 2020).

Sanitation governance is recognized by UNDP as “the social and political elements that make sanitation systems successful (or fail) such as rules, roles, ethics, and relations (UNDP,2015)”. This thesis discusses further sanitation governance elements such as rules, roles, and relations within sanitation system in Indonesia.

2.3 Sanitation governance development in practice

It is worth noting that the concept of governance is perceived differently by scholars, and by politicians and state actors (Castro, 2007). While scholars discus ideal governance as a long process of dialogue and negotiation, practitioners often consider it a policy strategy (Castro, 2007; Romano & Akhmouch, 2019). In this section, we discuss the governance development in general from a practical perspective.

2.3.1 Decentralized governance

Centralized government has been observed to be limited in addressing complex problems and human dimensions (Ekane et al., 2020; Pahl-Wostl, 2009). In water and sanitation management systems, a technical-only approach deemed as insufficient to respond to the demands of a constantly growing population and other external environmental pressures (Iribarnegaray & Seghezzo, 2012; Pahl-Wostl et al., 2007). Distributing the decision-making processes would potentially create more adaptive governments, and thus context-specific solutions to solve the problem.

The concept of governance networks emerged when many countries decentralized their power. Decentralization in the provision of sanitation services is common in most developing countries (Dickson, 2006; Ekane et al., 2020; Herrera & Post, 2014; Mason et al., 2020). Decentralization is described as a distribution of responsibility, authority, power and resources from the central authority to a lower level of government (Herrera, 2014; Mwihaki, 2018). The traditional top-down command-and-control mechanism shifts into horizontal non-competitive networks of stakeholders creating multiple actors that are interdependent to each other (Ekane et al., 2020).

Mwihaki (2018) catalogued three forms of decentralization: administrative, fiscal, and political. Administrative decentralization is concerned with the transfer of public services from the central authority to regional or functional authorities. Fiscal decentralization comprises the capability to raise adequate budget at lower levels and retain control over its expenditure. Political decentralization enables citizens and elected representatives to make public decisions through pluralistic politics at a localized level.

Water and sanitation service decentralization is an example of administrative decentralization, where the responsibility for providing services is transferred from the national government to subnational governments (Herrera,2014). It is not always accompanied by fiscal and political decentralization.

Decentralization attempts to improve performance (Herrera & Post, 2014; Mason et al., 2020) by (1) improving local stakeholders' responsiveness to local contexts and needs, (2) developing awareness of water planning and resource constraints, and (3) allowing individuals to influence project design and resource allocation.

The WASH system that is made of multiple actors can become capable of learning and adapting to new information (Huston & Moriarty, 2018). With a supportive environment, it allows horizontal information exchange (Fischer et al., 2019) and social learning (Pahl-Wostl, 2009). That would create a more adaptive and resilient system (Cisneros, 2019; Crona & Parker, 2012).

2.3.2 Sanitation governance challenges in practice

In practice, decentralization does not directly guarantee a better quality of service (Mason et al., 2020). Weak leadership, low political commitment, little oversight and harmonization of all stakeholders involved are a few examples why decentralization does not necessarily translate to better implementation (Galli et al., 2014).

The lack of a specific institution responsible for sanitation service provision is listed as one of the typical institutional barriers that disrupt the progress of sanitation sector (Galli et al., 2014). The separation and distribution of governance functions without clear leadership through one coordinating body would led to a certain degree of fragmentation in roles (Galli et al., 2014; Mulyana & Prasojo, 2020).

In Rwanda and Uganda, sanitation is distributed across different sectors, and thus tackled in various policies in both countries (Ekane et al., 2020). These decentralized and distributed roles and responsibilities have created coordination problems.

In Kenya, overlaps and competition around sector leadership at national levels and below, weak incentives for subnational governments to commit policy resources and attention, and limited enabling regulatory oversight were identified as institutional challenges (Mason et al., 2020). Ekane et al (2020) pointed out unintended consequences of decentralization in Kenya, where attempts to devolve government have instigated patronage and rent-seeking with popular expectations of "*everyone's turn to eat (pg 348)"*.

Research done by Abeysuriya et al. (2019) explained how comprehensive planning in developing countries does not translate to successful implementation. Low levels of public interest in sanitation sector and the prevalence of a rational comprehensive planning approach where perfect system can be achieved does not provide the political incentives necessary to achieve goals and also presents a huge barrier for stakeholders to commit to project implementation.

Many development initiatives fail to improve state capabilities because they get stuck in "capability traps" where governments place more emphasize what the practice looks like instead of what the practice does (Andrews et al., 2013). Sanitation planning processes that was carried out in several small cities in Sumatra, Indonesia was found to be unable to guide long-term strategic sanitation delivery. "Political economy studies of WASH and related urban services in Asian low- and middle-income countries, have revealed that the complexity of governance combined with weak institutions are a detriment to urban service delivery." (Narayan et al, 2020 pg 2)

Privatization, another institutional reform that is often implemented together with decentralization, can further undermine decentralization goals (Herrera & Post, 2014). Decentralization brings services closer to people and hence makes local service provision more political, whereas privatization protects the service from political influence by making it part of a market structure. Privatization has the potential to marginalize poor citizens and increases social conflict in urban services provision (Hadipuro, 2010; Herrera, 2014). These two simultaneous attempts to solve the water and sanitation challenges have complicated the situation even further.

Although actors have desired institutional framework and policy in place, it does not guarantee translation into implementation. Privatization combined with decentralization creates polycentric governance. This prompts us to look deeper into their decisions within key activities and how those outcomes are influenced across key activities.

2.4 Polycentric Governance and Network of Adjacent Action Situation (NAAS)

Since many developing countries have decentralized sanitation service provision tasks and also involved other formal stakeholders such as enterprises, these attempts have created polycentric governance. We briefly compare polycentric governance and decentralized governance, then explain the Network of Adjacent Action Situation framework to understand how we can contextualize sanitation governance.

Polycentric systems are characterized by multiple governing authorities at different scales who do not stand in hierarchical relationship to each other but function nonetheless as a coordinated system. It is similar to decentralized governance which usually implies power distribution through the central government and developing various actors at different levels for different policy problems (Morrison et al., 2017). Both are represented by multiple actors with interdependent tasks.

Polycentric governance and decentralized governance differs in decision making considerations. While polycentric governance view action through the consideration of other actors' possible actions, processes of cooperation, competition, conflict, and conflict resolution (Carlisle & Gruby, 2019), decentralized governance often do not recognize competition and conflict between formal stakeholders due its stronger top-down approach.

We will look Network of Adjacent Action Situation (NAAS) to guide us contextualize governance more systematically.

2.4.1 Action situation

The action situation concept refers to the social space where different actors or groups make interdependent decisions resulting in the joint outcomes (Kimmich & Tomas, 2019; Ostrom, 2005). Whenever two or more individuals are able to choose actions that collectively produce outcomes, they can be said to be involved in an action situation. It includes transactions in a market between buyers and sellers, legislative decisions by legislators, groundwater extractions done by farmers in the same watershed, and international negotiation between heads of countries.

An action situation is comprised of seven clusters of variables (Ostrom, 2005), as illustrated in Figure 5.

1. Participants (who may be either single individuals or corporate actors),
2. Positions,
3. Potential outcomes,
4. Action-outcome linkages,
5. The control that participants exercise,
6. Types of information generated, and
7. The costs and benefits assigned to actions and outcomes.

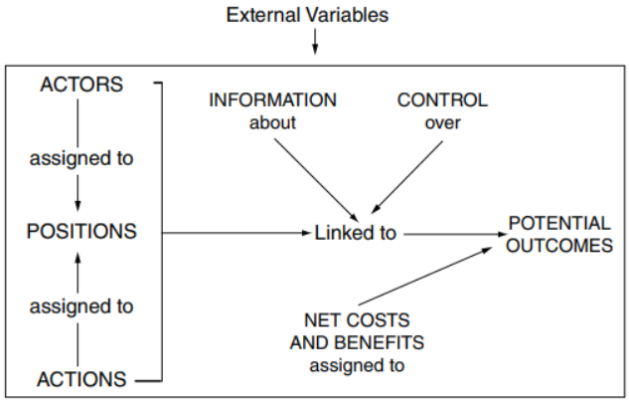


Figure 5 The internal structure of an action situation (Ostrom, 2010)

Participants in an action situation are actors who make decisions assigned to a **position** (or role in the action situation). They are capable of choosing **actions** from a set of options in a decision process. **Potential outcomes** are the product of joint decisions made by all participants. How the outcomes are reached by decisions made by participants are **action-outcome linkages**. **Control** component is concerned with the influence of participants over the linkages of the actions to outcomes. It varies from absolute to almost none. The **cost** of the actions and **benefits** of the outcomes are assumed to be considered by participants when choosing an action. **Information** about an action situation may be completely or partially known by the participants.

We will use traditional market transaction as an example. A man who tries to buy fruit in a traditional market is the **participant** who is assigned to **position** of buyer. Naturally, there will be a seller too. The buyer may choose to negotiate the price or buy it at the specified price without any negotiation and the seller may provide a counteroffer, accept the offer, or refuse to negotiate. This set of options are their possible **actions**. **Potential outcomes** from this traditional market transaction action situation are transacting at full price, transacting at a negotiated price, and no transaction.

Action situation rules may be changed by the results of process in another action situation or at higher levels such as policies (or collective choices) that in turn are also influenced by constitutional action situations. Back to our example, the capital needed to procure the fruits is set in another action situation, negotiation actions might be allowed through policy, and the policy process used to create those rules is set by the constitutional action situation. Network of Adjacent Action Situation (NAAS) intends to capture the interactions between action situations and incorporate the actors' range of options.

2.4.2 Network of Adjacent Action Situations

McGinnis (2011) argued that the working components of an action situation can be viewed as the outcomes of processes occurring in adjacent action situations, thus called as an Network of Adjacent Action Situation (NAAS). An action situation is counted as adjacent to the other action situation if the outcome of the action situation directly affects the variables or components of the other action situation (Kimmich, 2013; McGinnis, 2011).

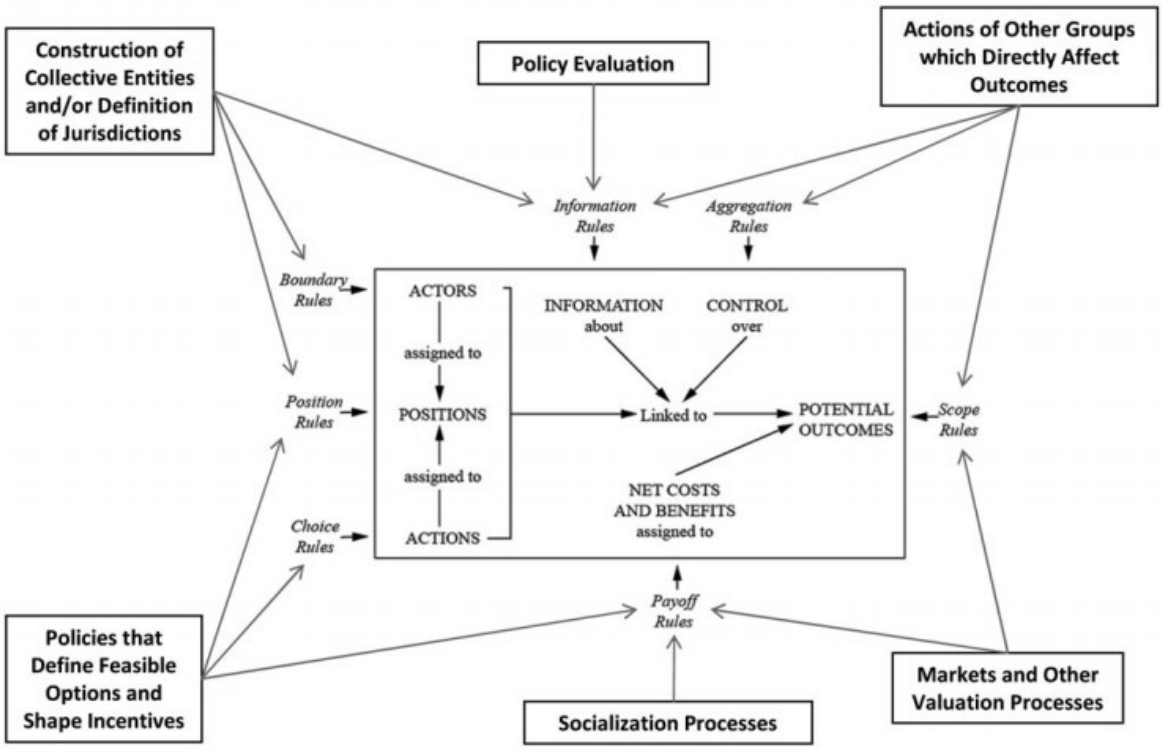


Figure 6 Action situation adjacent to a focal action situation (McGinnis, 2011)

Figure 6 illustrates how adjacent action situations can influence the focal action situation Functional connections are represented by links between different action situations. The same participants may participate in various action situations that can influence the value of other action situations' variables.

2.4.3 Action situation identification method

The identification and analysis of action situation networks and links require in-depth studies of the patterns of each situation (Kimmich, 2013). However, there is no established, systematic method yet to empirically identify adjacency or types of links and their effects on a core action situation.

McGinnis (2011) proposed generic tasks within polycentric governance to identify action-situation networks in a systematic procedure., such as (1) production, (2) provision, (3) financing, (4) consumption, (5) coordination, (6) dispute resolution, (7) rulemaking, (8) monitoring, (9) constructing collective entities, and (10) internalizing norms (socialization and education).

We choose the following action situation boundaries with reference to key activities in sanitation. We use framework developed by Mason et al (2020) to map service delivery functions across decentralized governance systems. They divided service delivery functions to five categories, as follow:

- **Policy** covering policies, plans and standards for sanitation software and hardware.
- **Regulation** involving monitoring, enforcement and incentive systems to ensure the delivery of policy objectives.
- **Financing** for infrastructure, operations and maintenance, and promotion (on-site and sewerage).
- **Provision** to ensure services are produced such as procurement, asset management, coordination, monitoring and evaluation.
- **Production** refers to the physical structure of the service delivery such as construction/operation of containment, conveyance, treatment infrastructure and mobilizing demand.

2.5 Recap

Sanitation ideally protects society and the environment from the excessive load of human wastewater pollution. It benefits humans by maintain healthy ecosystems. This thesis research cover containment storage/treatment, conveyance – emptying/transport, and treatment phase.

Water and sanitation governance recognizes the complexity of regulatory processes and their interaction. State of balance between formal and informal institutions and diversity of governance modes of hierarchies, market, or networks can determine governance adaptivity. Structural characteristics can determine governance resilience. We further discuss governance elements such as role, rules, and relations within sanitation systems in Indonesia.

Many developing countries have decentralized their sanitation service provision tasks. It has brought about sanitation governance challenge. Without a proper framework, sanitation governance has become simultaneously fragmented and overlapping. Also, planning is not always followed by implementation as public demand is low and planning is rather seen as a checklist instead of a process needed to ensure long-term strategic delivery.

Decentralization and privatization institutional reforms have created polycentric governance. We require analytical descriptive research to depict the reality of existing sanitation governance since “Governments often fall into “capability traps” by complying with fixed agendas of what is considered best practice (“what they look like”) with little or no improvements in “what they do” (Ekane et al, 2020 pg 347).”

McGinnis provides useful tools to contextualize sanitation service provision as reviewed in this chapter. The NAAS framework offers the capability to study the influence between action situations. To identify key activities, the sanitation service delivery function proposed by Mason et al (2020) is used. Action situations will be constructed using the seven component variables by Ostrom (2005).

.

3 Research Methodology

This chapter starts by restating the main research question and additional research questions to encapsulate the issues that were raised in the previous sections. The research methods used to answer RQ2-RQ5 are presented. A research flow diagram summarizing the research steps is displayed.

3.1 Research question

The main research question for this study is:

1. "How do the interactions among various actors influence sanitation service provision in Jakarta?"

These following questions are steps to get us to the main research question.

i. How is sanitation governance explained from a theoretical perspective?
ii. What does the formal institutional arrangement for sanitation governance in Indonesia look like?
iii. Who are the main actors and what are the functions they serve in Jakarta's sanitation service provision?
iv. How do these actors and their functions interact in Jakarta's sanitation service provision?
v. What recommendations can be made to improve the coordination of sanitation service provision in Jakarta?

3.2 Research method

Various research methods were implemented in this thesis to address to the research question. These methods are limited to online instruments because of the COVID-19 pandemic situation and researcher's academic timeline. This limitation importantly results in a low number of interviews. The impact of this limitation is discussed on section 8.1.

1. *How is sanitation governance explained from a theoretical perspective?*

A literature review is conducted (see chapter 2) to discuss water and sanitation governance related theories, the perspective of decentralization in governance, and polycentric governance. Additionally, the NAAS framework is introduced as a lens for understanding the WASH governance system.

2. *What does the formal institutional arrangement for sanitation governance in Indonesia look like?*

A desk study and two preliminary interviews are conducted to gain an understanding of Indonesia's sanitation institution. We interview two Indonesian experts that have done their master research on Indonesian sector to complement data collected from desk study. Open structured interviews were conducted, and reference documents were retrieved. This research step explains the constitutions and policies, that exist in Indonesia. Typical stakeholder arrangement in Indonesia is explained. The discussions served as a foundation for exploring the specific situation in Jakarta.

3. *Who are the main actors and what are the functions they serve in Jakarta's sanitation service provision?*

Actors in Jakarta's sanitation sector development are listed and mapped against sanitation delivery service function to create a comprehensive map of actor. It is developed through

analyzing findings from the previous research question and additional desk studies. The map was validated by an expert on sanitation in Jakarta.

4. *How do these actors and their functions interact in Jakarta's sanitation service provision?*

To gain an understanding of how interactions occur, A NAAS of Jakarta's sanitation is generated. NAAS was initially designed using the actors map created in the third research sub-question, and then improved iteratively through semi-structured interviews with WASH expert in Jakarta and Indonesia, and grey literatures on Jakarta's sanitation development. Component variables explained in Section 2.4 were used to design the interview questions. The interview procedure can be found in Appendix B. Interview. Interview contacts were collected through a snowball method. Six interviews were successfully conducted. These were experts that had experience working within organization identified in the previous research question. All of them has or had decision making power within the organization.

Ten interviews had been planned to be conducted with key stakeholders related to sanitation in Jakarta. This plan was compromised because of the lack of entry points (low number of initial available contact) and difficulties in contacting and makings appointment with potential interviews. Lack of entry points caused slow rapport building and thus, low level of commitment to making appointment. Contact and appointment difficulties were caused by time differences and interviewees' busy schedule. A few interview appointments were postponed.

Complementing the interviews, we analyzed four documents related to sanitation service provision in Jakarta or institutional sanitation arrangements in Indonesia. These four documents were collected through an online search or through recommendations by interviewees. Similarly, we look for documents that contained information related to the action situation components.

To prepare the interview data for qualitative analysis, interviews in Indonesian were transcribed and translated into English. Data collected from interview and literature were processed into matrix of sanitation service delivery function and component variables (see Appendix D. Action situation component variables).

5. *What recommendations can be made to improve coordination of sanitation service provision?*

Results from Research Question 4 are discussed and analyzed. Recommendations are made on how Indonesian governments can do to improve coordination among stakeholders based on the findings of the NAAS.

3.3 Recap – research flow diagram

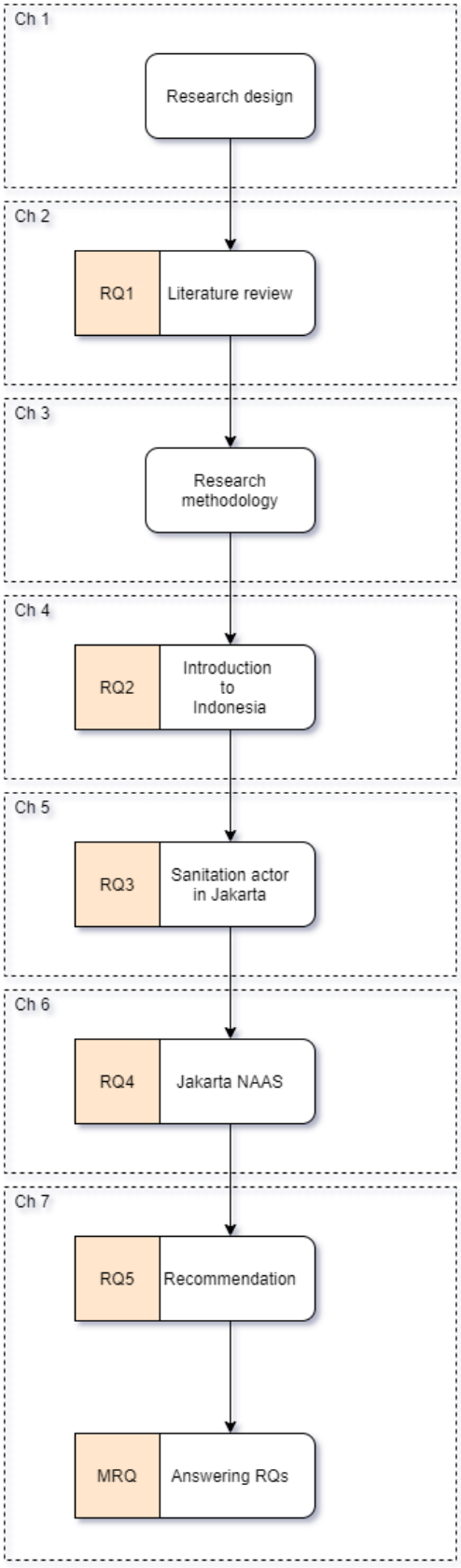


Figure 7 Research flow diagram

4 Introduction to sanitation governance in Indonesia

This chapter presents the background information of Indonesia to help us to understand Jakarta stakeholders' arrangements in the upcoming chapter. We discuss relevant institutions for sanitation service provision and nested stakeholders in Indonesia's sanitation governance. It answers RQ2: "What does the formal institutional arrangement for sanitation governance in Indonesia look like?". Findings serve as boundary for actor identification in Jakarta case study.

4.1 Institutional overview of Indonesia

To give the overview of sanitation institution in Indonesia, we describe the formal laws and regulations in place, and also relevant policy agenda. The laws and regulations highlight the significance of sanitation in the constitution. The policy agendas highlight the direction of sanitation services development in practice. Understanding sanitation governance in Indonesia requires us to know the existing rules. This section provides an overview of the existing regulations and policies.

4.1.1 National sanitation laws and regulations

Officially, the significance of sanitation is represented in key laws and regulations. Sanitation access is principally addressed in the Constitution of Indonesia (*UUD RI 1945*) article 28 which regulates citizen's rights. Water resource is started to be regulated in 1974 through Law 11/1974 about watering. The law replaced by Law 7/2004 and later by Law 17/2019 about water resource. Sanitation aspect has not been integrated within the water resource law (Nalle & Syaputri, 2019).

In practice, the absence of national sanitation law appear to cause the low number of sanitation regulation in cities/regencies (Nalle & Syaputri, 2019). There is no national regulation on the technical minimum service standards for wastewater services (Al'Afghani et al., 2019). Only 34 out of 541 regencies/cities (onwards will be referred as district/local) have sanitation regulation in place in 2019 (Nalle & Syaputri, 2019). It signifies a huge gap in sanitation regulation on regency/city level despite several regulations that exist on the national level which will be explained subsequently.

In administrative decentralization aspect, Indonesia is moderately devolved. Local governments of cities and regencies are tasked with service provision since 2001 under Indonesia regional autonomy laws (Abeysuriya et al., 2019). Service provision responsibility and authority is further divided in detail by Law 23/2014 about local government (*UU 23/2014*). Sanitation sector development is led by district government with support from national and provincial government (Mason et al., 2020). The policy agenda still often being set on the national level. Law of local government put district government, the lowest level of autonomous government, in high importance for making decisions in sanitation sector improvement.

Indonesia is highly decentralized in political form. District Parliament (DPRD) in provincial level and district level is assigned by political factions supported by the citizens. Governor and district mayor (*bupati/ walikota*) are chosen directly by the citizens in respective administrative boundary. District mayors have power over sector prioritization, including sanitation development and allocated budget.

On financial aspects, district government receive budget allocation from national revenue with limited borrowing and revenue raising powers (Mason et al., 2020). Since presidential decree 185/2014 (*Perpres 185/2014*) about acceleration in provision of water supply and sanitation, district governments have access to national financial support regarding water and sanitation development. Special allocation budget (*DAK*) for water and sanitation is provided by the national government. The given grant can be matched up to 10 times local government

allocation budget to water and sanitation sector (World Bank Group, 2015). However, only a limited number of items can be financed.

Water in Indonesia has been recognized as a natural resource and important environmental component that must be protected. It is illustrated since Government regulation 82/2001 that regulate water quality management and water pollution control (*PP 82/2001*). Domestic wastewater effluent standard is further regulated by Decree of Ministry of Environment and Forestry 68/2016 (*PermenLHK 68/2016*).

Domestic wastewater system development is further regulated under minimum service standard regulation (*PP 2/2018*) in one of the six developing sectors, coupled with drinking water service provision. Previously, sanitation services were not included in Law 25/2009 on minimum service standard regulation. Because of this decision, local government is officially involved in sanitation service provision arena. Ministerial Decree of Public Works and Housing about Domestic wastewater management system guideline (*PermenPU 4/2017*) was published to help the regional government. The decree provides information and possible actions in hope to aid the local government.

Table 1 summarized mentioned law previously and it is arranged from the general scope (top of the table) to a specific scope (bottom of the table).

Table 1 Summary of Indonesia sanitation law and regulation (up: general – down: technical/specific)

Category	Indonesian regulation		
Constitution	UUD RI 1945 Article 28H		
UU (Law)	Law 23/2014 local government	Law 17/2019 water resource	
PP (Government Regulation)	Gov reg. 82/2001 water quality management and water pollution control	Gov reg. 2/2018 minimum service standard	
Presidential Decree	Presidential regulation 185/2014 acceleration in provision of water supply and sanitation		
Ministerial Decree	Ministerial Decree of Public Works and Housing. 4/2017 domestic wastewater management system	Ministerial Decree of Health 3/2014 community based total sanitation	Ministerial Decree of Environment and Forestry. 68/2016 domestic wastewater standard
Subnational regulation (example)	Prov reg. Banten 3/2019 about regional wastewater pollution management and control		
	District reg. Yogyakarta City 7/2009 about wastewater management retribution	District reg. Bekasi City 5/2018 about wastewater management	

In Jakarta, Governor of DKI Jakarta has published decree of domestic wastewater management in 2005 (*Pergub DKI Jakarta 122/2005*). The decree is promulgated based on concern of increasing urban activity that leads to soil and groundwater quality contamination. This decree puts Jakarta provincial government as one of the earliest subnational governments who have legal ground in sanitation service provision.

4.1.2 National sanitation policies

Policy in Indonesia generally comes from the national stakeholders. Six policies related to sanitation are explained.

Product from the policy level action arena

National Medium Term Development Plan (RPJMN)

Sanitation role has been prioritized in National Medium Term Development Plan (RPJMN) since 2009 (Abeysuriya et al., 2019; Pokja AMPL Nasional, n.d.-b). The latest RPJMN, RPJMN 2020 – 2024, has acknowledged several challenges and issues surroundings basic settlement services provision such as (1) low capability of the local government, the management, and institutional agencies for development, (2) suboptimal policy implementation performance, (3) low citizen's demand in safely managed sanitation access. The RPJMN then become guideline for cities/regencies to develop their development plan, resulting in Regional Medium Term Development Plan (RPJMD).

Community-Based Total Sanitation (STBM)

In the rural area, STBM is the spearhead policy of WASH development sector. STBM has five pillars, consisting of (1) open defecation free (ODF) meanings no open defecation practice, (2) safe handwashing behavior, (3) healthy food and beverage, (4) safe domestic solid waste management, and (5) safe domestic wastewater treatment. Due to this extensive approach, sanitation uptake in rural area is better compared to the urban area (World Bank Group, 2015).

STBM is inspired by Community Led Total Sanitation (CLTS) since 2004 to empower the community in rural area to meet their sanitation needs (Engel & Susilo, 2014). It is initiated by Ministry of Health whereas the local government mainly provide technical training in the field (Susilo & Vidyattama, 2020). The program is mostly successful for village with high initial social capital while effect on villages with low initial social capital works counterproductively (Cameron et al., 2019).

Community-Based Sanitation (Sanimas)

Indonesia's government have tried community-based water and sanitation service model since late 90s, and it has been implemented nationwide starting 2003-2004 (Al'Afghani et al., 2019). It reached 25.000 community-based systems being built, including urban areas, in Indonesia. It is criticized for potentially putting excessive burden on communities and undermine the local government engagement.

Accelerated Sanitation Development for Human Settlement (PPSP)

Accelerated Sanitation Development for Human Settlement (*PPSP*) is a national program to promote comprehensive sanitation development planning for every cities/regencies through several steps (Pokja AMPL Nasional, n.d.-a). City Sanitation Strategy (*SSK*) is the main planning document to guide the sanitation program implementation. SSK has been developed in 414 city/regency until 2020 (Bappenas, 2019). While it is expected to increase safely managed sanitation coverage, significant progress was not seen in those cities/regencies (Bappenas, 2019).

A city without slum (Kotaku) and Climate friendly village program (Proklim)

Additionally, a couple programs indirectly related to sanitation such as Kotaku (A city without slum) which aim to improve urban slums situation and Proklim (Climate friendly village program) aim to improve village resilience against global warming were also raised by national ministries.

Kotaku (Kota tanpa Kumuh) is a strategic program conducted by Directorate General *Cipta Karya* under Ministry of Public Works and Housing to improve urban slums condition. Kotaku covers seven aspects of slum area: (1) building condition, (2) neighborhood road condition, (3) water supply condition, (4) drainage environment, (5) wastewater management condition, (6) solid waste management condition, and (7) fire protection condition (Kementerian PUPR, n.d.). Additionally, Kotaku also concerns public open space availability.

Table 2 Summary of sanitation development program in Indonesia adapted from Apriadi (Inpress)

Program	Description	Institution
Community – based – Sanitation (Sanimas)	• Community-based wastewater treatment plant provision program • Funding scenarios: regular, USRI, IsDB, DAK	Ministry of Public Work and Housing
Community-based total sanitation (STBM)	• Annual activity related to healthy and clean behavior through community	Ministry of Health
A city without slum (slum-free-city) – KOTAKU	• Infrastructure development and social and economic assistance for better Community livelihood sustainability in slum location • Scope of the program: basic services	Ministry of Public Works and Housing with local government
Climate-friendly-village-Program (Proklim)	• Increase the involvement of the community and another stakeholder to strengthen the capacity of adaptation to the impacts of climate change and GHG emission reduction • Scope of Program: adaptation and mitigation to several aspects, including wastewater management • Executed on grassroots levels (community level to village/sub-district level)	Ministry of Environmental and Forestry
Accelerated Sanitation Development for Human Settlement (PPSP)	• Sanitation development program on a national scale • Targets: free open defecation, reducing waste generation and implementing environmental-friendly waste management, and reducing water ponding/flooding.	Coordinator: Sanitation National Working Group (POKJA Sanitasi)

National policy mainly comes from Ministry of Public Works and Housing, Ministry of Health, Ministry of Environment and Forestry, and Sanitation National Working Group. Beside Sanitation National Working Group, these three ministries are the most active ministries in sanitation development sector.

4.2 Indonesia sanitation formal stakeholders

Sanitation service provision is delegated by the national government into the subnational government (PP 2/2018, 2018). It is up to the province and district government on the task distribution. Although sanitation services are commonly provided by district government, a few provincial government hold more initiatives in sanitation service provision such as North Sumatra Province that mainly serve Medan city (Ermiza, 2018), Bali provincial government that covers Denpasar, Sanur, and Kuta area (Abfertiawan, 2019), and Jakarta Capital City

which cover the whole province (PERGUB Prov. DKI Jakarta No. 41 Tahun 2016 tentang Rencana Induk Pengembangan Prasarana dan Sarana Pengelolaan Air Limbah Domestik, 2016).

Figure 8 illustrates general arrangement of executive organizations in Indonesia. Typical stakeholders related to sanitation sector development are described by three levels of autonomous government in Indonesia: national level, provincial level, and district level. On the following parts, we will refer provincial level and district level as subnational level.

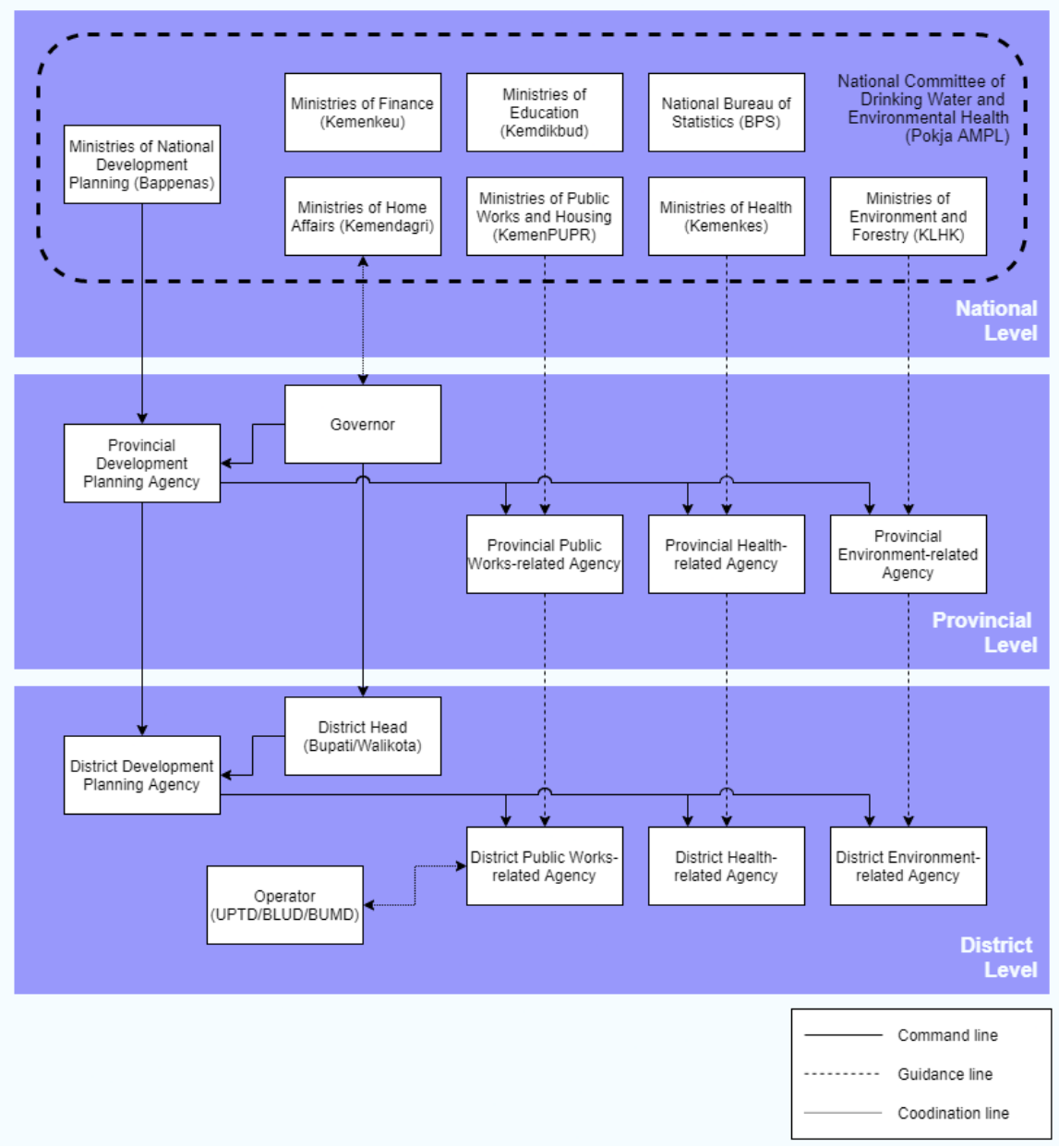


Figure 8 Indonesian typical sanitation stakeholder arrangement

4.2.1 National stakeholders

National Steering Committee for Drinking Water and Environmental Health (*Pokja AMPL*) is a working group across ministries dedicated to improving water and sanitation coverage (Pokja AMPL Nasional, n.d.-c). There are six working fields in *Pokja AMPL*: (1) policy socialization and advocacy field, (2) water supply technical field, (3) sanitation technical field, (4) institutional, partnerships, and empowerment of community field, (5) funding field, and (6)

monitoring and evaluation field. It is led by National Planning Agency (Bappenas) and staffed by different ministries official, such as

- Ministries of National Development Planning (*Bappenas*),
- Ministries of Public Works and Housing (*KemenPUPR*),
- Ministries of Home Affairs (*Kemendagri*),
- Ministries of Health (*Kemenkes*),
- Ministries of Finance (*Kemenkeu*),
- Ministries of Environment and Forestry (*KLHK*),
- Ministries of Education (*Kemendikbud*), and
- National Bureau of Statistics (*BPS*).

Ministries of National Development Planning (*Bappenas*): *Bappenas* is tasked to develop national development policies, control and evaluate the implementation, and providing general orientation for various sectors, levels, and regions in Indonesia (Bappenas, n.d.). National Medium Term (five-year period) Development Planning is created through this ministry. Sanitation development policy lies under the purview of Directorate Urban, Housing, and Settlements within the ministry.

Ministries of Public Works and Housing (*Kementerian PUPR*): Sanitation section is housed under *Cipta Karya* Directorate Group as one of the directorates (Kementerian PUPR, 2020). They concern the national provision of sanitation service infrastructures. Their main task is to make national sanitation policy from a technical perspective, to build the technical capacity of the lowered level governments, and to supervise target realization of the lowered level governments.

Ministries of Environment and Forestry (*KLHK*) is represented by directorate of water pollution control. Their goal is to preserve water body quality. To achieve the goal, they are tasked with prevention and mitigation of water pollution, and water quality recovery (Kementerian Lingkungan Hidup dan Kehutanan, 2016). It encompassed regulation of water quality standard, water body (river, lake, and groundwater) quality inventory, and wastewater pollution load reduction from domestic source, industry source, and non-point source.

Ministries of Home Affair (*Kemendagri*): Directorate Group of Regional Development (*Direktorat Pembangunan Daerah*) carries out the main task related to improving sanitation institutional framework. They concern with improving institutional framework on the subnational government level (Kemendagri, n.d.). It covers facilitation, coordination, monitoring, and technical guidance.

Ministries of Health (Kemenkes) is represented by directorate group of public health. In regards to sanitation, sanitation behavior is the main concern (*Kementerian Kesehatan Republik Indonesia*, n.d.). Most of their program aims to reduce open defecation practice and reach open defecation free (ODF) situation.

4.2.2 Subnational stakeholders

Regional executive leader. Every province is led by a governor (*gubernur*). Every district is led by a district mayor (*walikota/bupati*). Regional executive leaders lead the policies implementation based on policy and regulation stipulated with the district parliaments. Governor and district mayor, mostly, are chosen directly by the citizens in respective administrative boundary. District is the lowest level of autonomous government. The Governor monitors and evaluates district development. They are also obliged to report on provincial development to related ministries.

While national ministries set the tone for the policy, the work of implementation often lies with the subnational executive agencies. Below, supporting executive agencies who implement policies are discussed.

Regional Development Planning Agency (*Badan Perencanaan Pembangunan Daerah*). Regional development planning agency is tasked with coordinating development plan across sectors within the administrative boundary (PP 41/2007 tentang Organisasi Perangkat Daerah). Annual budget request by each agency is compiled by this agency. It later passed through regional district parliament.

Executive agency (*Dinas*) tasked with improving sanitation sectors in principle is related to (1) public works, (2) health, and (3) environment (Mason et al., 2020). These three agencies correspondent with Ministry of Public Works and Housing, Ministry of Health, and Ministry of Environment and Forestry.

Public works-related agency/ Regulator. Public works related agency is usually concerned with sanitation infrastructure such as house connection, sewerage, sludge treatment plant, and wastewater treatment plant. It is often called as regulator as the agency often manage and regulate the task of service provision that will be carried out by the operator agency.

Health-related agency. This agency is mainly concerned with sanitation behavior such as open defecation and handwashing.

Environment-related agency. This agency is concerned with environment quality, in particular water body quality. The organization carried out monitoring task of effluent produced by wastewater treatment plant.

The same task can lies under the purview of different agencies in different provinces/districts. For example, the task of constructing sanitation infrastructure (public works related) in Banten Province and South Sulawesi falls under Public Works and Spatial Planning Agency (*Dinas Pekerjaan Umum dan Penataan Ruang*), while in Jakarta Province and West Java, it falls under Water Resource Agency. This also happens on the district level, in Medan the task falls under Housing and Settlement Agency (*Dinas Perumahan dan Permukiman*) while in Semarang, it falls under Spatial Planning and Housing Agency (*Dinas Tata Kota dan Perumahan*).

Technical agencies/ Operator. In Indonesia, the agencies involved in sanitation provision sector are commonly categorized as (1) operator and (2) regulator. The operator usually entails technical agencies that mainly tasked to provide public goods. The regulator on the other hand refers to the executive agencies that plan, regulate, and manage the operator.

Operator is preferably characterized in one of the three types: (1) Local Technical Implementation Unit (*UPTD*), (2) Local Public Service Agency (*BLUD*), and (3) Local Owned Enterprise (*BUMD*), that mainly tasked to provide public goods (Gumilangsari, 2020). These three differ in financial authority and decision-making autonomy. Sanitation sector is sometimes incorporated in water supply municipal company (*PDAM*). Out of 541 districts, 113 have designated operators related to domestic wastewater service management (Bappenas, 2019).

4.3 Recap

This chapter lays out the formal institutional arrangements in Indonesia and introduces us to national and subnational sanitation stakeholders. Indonesia currently does not have a single accepted sanitation law. Sanitation service provision is mandated to the subnational government through public goods and services regulation.

Policy in Indonesia largely comes from the national stakeholders, namely (1) Ministry of Public Works and Housing, (2) Ministry of Health, (3) Ministry of Environment and Forestry, and Sanitation National Working Group. In addition to these three ministries, there are two additional active ministries in the national level: Ministries of National Development Planning, who is concerned with development across sectors including sanitation sector, and Ministries of Internal Affairs, who is tasked to develop institutional capacity of subnational government.

In the subnational levels, executive agencies who carried out task related to sanitation are related to (1) public works function, (2) health function, and (3) environmental function. Different provinces/districts may have different agencies. It is desired for subnational government to have distinguished and dedicated technical operator towards sanitation service provision instead of provided by executive agencies.

With knowledge gained in this chapter, we delve deeper into our case study. The next chapter presents actors and their functions on the Jakarta level where sanitation services are largely provided.

5 Getting to know sanitation actors in Jakarta

This chapter introduces the actors involved in the Jakarta sanitation system and sets the foundation for the following NAAS chapters. We identify actors based on reference to the subnational stakeholders in the previous chapter. By doing so, it aims to answer RQ3: "Who are the main actors and what are the functions they serve in Jakarta's sanitation service provision?". Stakeholder involved specifically in Jakarta, the subnational government, are fleshed out. The sanitation governance situation in Jakarta is discussed according to the actors involved and the sanitation delivery function.

5.1 Actors involved in provision of sanitation services in DKI Jakarta

Jakarta as Indonesia's capital is inhabited by 10.56 million people as measured in September 2020 (BPS Provinsi DKI Jakarta, 2021). Due to its status as the capital, Jakarta has a special autonomy. Its district mayor (*walikota/bupati*) is appointed by the governor upon DKIJ District Parliament (*DPRD DKI Jakarta*) consideration (Muhtada, 2016). Compared to other provinces where district mayors are chosen by citizens, this unique method of district mayor appointment would naturally put strong influence power on Jakarta's governor.

We use subnational stakeholders' description in section 4.2.2 and findings by Trieputra (2015) to identify the involved actors. Figure 9 shows actors involved with provision of sanitation services in Jakarta. It also presents the formal relation within sanitation actors in Jakarta metropolitan city. Different actors are shown in boxes whereas the links between the different actors display their relationship.

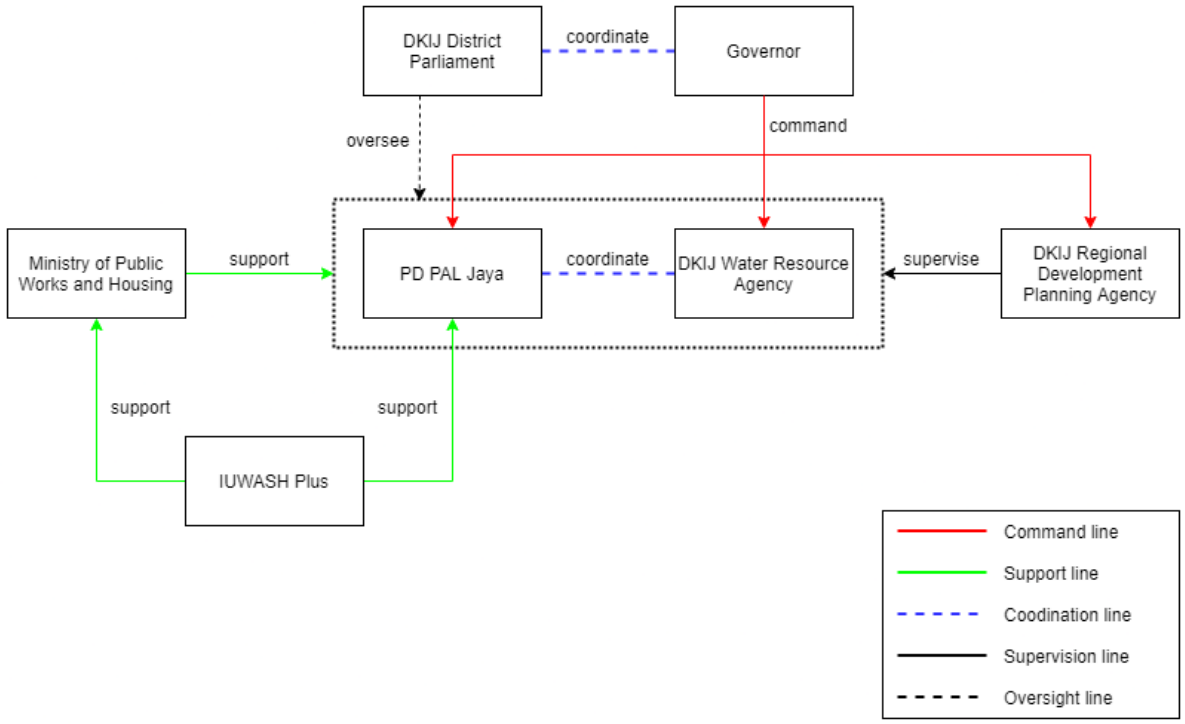


Figure 9 Formal chart for the sanitation of Jakarta (adapted from Trieputra (2015))

Stakeholders involved in Jakarta's sanitation system

Governor. The governor of DKI Jakarta is the leader of the executive body on the provincial level. He/she is chosen every five years through public election. Since 2014, the governor of DKI Jakarta is accompanied by the Governor Advisory Team (*TGUPP*) (Dewati et al., 2017).

The function of Governor Advisory Team slightly varies and its size changes as governor turnover takes place.

DKIJ Regional Development Planning Agency (*Bappeda DKI Jakarta*). This organization is the provincial executive agency corresponding to the role of Ministry of National Development Planning role on a national level. They are in charge to plan long-term and medium-term developments for DKI Jakarta. The produced plan serves as the central guidance for every other executive agency in Jakarta to plan their own program in respective sector.

DKIJ Water Resource Agency (DSDA DKI Jakarta). Formerly known as DKIJ Water Management Agency (*Dinas Tata Air DKIJ*), the DKIJ Water Resource Agency in Jakarta works in water related sectors such as water supply, storm water, surface and ground water and wastewater as well as fecal sludge.

Initially, the DKIJ Water Management Agency who was appointed by the DKIJ Governor to improve sanitation access within the administrative boundary (PERGUB Prov. DKI Jakarta No. 41 Tahun 2016 tentang Rencana Induk Pengembangan Prasarana dan Sarana Pengelolaan Air Limbah Domestik, 2016). This major task transferred to DKIJ Water Resource Agency along with the organization reform later in 2016.

PD PAL JAYA. It is the public owned enterprise (*BUMD*) responsible to operate fecal sludge treatment plants and to provide sanitation services in Jakarta. The service includes sewer-based, on-site management, and regular desludging service. PD PAL Jaya was firstly created as a government body to handle specifically sewerage constructed in Central Jakarta (surrounding Setiabudi and Tebet). It later became a public owned enterprise in 1991 (World Bank Group, 1993).

DKIJ Environmental Agency (DLH DKI Jakarta). The agency is the executive body of government affairs in the field of environment. Their work is divided into four major categories, namely air pollution control, water pollution control, solid waste management, and environmental activity compliance supervision (DLH DKI Jakarta, n.d.-b). Related to sanitation, DKIJ Environmental Agency is concerned with water pollution control.

DKIJ District Parliament (DPRD DKI Jakarta). This organization is the provincial legislative body that is in charge of passing provincial law. The district parliament is additionally responsible to monitor the regional spending budget. They have the power to allow or reject programs proposed by the provincial government, including sanitation related programs (Trieputra, 2017).

IUWASH Plus. Funded by US AID, this program is involved with PD PAL Jaya through staff training, marketing surveys, and by promoting regular desludging service concepts.

Ministry of Public Works and Housing. Due to its special autonomy status, the Ministry of Public Works and Housing is more involved in the Jakarta sanitation service provision. Currently, Ministry of Public Works and Housing together with DKIJ Water Resource Agency focus on reaching wastewater treatment plant (WWTP) milestone in regard to NCICD and existing master plan(Trieputra, 2017).

5.2 Actors who influence provision of sanitation services in DKI Jakarta

In this section, we incorporate both national level of stakeholders and Jakarta level of stakeholders. Since policy is largely started at the national level and constitution also made in the national level, we argue that national stakeholders hold a certain of power to influence the lower level of governments.

Table 3 map actors involved on the Jakarta level as mentioned in section 5.1 and actors involved on the national level as mentioned in section 4.2.1, according to the following scope proposed by Mason et al. (2020):

- **Policy:** covering policies, plans and standards for sanitation software and hardware.
- **Regulation:** involves monitoring, enforcement and incentive systems to ensure delivery of policy objectives.
- **Financing** for infrastructure, operations and maintenance, and promotion (on-site and sewerage)
- **Provision** to ensure service is produced such as procurement, asset management, coordination, monitoring and evaluation.
- **Production** refers to the physical structure of the service delivery such as construction/operation of containment, conveyance, treatment infrastructure and mobilizing demand.

We interview two Indonesian experts that have done their master research on Indonesian sector to complement data collected from desk study. Open structured interviews were conducted, and reference documents were retrieved. We include households as the main beneficiaries of the sanitation service provision.

We categorize actors based on policy function and government level to help us distinguish which actors important in which key activity. On the Jakarta level, the Water Resource Agency is the most involved agency in the Jakarta sanitation service provision. This is to be expected due to their official status as the main regulator in Jakarta.

In the policy aspect, the work of the Water Resource Agency is accompanied by the governor and his/her advisory team, the DKIJ Regional Development Planning Agency, and the DKIJ District Parliament. Although theoretically, the District Parliament is responsible for setting the boundaries of sanitation service provision and legal binding force. Governor Decree promulgated by the governor is prohibited to punish violator.

In the regulation aspect, the governor has the option to set effluent quality standards as long as it does not violate the standards set by the national level. In 2005, the governor of DKI Jakarta published domestic wastewater management regulation including effluent quality standard (Pergub 122/2005). The DKIJ Environmental Agency is tasked with the monitoring of wastewater effluent and water body quality. Wastewater producers are obligated to report their self-monitoring every month and send treated wastewater to be tested by the DKIJ Environmental Agency every three months. DKIJ Water Resource Agency is tasked to monitor PD PAL Jaya's performance.

In the financing aspect, there are two budgets of concern: PD PAL Jaya's budget and Provincial budget. PD PAL Jaya's income is determined by the number of customers using their service (number of connection and desludging service), and the type of customers (household or business). PD PAL Jaya is obligated to send 40% of their profit to the provincial budget (JICA, 2012). The provincial budget is planned annually. Every year the DKIJ Water Resource Agency and other executive agencies make budget proposals. The DKIJ Regional Development Planning Agency is tasked to compile provincial budgets proposal according to governor's priority instruction. DKIJ District Parliament approval is needed to give clearance. Provincial budget can be used to aid PD PAL Jaya through regional investment budget (*penyertaan modal daerah*).

In the provision aspect, DKIJ Water Resource Agency is supposed to coordinate with PD PAL Jaya and execute the plan to develop wastewater management. PD PAL Jaya may procure

vacuum trucks, expand sewerage system, and partnering with private sector for providing desludging services.

In the production aspect, PD PAL Jaya operates the sewerage system, desludging service, and septage treatment plant operation. Households become the counterpart of PD PAL Jaya in terms of the service consumption. They increase service demand by having regular desludging services or on-call desludging services, connecting the household wastewater outlet to sewerage, and installing septic tanks.

On the national level, the actors listed are part of the national sanitation working group (refer to Section 4.2.1). In the policy aspect, Ministry of Public Works and Housing is involved by giving technical guidance while the Ministry of National Development Planning is the general coordinator of sanitation development. In the regulation aspect, the Ministry of Environment and Forestry is responsible to monitor and preserve the overall environmental quality. The Ministry of Public Works and Housing is involved in monitoring sanitation access progress done by DKI Jakarta government. In the financing aspect, the sanitation investment budget mainly goes through the Ministry of Public Works and Housing while the Ministry of Finance determines the budget envelope (Mason et al., 2020). In the provision aspect, the Ministry of Internal Affairs is supposed to develop and improve institutional capacity on the subnational level. On the national level, Ministry of Public Works and Housing is the most involved actor in the Jakarta sanitation sector.

For the next chapter, we will use service delivery function category as action situation boundary. Additionally, we divide the action situation that happen in Jakarta according to stakeholder level: Jakarta level, and national level. Production and provision functions are merged to simplify the diagram and because the closeness of the two functions.

Table 3 Actor mapping in Jakarta sanitation sector according to sanitation service delivery function

Actor	Primary role/motivation	Policy	Regulation	Financing	Provision	Production
Jakarta level						
Governor of Jakarta	Executive leader of Jakarta province	Approve master plan. [g]	Set effluent quality standard	Prioritize sector to have more budgets. Setting service tariff. [g]		
DKIJ Governor Advisory Board (TGUPP DKIJ)	Giving advice and input to strategic policy	Giving input to sanitation sector development				
DKIJ Planning Agency (Bappeda DKIJ)	Jakarta province development planner	Planning DKIJ development (economy, spatial planning, utilities, etc) [a]		Compile provincial budget proposal [a]		
DKIJ Water Resource Agency (DSDA DKIJ)	Main regulator of sanitation service. Also handles other water resource aspect	Plan wastewater management and development [c]	Monitoring subsidy given to PDPAL [c]	Arrange wastewater sector fund [c]	Implement wastewater management and development [c]	
PD PAL Jaya	Main operator of sanitation service			Propose service tariff that should be charged to customers	Procure vacuum trucks. [b] Partnering with private sector for desludging. [b]	Providing regular desludging service Providing decentralized wastewater management service Providing sewerage service [b]

Actor	Primary role/motivation	Policy	Regulation	Financing	Provision	Production
DKIJ Environmental Agency (DLH DKIJ)	Concerning environment quality		Effluent quality monitoring [a]			
DKIJ District Parliament (DPRD DKIJ)	Provincial legislative			Accept provincial budget proposal [e]		
National level						
Ministry of National Development Planning	National strategic development planner	Set provincial target. Determine national development priority. [h]				
Ministry of Internal Affairs	Carry out nation affairs related to internal affairs				Develop and improve institutional capacity on the subnational level (provincial level and regional level)	
Ministry of Finance	Carry out nation affairs related to nation finance			Provide special allocation budget [d]		
Ministry of Public Works and Housing	Carry out nation affairs related to public works and housing	Give guidance for wastewater treatment system Ex: setting wastewater treatment system guideline for cities/regencies [i]	Monitoring access progress done by DKIJ [e]	Financial aid in large infrastructure [e], such as Jakarta Sewerage Development Program (JSDP)		

Actor	Primary role/motivation	Policy	Regulation	Financing	Provision	Production
Ministry of Environment and Forestry	Carry out nation affairs related to environment and forestry		Setting safe domestic wastewater effluent standard [f]			
Non-formal stakeholders						
IUWASH Plus	Development partner				Giving technical and conceptual training [e]	
Household	Health beneficiaries			Pay service provided and septic tank construction		Connect to sewerage Have septic tank and use desludging service

a. (Gumilangsari, 2020)
b. (PD PAL Jaya, 2021)
c. (Dinas SDA Jakarta, n.d.)
d. (Peraturan Presiden Nomor 185 Tahun 2014 Tentang Percepatan Penyediaan Air Minum dan Sanitasi, 2014)
e. (Trieputra, 2017)
f. (PermenLH Nomor 68 Tahun 2016 Tentang Baku Mutu Air Limbah Domestik, n.d.)
g. (JICA, 2012)
h. (Bappenas, n.d.)
i. (Permen PUPR Nomor 04 Tahun 2017 Tentang Penyelenggaraan Sistem Pengelolaan Air Limbah Domestik, 2017)

5.3 Recap

We have mapped Jakarta actors, national actors, and non-formal actors, such as IUWASH and households according to service delivery functions as described by Mason et al (2020).

We found that PD PAL Jaya is the only actor responsible of the production function in the Jakarta sanitation service provision. On policy function, there are four actors involved, namely: Governor, Governor Advisory Team, DKIJ Regional Development Planning Agency, DKIJ Water Resource Agency. It is plausible that the expansion of sanitation services in Jakarta becomes dependent on these four actors. On the national level, Ministry of Public Works and Housing is the most involved stakeholder as they participated in most of the functions. Household actors are excluded from further discussion. We consider the actor type is too different compared to other actors.

In the next chapter, action situations will be made out of these service delivery functions and on two levels: Jakarta and national. We consider the national level actors relevant enough to influence Jakarta sanitation service system. Existing sanitation service is represented by provision and production aspects. We explore how policy, regulation, and financing influence the focal action situation, provision & production action situation.

6 Action situations for Jakarta's sanitation governance

This chapter presents the results from the application of the Network of Adjacent Action Situation (NAAS) framework. The analysis answers RQ4: "How do these actors and their functions interact in Jakarta sanitation service provision?" First, every action situation of our case study is described and then summarized into the NAAS framework.

6.1 Action situation in Jakarta sanitation

NAAS is an interconnected network of action situations. Understanding the actors involved (refer to Section 5.2), we can now begin analyzing action situation that influence Jakarta production and provision. An action situation (or sometimes called as policy arena) is a space when two or more actors produce results through a set of potential actions. An action situation is at the very least comprised of seven clusters of variables: (1) participants, (2) positions, (3) potential outcomes, (4) action-outcome linkage, (5) participant's control, (6) types of information generated, and (7) costs and benefits of the actions and outcomes (Ostrom, 2005; Polski & Ostrom, 1999). These seven components' variables allow us to systematically build action situation related to sanitation key activities in Jakarta.

The sanitation NAAS in Jakarta is derived from literature gathered related to the sanitation development of Indonesia and Jakarta, and six interviews conducted with representative actors (refer to Section 3.2). Table 4 shows which sources give information related to a certain action situation. The background information on interviewees can be found on Appendix B.2 and the document summary can be found on Appendix C. Document Summary.

Collected data is divided according to which topic they discuss and further fill in component variables listed by Ostrom (2005). We further refine and summarize component variables in each category based on sources into one table representing one action situation. The steps taken to create these action situations is elaborated on in Appendix D. Action situation component variables.

Table 4 Information checklist on sanitation NAAS

Source collection	National Policy	Jakarta policy	National regulation	Jakarta regulation	National financing	Jakarta financing
JICA, 2018		✓		✓	✓	
JICA, 2012	✓	✓	✓		✓	
PMU PPSP, 2020	✓				✓	
Bemaco Rekaprima, 2018		✓	✓			
Interview 1	✓	✓		✓	✓	✓
Interview 2		✓				✓
Interview 3		✓		✓		✓
Interview 4	✓					
Interview 5	✓					✓
Interview 6	✓					

In this chapter, a diagram of action situation is shown in a box. It consists of participants variables represented by circles, outcome variables represented by rectangles, and choice variables represented by arrows. We consider participants, choice, and outcome variables are

the most relevant to contextualize the action situation. Participants highlights who are the actors/players within the action situation, choice highlights what action can be chosen/played by the actors/players, and outcome highlights the product of the action situation (Ostrom, 2005). We acronymized action situation as 'AS' to reduce repetition.

6.1.1 National Policy action situation

In the National Policy AS, the making of national sanitation policy is the main activity (Figure 10). The national sanitation policy is set every five years. The produced national sanitation policy is incorporated into the national medium-term development plan (RPJMN) (*Interview 1*, personal communication, June 2, 2021, p. 1).

The latest plan, RPJMN 2020-2024, establishes a national sanitation indicator goal, which should be met within a five years period (end of 2024). This goal includes indicators such as the percentage of basic sanitation and safely managed sanitation, number of houses connected to sewerage, number of households served by decentralized wastewater treatment plant (WWTP), amount of city/regency that implement fecal sludge management (FSM), and percentage of open defecation free (ODF). RPJMN 2020-2024 prioritizes basic utilities infrastructure and urban infrastructure which both includes sanitation infrastructure (sewerage and sewage system). To meet the goal, RPJMN 2020-2024 determines aspects to improve such as institutional (operator and regulator) capacity, fecal sludge management service preparation, water and wastewater bundled services, centralized wastewater management system, and decentralized wastewater management system. These decisions made in National Policy AS influence sanitation development planning at the subnational level, including Jakarta (outgoing arrow).

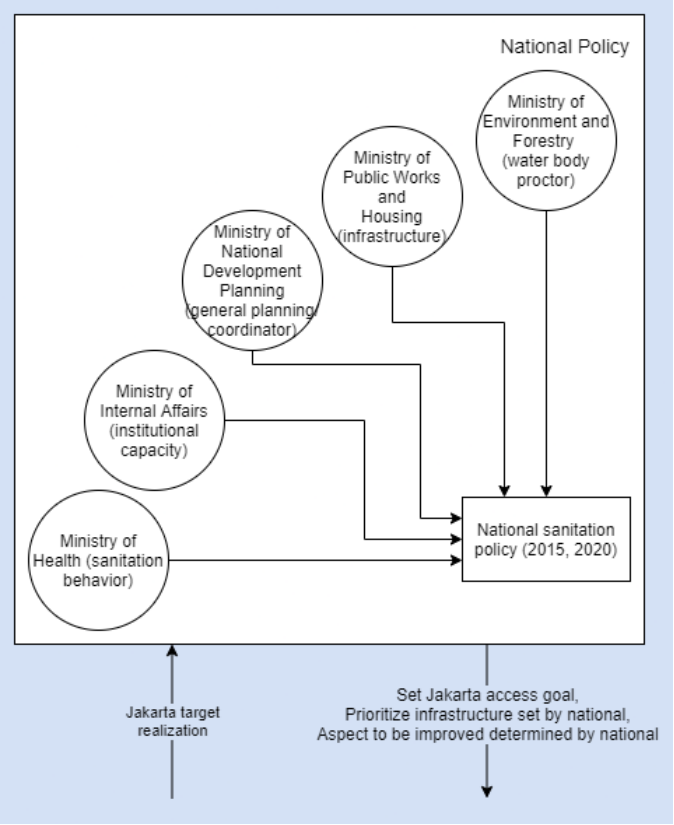


Figure 10 National Policy AS diagram

On the national level, sanitation policy is largely discussed within *AMPL* (Drinking Water and Environment Preservation Working Group) (refer to Section 4.2.1 for description). The Ministry

of National Development Planning (*Bappenas)*, Ministry of Public Works and Housing (Kemen*PUPR*), Ministry of Health (*Kemenkes)*, and Ministry of Internal Affairs (*Kemendagri*) are considerably active ministries regarding sanitation access improvement (*Interview 4*, personal communication, June 23, 2021, p. 4). The Following paragraph explains ministries' role and responsibility related to sanitation.

The Ministry of National Development Planning, the coordinator of five-year national development plans, desires development in all sectors, including sanitation. They set five years development target for every province in Indonesia based on the target realization of the previous plan (represented by ingoing arrow, Jakarta target realization). The Ministry of Internal Affairs concerns the institutional capacity of the subnational stakeholders, including human resource capacity. The Ministry of Public Works and Housing is responsible for major sanitation infrastructures and technical aspects, such as city-scale fecal sludge treatment plant, city-scale wastewater treatment plant, and sewerage system. The Ministry of Health is in charge of reducing open defecation practice. The Ministry of Environment and Forestry is situated on environmental quality monitoring and protection. They desire stable or improving water body environmental quality. Because of monitoring and protection role, the role places the Ministry of Environment and Forestry more active in enforcement than sanitation service development itself. Ministry of Education and Culture *(Kemendikbud*), Ministry of Finance (*Kemenkeu*), and National Bureau of Statistics (*BPS*) are not much recorded and so we consider them to be less active in sanitation policymaking.

The Ministry of Internal Affairs, which is responsible for the capacity building of district governments, is reportedly difficult to keep up with infrastructure development (*Interview 6*, personal communication, June 29, 2021). Additionally, the Ministry of Internal Affairs could not do it alone because of various sectors that must be covered. The directorate general of regional development often work closely with the directorate general of Cipta Karya, Ministry of Public Works and Housing, to improve the capacity of the district governments (*Interview 6*, personal communication, June 29, 2021). JICA (2012) analyzed the Jakarta institutional framework in the Jakarta case study, resulting in a few institutional reforms clarifying roles and responsibilities.

6.1.2 Jakarta Policy action situation

In the Jakarta Policy AS, master plan creation is the main activity. The main outcome of Jakarta Policy AS is an infrastructure implementation plan. Jakarta sanitation master plan was recorded to be created twice, first in 1991 and second in 2012. The old master plan made in 1991 was not implemented because DKI Jakarta (Governor) did not approve it (JICA, 2012). The exact reason is unidentified. Besides constructed sewerage pilot project (currently zone 0 covering Setiabudi and Tebet area), sewerage coverage has been mostly stagnant since then.

Jakarta sanitation master plan was created once more in 2012. In the master plan of 2012, Jakarta is divided into 15 zones, including the existing zone 0 (JICA, 2018). The construction initially was determined to be executed in three development periods spanning from 2012 until 2050. The sewerage system facility was planned to cover 80% of households in Jakarta by the end of the development period. In 2014 and 2016, it was revised twice for the NCICD and the Jakarta final version, respectively (JICA, 2018). The project will be completed in 2030, with fewer sewerage system connections and more septic tanks-fecal sludge treatment facilities (outgoing arrow: access target, infrastructure plan, and construction timeline). The active Governor has approved DKI Jakarta's updated master plan. It is issued under Governor Decree 41/2016 (*PERGUB Prov. DKI Jakarta No. 41 Tahun 2016 tentang Rencana Induk Pengembangan Prasarana dan Sarana Pengelolaan Air Limbah Domestik*, 2016). The

approval of the master plan also meant budget approval to implement the master plan (outgoing arrow: planned budget approval).

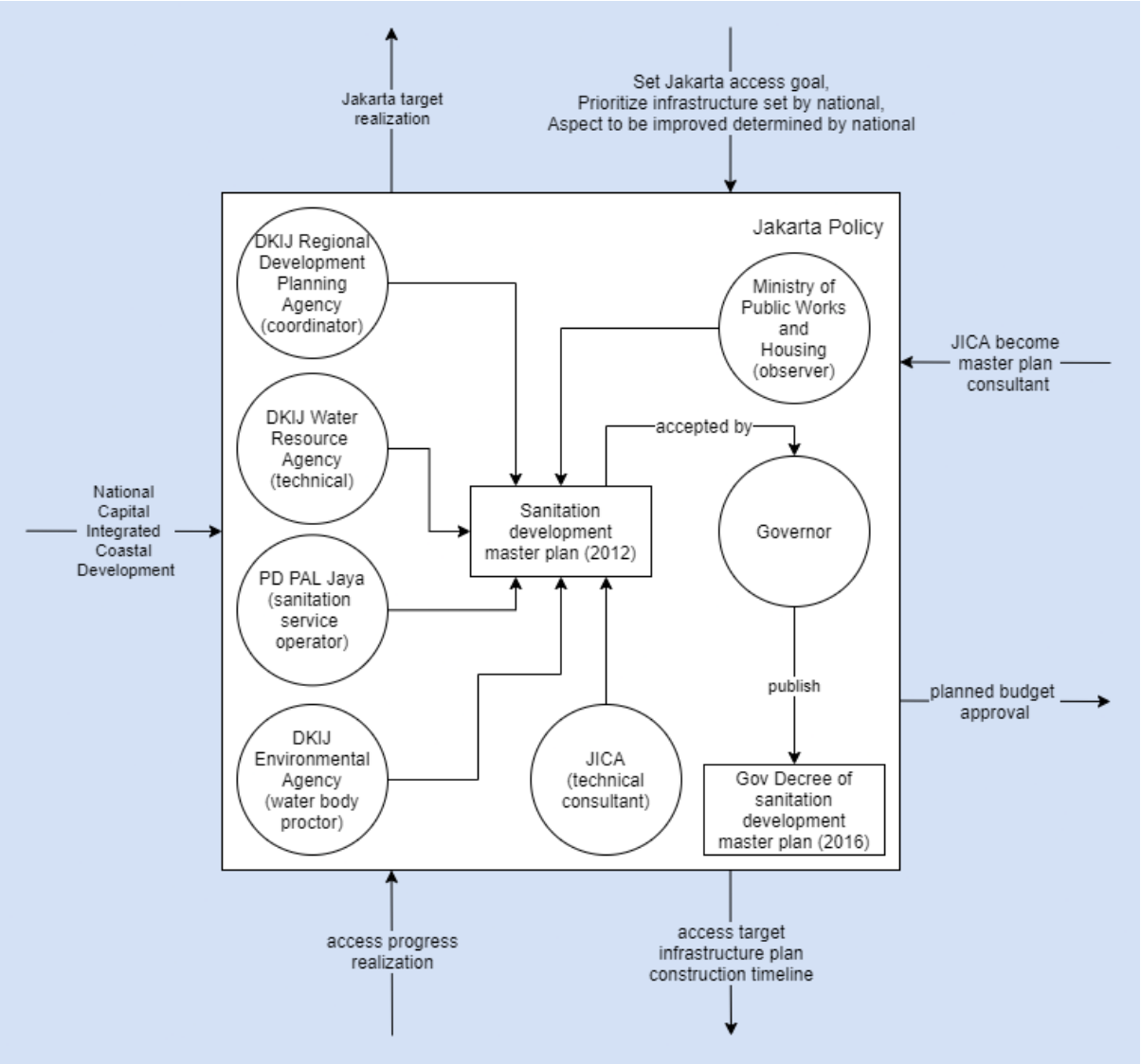


Figure 11 Jakarta Policy AS diagram

Figure 11 illustrates the Jakarta Policy action situation and influence that the action situation receives and exerts toward other action situation. National Capital Integrated Coastal Development (NCICD), a national strategic project from the national government, plan to embank the northern part of Jakarta creating giant sea wall and creating giant freshwater reservoir. This Project creates extra pressure for Jakarta government to properly manage produced domestic wastewater (Trieputra, 2017) or otherwise, what is intended as freshwater reservoir ended up as the largest septic tank collecting domestic wastewater that get to rivers. This extra sense of urgency would likely guarantee improvement on Jakarta sanitation service provision (ingoing arrow: National Capital Integrated Coastal Development).

Jakarta monitor and report their own sanitation access progress to the national government (ingoing arrow: access progress realization; outgoing arrow: Jakarta target realization) (*Interview 1*, personal communication, June 2, 2021, p. 1). DKIJ Water Resource Agency carries this task and report it to the Ministry of Public Works and Housing. In return, every five years DKI Jakarta government would receive sanitation access target from the national

government, and prioritized infrastructure along with aspects to be improved (ingoing arrow: set Jakarta access goal, prioritize infrastructure set by national, and aspect to be improved).

Japan International Consultant Association (JICA) is involved in the master plan 2012 as part of technical cooperation between Japan and Indonesia, when the Ministry of Public Works and Housing secured Japanese loans (ingoing arrow: JICA become master plan consultant). This decision results in institutional analysis causing a few organizational reforms. DKIJ Regional Environment Management Board (BPLHD DKIJ) was strengthen and reorganized into DKIJ Environmental Agency in January 2017 (JICA, 2018). DKIJ Water Management Agency was also reorganized into DKIJ Water Resource Agency within the same period. Septic tanks and sludge treatment facilities were transferred to PD PAL Jaya. These several organizational reforms clarify roles and responsibilities within organization related to sanitation in Jakarta. PD PAL Jaya later on appointed as main operator of sewerage system and fecal sludge management in Jakarta, whereas DKIJ Water Management Agency as the main regulator who plans, and coordinate sanitation service development, and DKIJ Environmental Agency as the main water proctor who monitor river quality.

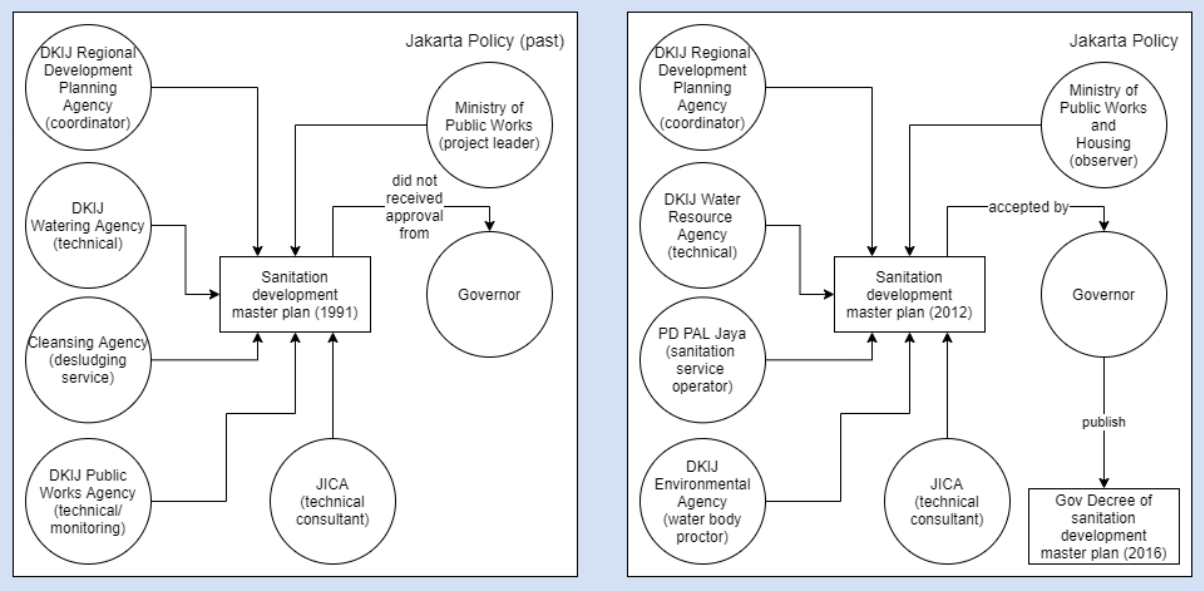


Figure 12 Jakarta Policy AS diagram (left picture: during master plan 1991, right picture: 2012-now)

Figure 12 compares important actors during master plan making in 1991 and 2012. Since Indonesia has not decentralized in 1991, Ministry of Public Works is the main project leader (JICA, 1991). This is contrast with 2012 arrangement. In 2012, the main responsibility is on Jakarta provincial government, and it is coordinated by DKIJ Regional Development Planning Agency (JICA, 2012). Ministry of Public Works and Housing was also there during planning in 2012 but they were involved to be an observer, presumably to smoothen out coordination between Jakarta provincial and national coordination.

Since Master Plan 2012 created until now, Governor of Jakarta Province has changed four times. Coordination among multiple actors in sanitation service provision have costed time and we see that a stable level of commitment is fortunately rather maintained until 2019. Going forward, it is still needed to ensure stable improvement in the sector. It is not rare for the plan to be changed or ignored because of leadership transition.

6.1.3 National Regulation action situation

In the National Regulation AS, publishing national law and regulation is the main activity. The main outcomes in National Regulation AS are missing sanitation law and domestic wastewater

effluent standard. Involved in this action situation are the Ministry of Public Works and Housing, the Indonesian Parliament, serve as national legislative body, and the Ministry of Environment and Forestry.

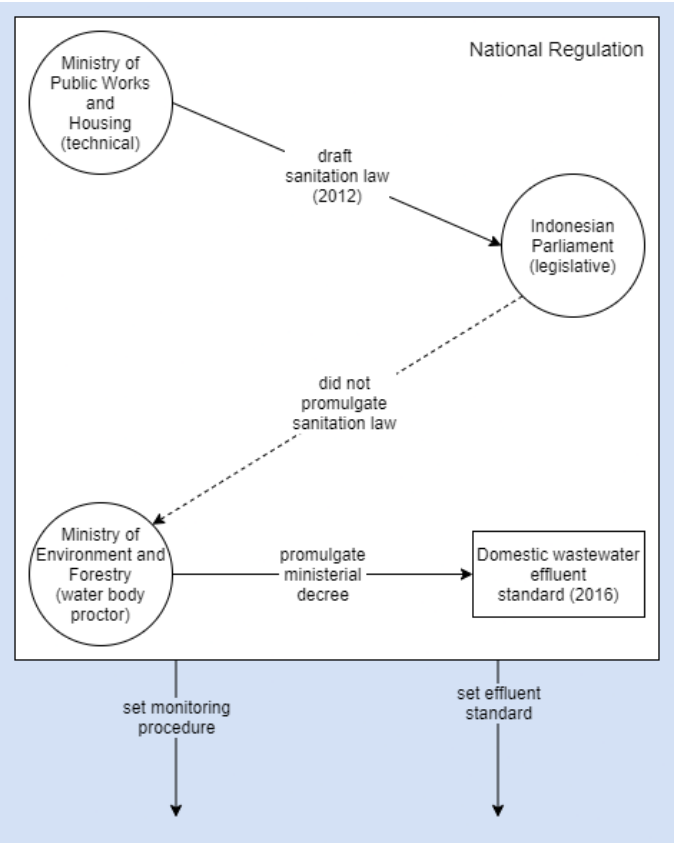


Figure 13 National Regulation AS diagram

JICA (2012) indicated that sanitation law has been drafted in 2012 by the Ministry of Public Works and Housing, covering domestic wastewater and drainage. The finished draft was planned to be introduced to the parliament by the end of 2012 and promulgated in 2013. Until 2021, no law related to sanitation has been passed through Indonesian Parliament (*DPR RI*). Sanitation law is supposed to overarch legal background of many sanitation components, such as sanitation scope, service obligation, institutional system, tariff setting, and quality management (JICA, 2012).

Although the Ministry of Public Works and Housing can draft the sanitation law that potentially cover monitoring procedure and effluent standard, the Ministry of Public Works and Housing could not directly promulgate a ministerial decree related to those aspects. The task of environmental monitoring is under the Ministry of Environment and Forestry. That is why the Ministry of Environment and Forestry promulgated the ministerial decree of domestic wastewater effluent standards is promulgated by in 2016 (outgoing arrow: set monitoring procedure; outgoing arrow: set effluent standards).

In addition, the Ministry of Public Works and Housing published guidelines on domestic wastewater management systems in 2017. This activity is not captured in the National Regulation action situation since it concerns monitoring and enforcement.

The national regulation related to sanitation has been published through other types of laws. The legal ground for sanitation service provision is separated among law and regulations such

as minimum service standard regulation (*PP 2/2018*), the ministerial decree of the guideline of domestic wastewater management system provision published by the Ministry of Public Works and Housing (*PermenPU 4/2017*), and ministerial decree of domestic wastewater effluent standard and monitoring procedure published by Ministry of Environment and Forestry (*PermenLHK 68/2016*). We speculate that both ministries decree and government regulation are efforts to give sanitation service provision more legal grounds and direction in the absence of national sanitation law.

Missing sanitation law is a missed opportunity in Indonesia. The water resource law that was ratified in 2019 did not integrate the sanitation aspect either. We argue that this missing law indicates a missing basic understanding of sanitation service importance and little interest paid by the Indonesian Parliament.

Theoretically, sanitation is a health hazard prevention effort and environment protection effort. We assume the common understanding of water consumption is that it is linear, rather than cyclical, going from water intake to consumption and then disposal without considering that water intake and disposal may occur within the same water body.

6.1.4 Jakarta Regulation action situation

In the Jakarta regulation action situation (Figure 14), monitoring effluent discharge is the main activity. The current monitoring activity results from the monitoring procedure and effluent standard set by the national government (located in National Regulation action situation). There are two actors involved: PD PAL Jaya as the wastewater treatment plant operator and DKIJ Environmental Agency as the water body proctor.

The main outcome in Jakarta Regulation AS is water quality preservation. The monitoring programs conducted by DKIJ Environmental Agency are water body quality monitoring, and regular report from operators (DLH DKI Jakarta, n.d.-a). Additionally, DKIJ Environmental Agency may decide to directly inspect treatment plants through an unannounced visit to the sites (*Interview 3*, personal communication, June 17, 2021). This monitoring activity would create enforcement and aim to maintain service production quality (outgoing arrow: enforcement).

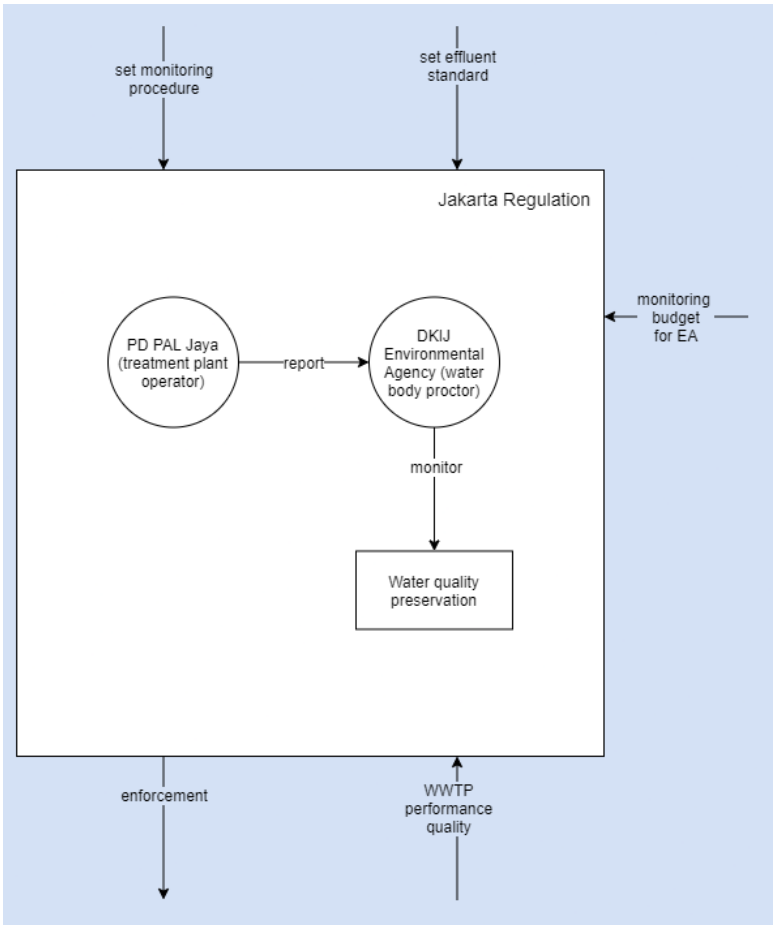


Figure 14 Jakarta Regulation AS diagram

PD PAL Jaya, in theory, has the option to violate the effluent discharge standard. The observed violation may result in several possible punishments, such as receiving a warning, fine, or temporary closure (*Interview 1*, personal communication, June 2, 2021). The DKIJ Environmental Agency is reportedly weak and needs more resources to monitor all environmental aspects properly (*Interview 3*, personal communication, June 17, 2021, p. 3). The DKIJ Environmental Agency may allocate resources to different aspects, including water body monitoring. It creates two situations: monitoring and negligence. PD PAL Jaya may choose to violate to save operational expenses creating two situations: obedience and violation.

DKIJ Environmental Agency budget depends on Jakarta's annual executive agencies budgeting which located in Jakarta Financing action situation (ingoing arrow: monitoring budget for Environmental Agency). More available resources or less available resources would influence how tight DKIJ Environmental Agency monitor water body and wastewater effluent.

PD PAL Jaya decision might be influenced by existing wastewater treatment plant (WWTP) performance quality (ingoing arrow: WWTP performance quality). When existing performance quality is optimum, PD PAL Jaya is disincentivized to violate the standard. Alternatively, WWTP performance might need to be reassessed and improved when the treated effluent exceeds the new standard.

When PD PAL Jaya prioritizes savings over performance quality, PD PAL Jaya preferably choose to obey when the DKIJ Environmental Agency decides to monitor and choose to

violate when it is being neglected. On the other hand, when PD PAL Jaya prioritizes performance quality, PD PAL always chooses to obey the effluent standard regardless of the DKIJ Environmental Agency decision. PD PAL Jaya has never been observed to violate the effluent standard.

Mason et al. (2020) exemplified an alternative monitoring approach at the district level, such as the local-owned water supply enterprise in Bandung, Indonesia, which establish the Memorandum of Understanding (MoU) with the private desludging company to permit them ti discharge into sewer maintenance holes rather than going through a long distance to reach the plant site. The community is encouraged to take photos and report illegal dumping to discourage private company from contaminating rivers.

6.1.5 National Financing action situation

In the National Financing AS, the matching grant scheme is the main activity. A matching grant scheme is a funding system where the national government will transfer the budget matching budget provided by the subnational government.

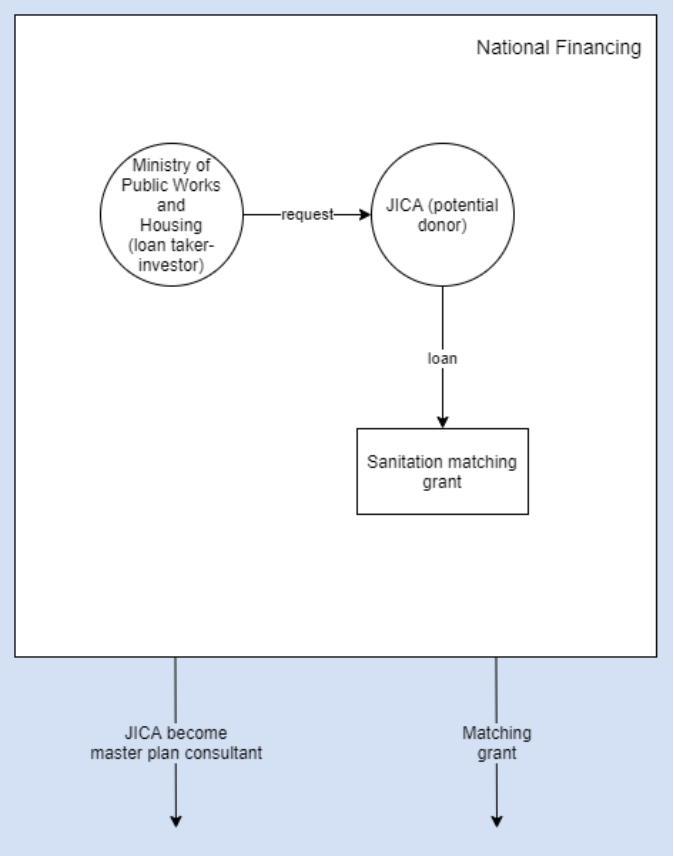


Figure 15 National Financing AS diagram

The matching grant scheme of infrastructure construction is the main outcome of this National Financing AS. DKI Jakarta, the implementing level of the government, dedicated some budget for sanitation project costs. As the national technical sanitation stakeholder, the Ministry of Public Works and Housing can decide the grant amount given to the subnational government. To provide the grant, the Ministry of Public Works and Housing can look for a donor that is willing to loan the budget needed or give the budget needed from the national budget (APBN). JICA, in this case, happened to be the loaner for the Jakarta Sewerage System Project. Japan and Indonesia are presumably building or maintaining a stable bilateral relationship. We

assumed that the Ministry of Public Works and Housing would find another donor if JICA did not agree to provide the Project's loan.

National Financing action situation influence Jakarta Financing action situation through matching grant given by the Ministry of Public Works and Housing (outgoing arrow: Matching grant). Through the loan disbursement from JICA, it partially funded the construction of the Jakarta Sewerage System in zone 1 and zone 6 equivalent to one million Jakarta residents, for which construction started in 2019. Additionally, decisions to get the loan from Japan government put JICA as the technical consultant when producing a master plan in 2012 (outgoing arrow: JICA become master plan consultant).

6.1.6 Jakarta Financing action situation

In the Jakarta Financing AS, annual regional budgeting (*APBD*) is the main activity. The main outcomes in Jakarta Financing AS are sanitation program budget allocation and monitoring budget allocation. Sanitation budget allocation consists of the annual budget for the DKIJ Water Resource Agency's activity program and the regional investment budget (*Penyertaan Modal Daerah*) for PD PAL Jaya. The provincial budget may only aid PD PAL Jaya in the investment aspect (*Interview 1*, personal communication, June 2, 2021, p. 1; *Interview 3*, personal communication, June 17, 2021, p. 3). New infrastructure investment is excluded because its decision is made with the policy approval (ingoing arrow: planned budget approval). Monitoring budget allocation consists of the annual budget for DKIJ Environmental Agency's monitoring activity program. The budgeting decision process (Figure 16) is explained in the following paragraphs.

Figure 16 depicts the decision-making process during the yearly regional budgeting exercise. The DKIJ Water Resource Agency, as the major sanitation regulator, and the DKIJ Environmental Agency, as the water body proctor, propose the budget for the upcoming fiscal year. The DKIJ Regional Development Planning compiles all submitted budgets (Gumilangsari, 2020). The Governor of DKI Jakarta then determines which sector gets priority. The budget proposal finally is presented to the DKIJ District Parliament to be approved. During this process, regional investment budget for PD PAL Jaya is decided (*Interview 3*, personal communication, June 17, 2021). Only then, activity program can be implemented (outgoing arrow: monitoring budget for DKIJ Environmental Agency; outgoing arrow: regional investment budget for PD PAL Jaya and activity program fund for DKIJ Water Resource Agency).

The DKIJ District Parliament can object to the budget proposal and request a certain sector budget to be raised or lowered. The DKIJ District Parliaments have not approved budget requests regarding public awareness campaigns in the last few regimes (Trieputra, 2017). It was perceived to be among the most corrupted programs in the past.

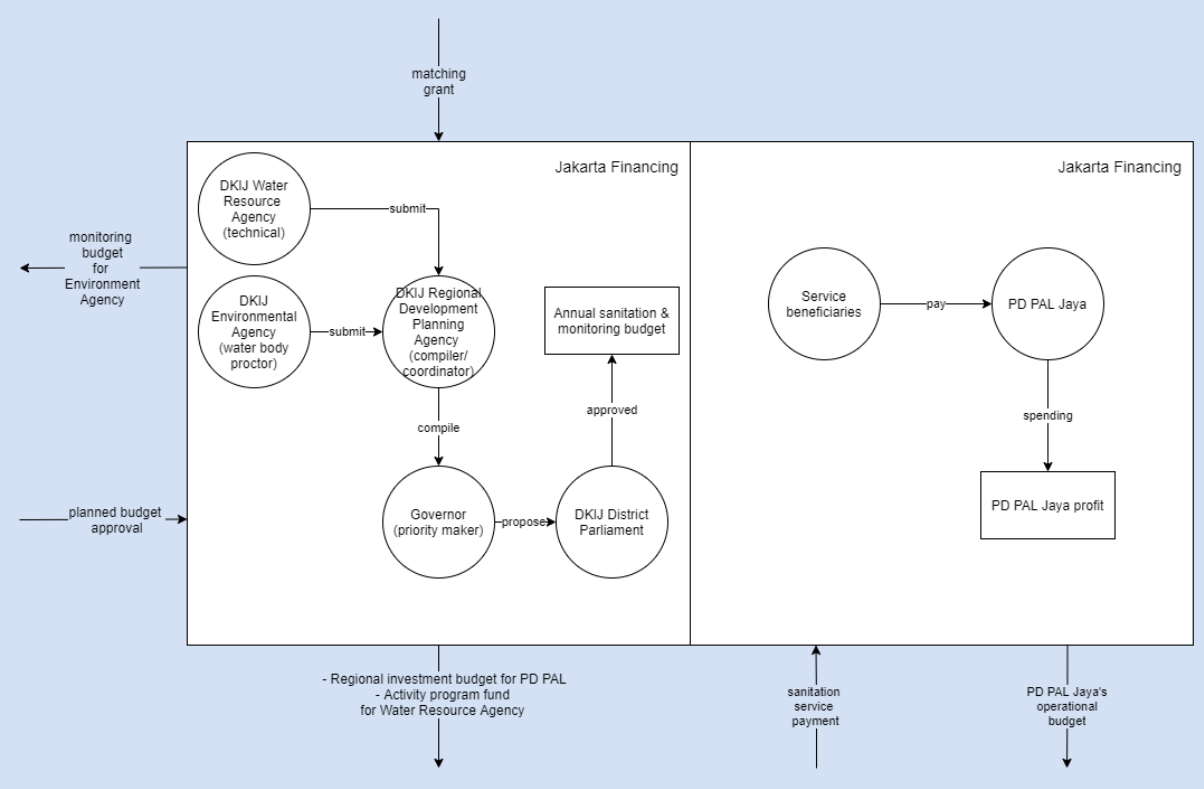


Figure 16 Jakarta Financing AS diagram (left: Jakarta provincial budget, right: PD PAL Jaya budget)

From a financial perspective, the DKIJ Water Resource Agency's budget is crucial in sanitation service development since PD PAL Jaya's budget is limited for sanitation service development (*Interview 2*, personal communication, June 14, 2021, p. 2; *Interview 3*, personal communication, June 17, 2021, p. 3). While the DKIJ Water Resource Agency and the DKIJ Environmental Agency prefer the highest possible budget allocation, DKIJ Regional Development Planning Agency, Governor, and DKIJ District Parliament desire the highest possible development progress across sectors. Since the DKIJ Water Resource Agency's budget depends on the annual budget, the political will of the governor of DKI Jakarta and the DKIJ District Parliament plays an important role in ensuring sustainable funding for sanitation service development.

PD PAL Jaya's budget is limited to sanitation service operational. Although PD PAL Jaya always profit each year, their investment power is limited (*Interview 3*, personal communication, June 17, 2021, p. 3). It is further inhibited as PD PAL Jaya must submit 40% of their profit to the provincial budget annually.

As an enterprise, PD PAL Jaya operation and maintenance depends on income (*Interview 3*, personal communication, June 17, 2021, p. 3; *Interview 5*, personal communication, June 28, 2021, p. 5). Income depends on customers who use the services (ingoing arrow: sanitation service payment). Business customers largely cover PD PAL Jaya's operational expenses. Households pay lower sewerage charges compared to non-household, and because of it, growth of coverage means less profit unless the tariff being charge is increased.

As of 2010, PD PAL Jaya's customers were 99.5% of non-household, mainly major businesses (JICA, 2012). It is predicted that the percentage of household customers will increase as the current sewerage is expanded. The collection rate of households become more important to consider since 63% of households pay in contrast to 99% of non-households pay (JICA, 2012).

6.1.7 Jakarta Production & Provision action situation

The main outcome in Jakarta Provision & Production AS is the existing safely managed sanitation access coverage. The DKIJ Water Resource Agency want sanitation service development, whereas PD PAL Jaya is concerned with operational performance and profit. Fecal desludging service in zone 0 was transferred in 2014, and fecal desludging service throughout Jakarta was transferred in 2016 from DKIJ Sanitary Agency (*Dinas Kebersihan DKIJ*) to PD PAL Jaya (JICA, 2018). The transfer completely put PD PAL Jaya in charge of sanitation service operation.

The sanitation service provision of Jakarta is mainly conducted by PD PAL Jaya and the DKIJ Water Resource Agency. PD PAL Jaya is responsible for most sewage and sewerage system operations and maintenance in Jakarta. The DKIJ Water Resource Agency as the regulator of sanitation service provision, is also tasked to construct and maintain domestic wastewater treatment system on a smaller scale, such as a communal system. Additionally, their work includes implementation programs, such as the treatment performance review, feasibility study of planned infrastructure, environmental document preparation, public awareness improvement related to Jakarta sewerage system construction, sewerage construction, and masterplan review (Dinas SDA Jakarta, 2017).

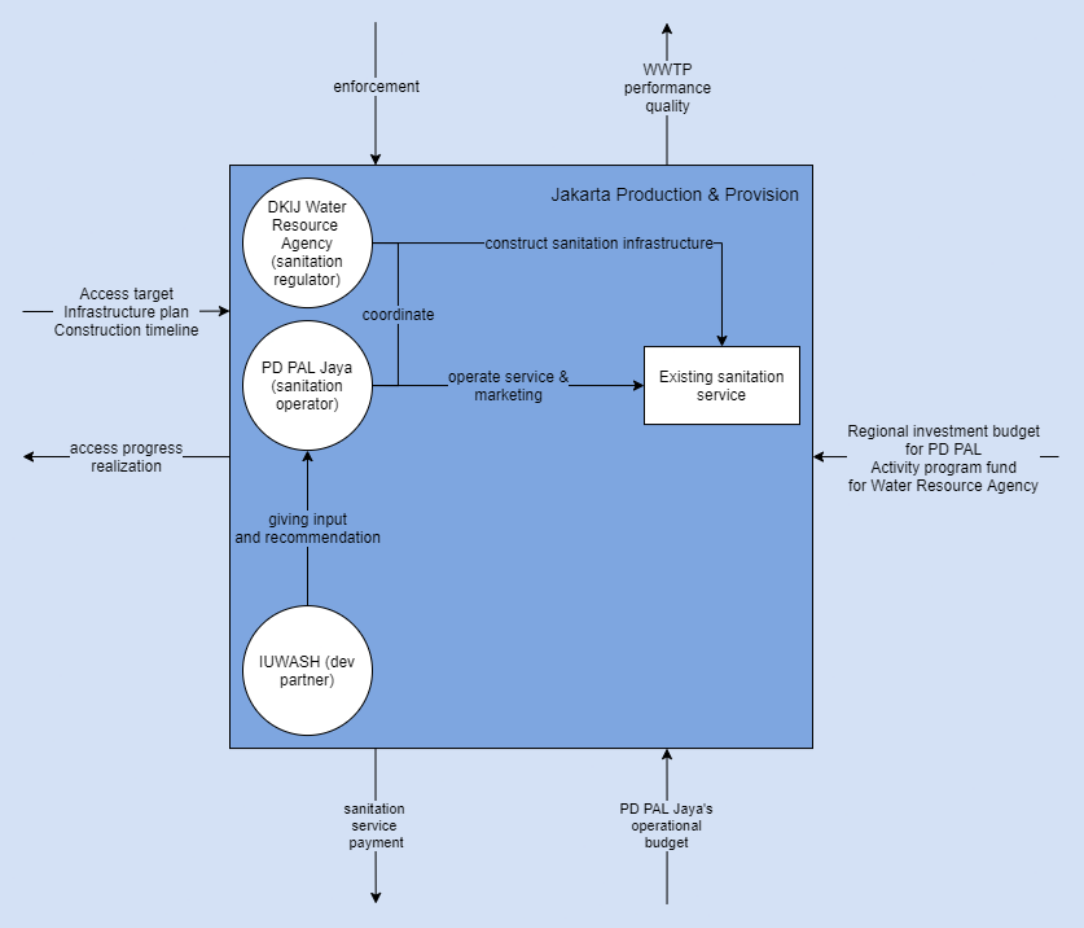


Figure 17 Jakarta P&P AS diagram

Jakarta production & provision action situation is influenced by all other Jakarta level action situations. Enforcement from Jakarta Regulation action situation maintains service produced to citizens (ingoing arrow: enforcement). PD PAL Jaya's operational budget highlights whether the budget covers operational and maintenance fees or not (ingoing arrow: PD PAL Jaya's operational budget). It results in WWTP performance quality within Jakarta Production &

Provision action situation (outgoing arrow: WWTP performance quality) and influences the Jakarta Regulation action situation. Service usage (or consumption) would turn out as payment (outgoing arrow: sanitation service payment) and increase PD PAL Jaya's income.

The sanitation service development within Jakarta Production & Provision action situation is influenced by regional investment budget for PD PAL Jaya and activity program fund for water resource agency from Jakarta Financing action situation (ingoing arrow: regional investment budget for PD PAL Jaya, and activity program fund for Water Resource Agency). The development is also influenced by access target, infrastructure plan, and construction timeline set in the Jakarta Policy action situation (ingoing arrow: access target, infrastructure plan, and construction timeline). The development results will be reported to the Jakarta Policy action situation through the outgoing arrow of 'Access progress realization'.

We discuss major existing sanitation services such as fecal sludge management measured by septage treatment plants performance and sewerage system measured by connection coverage. Jakarta currently has two septage treatment plants, IPLT Duri Kosambi located in West Jakarta and IPLT Pulo Gebang located in East Jakarta. With a planned capacity of 900 m^3/day, both plants operate less than 50% operating capacity (Trieputra, 2017). Trieputra (2017) calculated that Jakarta has produced on average 5.000 m^3 of fecal sludge per day in 2015.

For the sewerage system, Jakarta currently has one existing wastewater treatment plant (WWTP) in Setiabudi Dam. Operating with conventional technology, aerated lagoon, this plant can treat domestic wastewater at approximately 28.000 m^3 wastewater per day (JICA, 2012). In 2012, on average, 18.000 m^3 of wastewater is treated every day. A new WWTP is currently constructed using a moving bed biofilm reactor. It is planned to add another 8.640 m^3/day treatment capacity to Jakarta.

Both underperforming services in fecal sludge management and sewerage system are aligned with research done by Winters et al. (2014), where they found in several cities that citizens' demand was relatively low. High levels of satisfaction with the status quo, lack of willingness to pay for sanitation services, and uncertainty whether or not the government was responsible for providing sanitation services were found to limit the demand for sanitation services.

Septic tank revitalization program is currently implemented by PD PAL Jaya and DKIJ Water Resource Agency in locations that critically needed sanitation intervention (*Interview 3*, personal communication, June 17, 2021, p. 3). It is one of the programs approved by the Governor of DKI Jakarta and DKIJ District Parliament that went through the Jakarta Financing action situation.

The DKIJ Health agency is previously expected to be active within Jakarta sanitation service development. The DKIJ Health agency is tasked with improving sanitation behavior and shifting people into using toilets or pit latrines. It might explain why they are not involved with sanitation infrastructure development that starts at containment storage/treatment (refer to Figure 4). The DKIJ Health Agency is arguable could provide an entry point towards sanitation public awareness campaign. While the DKIJ Health Agency may be unable to promote the service directly, they can indirectly guide the community to install proper septic tanks, desludging regularly, and connect to sewerage by disseminating the positive impact of sanitation service.

6.2 Network of Adjacent Action Situation in Jakarta sanitation

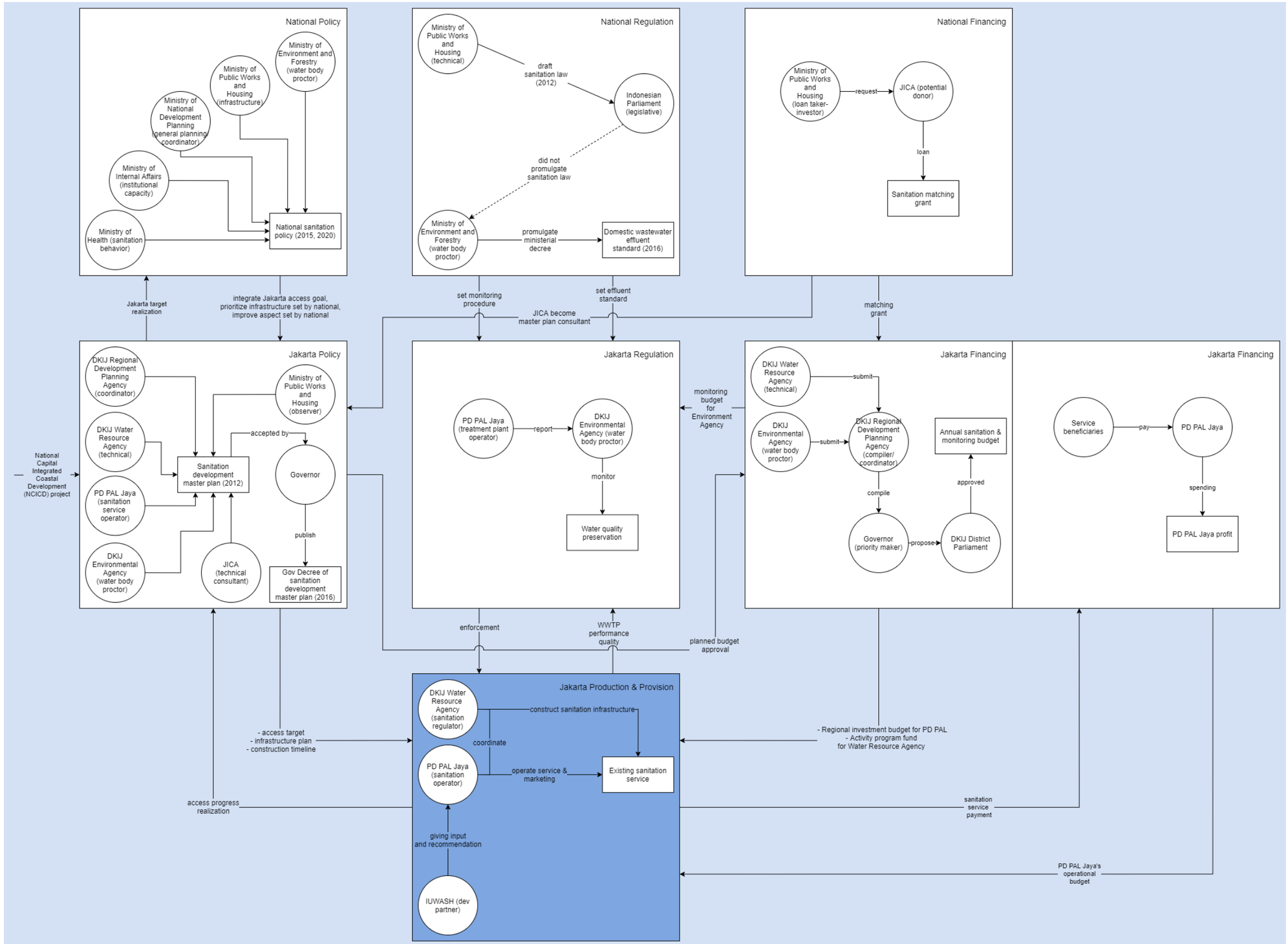


Figure 18 NAAS of Sanitation in DKI Jakarta

We have explained each action situation that happened in Jakarta sanitation.

Figure 18 summarize all (seven) action situations explained before. With the understanding of every action situation, we discuss effects between action situations shortly. The links between action situations display their relationship.

Leverage action situation: Jakarta Policy AS and Jakarta Production & Provision AS.

Jakarta Policy AS is one of the most connected action situations in the NAAS diagram. Jakarta Policy AS influences three other action situations, national policy, Jakarta financing, and Jakarta production & provision. In return, Jakarta policy is influenced by three action situations: national policy, national financing, and Jakarta production and provision. It seems Jakarta Policy AS is one of the leverage points where small changes can start a major shift.

As for example, the absence of master plan 1991 approval did not allow for any meaningful development in sanitation services until 2012. Compared to absence of sanitation law in National Regulation AS, the absence of master plan influenced more action situations. It signifies the 'leverage point' within Jakarta Policy AS.

Additionally, because of Master Plan in 1991 was rejected and no Master Plan made until 2012, it potentially allowed septic tank installation to be unstandardized. An unintended consequence occurred where a portion of existing septic tanks are unlined and better to be called as soak pits.

NCICD influence master plan 2012 implementation by delay and additional pressure. It took two revisions between 2012 to 2016 until official approval and published as Governor Decree. At the same time, NCICD presumably pressure the plan to be approved so Jakarta's rivers can become cleaner. This signify how Jakarta Policy AS can be easily influenced.

Our result supports Abeysuriya et al (2019) findings that planning does not necessarily translate to implementation. In Jakarta case, the implementation is delayed for seven years. It is better compared to the absence of planning in the past that crucially complicates further Jakarta sanitation service development. Jakarta coverage has been stagnant since 1991, when zone 0 was completed.

Unsurprisingly, Jakarta Production & Provision AS is another most connected action situation. It influences Jakarta Policy AS, Jakarta Regulation AS, and Jakarta Financing AS. The Jakarta Production & Provision AS is influenced by the same three AS. Current actors involved in Jakarta Production & Provision AS are

The two leverage points highlights the importance of planning phase and implementation phase. It also highlights their situation as two distinct phases.

Active actors: Ministry of Public Works and Housing, DKIJ Water Resource Agency, PD PAL Jaya, and DKIJ Environmental Agency.

There are a few actors who involved in many action situations. Ministry of Public Works and Housing who participates in four adjacent action situations (National Policy, National Regulation, National Financing, and Jakarta Policy). PD PAL Jaya who participates in four adjacent action situations (Jakarta Policy, Jakarta Regulation, Jakarta Financing, and Jakarta Production & Provision). DKIJ Water Resource Agency who participates in three adjacent action situations (Jakarta Policy, Jakarta Financing, and Jakarta Production & Provision). DKIJ Environmental Agency who participates in three adjacent action situations (Jakarta Policy, Jakarta Regulation, and Jakarta Financing).

It is worth noting that these action situations which involved these actors does not necessarily influence one another. This may point to an alternative explanation to the absence of conflict. Since some actors participate in multiple action situations, they are capable of aligning preferable outcomes with adjacent action situation outcomes.

For example, the Ministry of Environment and Forestry potentially published domestic wastewater standards in 2016 because they are involved in the National Policy action situation. National Policy AS does not influence National Regulation AS nor the other way around. The decision made could be because of the awareness that the national sanitation policy will need supporting regulation to implement.

Our thesis does not specifically display the impact of actively participating actors in multiple action situation. Further research is needed.

7 Answering research question

This chapter concludes the thesis research. The answer to each research question is recapped and concluded to tie everything discussed. We ended this chapter by suggesting formal stakeholders and answering RQ5: “What recommendations can be made to improve coordination of sanitation service provision?”.

This thesis studied Jakarta sanitation-related stakeholders and tried to understand the influence of actors’ interaction towards sanitation service provision. In general, little can be said about whether actors’ interactions influence the actual provision positively or negatively. What can be said, however, actors’ interaction is likely to delay sanitation service development in Jakarta. Highlighted delays are

- Master Plan created in 2012,
- Master Plan went through two revisions and was approved in 2016, and
- The construction started in 2019.

Research question 1: How is sanitation governance explained from a theoretical perspective?

Sanitation is part of the human water cycle. The sanitation service chain in the domestic wastewater management system starts from the latrine until disposal into the environment. In this thesis, we heavily discuss the infrastructure-related, including sewerage network, septic tank, vacuum truck, sewage treatment plant, and fecal sludge treatment plant.

Governance provides an alternative to state hierarchies and market systems. However, there is no consensus on governance definition let alone water and sanitation governance. Several research studies on water and sanitation governance explore the impact of social networks, types of governance mode, dimension of governance, and the impact of multiple actors’ nature towards learning and adapting.

Many developing countries decentralize the sanitation service provision task and also attempted institutional privatization reform. This combination creates polycentric governance, where enterprises and formal actors work as a coordinated system instead of a hierarchical one. We use the Network of Adjacent Action Situations (NAAS) framework proposed by McGinnis (2011) to contextualize current sanitation governance in Jakarta, Indonesia’s case study area.

There is no established method to identify and analyze action situation networks and links. We choose the service delivery function developed by Mason et al. (2020) to identify key activities in sanitation as action situation boundaries. These functions are policy, regulation, financing, provision, and production. We use action situation component variables developed by Ostrom (2005) to depict a single action situation.

Research question 2: What do the formal institutional arrangements for sanitation governance in Indonesia look like?

Formal institutional arrangements for sanitation governance in Indonesia are divided between laws and policies, and between national stakeholders and subnational stakeholders as shown in Chapter 4. On the constitutional level, Indonesian sanitation is not integrated with water resource law. Sanitation service provision is mandated as service provision since 2014, although district governments are decentralized and tasked with service provision starting in 2001. Indonesia sanitation service provision is lagging behind other public goods services.

The policy generally comes from the national government, specifically the Ministry of Public Works and Housing, Ministry of Health, Ministry of Environment and Forestry, and Sanitation National Working Group (refer to Section 4.2.1).

Sanitation service operation is carried out by the subnational government (provincial government and district government). Although, in general, sanitation service provision is supposed to be delivered by the district government, North Sumatra, Bali, and Jakarta are a few examples of provisions carried out by the provincial government.

Active agencies in sanitation development are public works related executive agencies, health-related executive agencies, and environment-related executive agencies, corresponding to the most active three ministries. Specific implementing organizations are unique in each location. For example, Banten Province and South Sulawesi Province put public sanitation infrastructure duty on Public Works and Spatial Planning Agency, whereas Jakarta Province and West Java Province put the same duty under Water Resource Agency.

In Indonesia, the agencies involved in the sanitation service provision sector are categorized as operators, who carry the technical operation task, and regulators, who plan and regulate the service development. Out of 541 cities/regencies, 113 cities/ regencies separate the operator and regulator role, and the rest of them still have it under one executive agency. This overlap creates a heavy burden for the executive agency.

Research question 3: Who are the main actors and what are the functions they serve in Jakarta's sanitation service provision?

There are many actors involved with various functions in regard to provision of sanitation services in Jakarta as shown in Chapter 5. In Jakarta, PD PAL Jaya (technical operator) and DKIJ Water Resource Agency (*DSDA DKI Jakarta*) (technical regulator) are the main actors in providing the sanitation services. PD PAL Jaya is largely involved with the major infrastructure operation while DKIJ Water Resource Agency involved in most key activities ensuring sanitation service is being developed.

There are five aspects in sanitation service delivery function: policy, regulation, financing, provision, and production. The policy aspect, sanitation service provision in Jakarta is influenced by Governor, DKIJ Governor Advisory Team, DKIJ Planning Agency, and DKIJ Water Resource Agency. Regarding regulation aspect, sanitation service provision in Jakarta is influenced by the Governor of Jakarta, DKIJ Water Resource Agency, and DKIJ Environmental Agency. On the financing aspect, sanitation service provision in Jakarta is influenced by the Governor of Jakarta, DKIJ Regional Development Planning Agency, DKIJ Water Resource Agency, and PD PAL Jaya. Various actors are involved in different aspects.

DKIJ Water Resource Agency has a critical role in developing sanitation service provision. We also highlight how critical support from other stakeholders can develop sanitation service provision. Besides PD PAL Jaya and DKIJ Water Resource Agency, four additional stakeholders are involved: Governor of Jakarta, Governor Advisory Team, DKIJ Regional Development Planning Agency, and DKIJ Environmental Agency.

Sanitation service provision is additionally influenced by policy and regulation made in the national level. On the national level, the actors influencing Jakarta sanitation services are part of Sanitation Development Working Group. They are the Ministry of National Development Planning, Ministry of Internal Affairs, Ministry of Finance, Ministry of Public Works and Housing, and Ministry of Environment and Forestry. Ministry of Public Works and Housing is the most involved actors on the national level.

Lastly, there are households in which sanitation service provision exist in the first place. They influence the production aspect through consumption, and financing aspect through service payment.

Research question 4: How do these actors and their functions interact in Jakarta sanitation service provision?

Jakarta sanitation service provision is complicated, as shown in Chapter 6. There are at least seven action situations with various actors involved in each action situation: Jakarta Policy AS, National Policy AS, Jakarta Financing AS, National Financing AS, Jakarta Regulation AS, National Regulation AS, and Jakarta Provision & Production AS.

The process took four years to turn a finished Master Plan in 2012 into an official commitment formed as Governor Decree in 2016. The construction was not started until 2019. Our result supports Abeysuriya et al (2019) findings that planning does not necessarily translate to implementation. In Jakarta case, the implementation is delayed for seven years.

While planning does not guarantee implementation, absence of planning crucially complicates Jakarta sanitation service development in the past. Jakarta coverage has been stagnant since 1991, when zone 0 was completed and master plan in 1991 did not get approval. It also potentially allowed installation of septic tanks throughout Jakarta to be unstandardized.

JICA (2012) has studied problematic sanitation responsibility distribution in Jakarta. They pointed out how multiple agencies cover some components while other components are not covered by any agencies.

Since then, ultimately, during 2016-2017, Jakarta Province stakeholders went through institutional reform to help task distribution and prevent unclear or overlapping functions (refer to Section 6.1.2). Sanitary Agency (*Dinas Kebersihan DKIJ*) and Environment Management Body (*BPLHD DKIJ*) transferred their functions to Environmental Agency and PD PAL Jaya. DKIJ Water Management Agency also reformed into DKIJ Water Resource Agency in the same period.

Emerging NCICD project presumably add grave importance to the success of sanitation service provision within the administrative boundary (refer to Section 6.1.1 and Section 6.1.2). We argued NCICD project help to materialize what is previously intangible, the benefit of sanitation service provision.

Ekane et al. (2020) found that decentralized sanitation roles and responsibilities create coordination problems in Rwanda and Uganda as more actors get involved in service delivery. Jakarta does not face the same problem. Conflict over policy goals and objectives is likely to be discussed and solved through master plan 2012 and strategic plan. Alternatively, some actors that participate in multiple action situations align their preferable outcomes with adjacent action situation outcomes.

We could not assess how the consensus is reached. Abeysuriya et al. (2019) and Chong et al. (2015) have raised this concern. They argued that bringing representatives from different sections or agencies has not ensured “interest or capacities for problem-solving and collective action”.

We believe that Jakarta sanitation stakeholders do not face value and approach problems. Conflict of value and approach related to wastewater management may happen across sectors, as Murwendah et al. (2020) indicated. They stated that the Jakarta sewerage system conflicts (overlapped) with other underground infrastructures, such as water, electricity, road,

railways, and MRT. Additionally, resource conflict possibly happened within agencies as they have various sections mandated to different functions besides sanitation.

Research question 5: What recommendations can be made to improve coordination of sanitation service provision?

Following recommendations are made for the formal stakeholders based on findings in this research. Since we find that value conflict and coordination do not necessarily pose strong barriers in the case study, we suggest ways to maintain and improve stakeholders' engagement within the sanitation sectors.

Short term: Framing project so sanitation project benefit can be materialized.

National Capital Integrated Coastal Development (NCICD) plan to embank the northern part of Jakarta, creating a giant sea wall and creating a giant freshwater reservoir collecting water from the upstream. This Project creates extra pressure for the Jakarta government to managed produced domestic wastewater properly (Trieputra, 2017). Otherwise, what is intended as a freshwater reservoir might ended up as the largest septic tank collecting domestic wastewater from rivers. This extra sense of urgency would likely guarantee improvement on Jakarta sanitation service provision.

Long term: Include human water cycle discourse into the day-to-day conversation.

Due to the long time taken to plan and provide sanitation service, actors' commitment is extremely important. Actors' commitment should be maintained over a long period and especially when facing leadership transition. Current research indicates actors are relatively committed, potentially because of NCICD. Not all governments have the luxury to afford additional projects.

The fact that sanitation law does not exist in Indonesia until today and does not include in water resource law implies the absence or the concern of the legislative body in Indonesia about sanitation. Winters et al. (2014) concluded that sanitation demand is lacking because of satisfaction condition with the suboptimal situation.

Winters et al. (2014) have highlighted the need for an educational campaign on sanitation issues among Indonesia's citizens. We argued that we could further bring sanitation as part of human water cycle discourse into day-to-day discussion through formal education. The human water cycle should be complementary knowledge to the natural water cycle. By doing this, we increase the understanding of the officials and Indonesia's citizens.

Adding human water cycle discussion to conventional water cycle material during school class should be easy and benefit foundational change. Another practical option is to facilitate study tour for children to the wastewater treatment plant, so wastewater treatment plant operators are incentivized to maintain properly and in return, their importance gets to be highlighted.

8 Reflection

A perfect thesis is a finished thesis. This chapter serves as contemplation of various challenges that were faced throughout this research.

8.1 Limitation and strength of this work

In this section, we reflect on the limitation and strengths of the conducted data collection activity and the data analysis activity. We hope to prevent the next researchers from repeating the same mistakes.

8.1.1 NAAS framework

The Network of Adjacent Action Situation (NAAS) framework has no established systematic empirical method to identify action situations, types of links and their effects on other action situations. We only found two papers (Kimmich, 2013; Kimmich & Tomas, 2019) that attempted to develop further the concept of the NAAS framework. What determines an action situation and its boundary is not a clear-cut activity. This led us to choose the service delivery function framework used by Mason et al. (2020) as key activities to determine action situations. Additionally, we iterate every few findings in making the NAAS diagram. This iterative approach and 'raw' framework led us to lengthen the preparation for the data collection and the data collection process itself.

Sanitation has differing problems of improving the access and also maintaining the access quality. Referring to the framework used by Mason et al. (2020), policy function and regulation function tend to work on the two different problems. For example, regulation concerned with monitoring and enforcement is more related to maintaining access quality, while a master plan relates to access development. The case is particularly distinct in the Jakarta Financing action situation. Jakarta provincial sanitation budgeting will impact access development and PD PAL Jaya budget which impacts service sustainability.

The NAAS framework developed was attempted to be validated with field experts. Due to unfamiliarity, we could not get the confirmation needed.

NAAS was developed using polycentric governance in mind, often applied in common pool resources management. Our research does not find a conflict within an action situation, often called a game model. As mentioned in Chapter 7, goal conflict or value conflict is potentially existed across sectors instead of within sanitation sectors. The conflict is absent partially happens because the sanitation governance in Jakarta is rather decentralized than polycentric. Executive agencies do not compete with one another because they have different and non-overlapping tasks.

On a positive note, this is the first attempt to implement the NAAS framework in the sanitation sector of developing countries. The NAAS framework showed its potential to be used outside common pool resource management issues. The framework also showed its potential to be applied in more decentralized governance and less polycentric governance.

Additionally, this research contributes to bridging the sanitation research field and public governance research field. It seems that the sanitation research field and public governance research field do not overlap much even though institutional and governance aspects are often mentioned as constraints towards universal sanitation access. Abeysuriya et al. (2019), Ekane et al. (2020), and Mason et al. (2020) were exceptions rather than being the norm. We believe that public governance research field could benefit from empirical research conducted in the sanitation sector and sanitation governance research could benefit from theoretical research conducted in the public governance research.

8.1.2 Remote data collection process

Due to the COVID-19 pandemic, mobility was greatly limited, so data collection must be done remotely. Appointments were more complicated to make than normal circumstances. There are a few reasons, such as time zone differences, interviewees' busy schedules, and various administrative procedures for different agencies. Furthermore, postponement of interviews happened few times because more urgent interviewee's activities popped up and have to be prioritized.

These prolonged appointment periods led us to decrease the number of interviews. Notably, we could not get interviews with key actors, such as DKIJ Water Resource Agency, DKIJ Regional Development Planning Agency, and DKIJ Environmental Agency. Because of this limited number of interviews, the thesis majorly lacks the relationship between actual result and planning layers.

On the digital document collected, we found a disparity in data quality. While policy documents done by JICA are reported thoroughly, monitoring and financing aspect related documents are harder to retrieve or incomplete. This disparity causes different details reported in these action situations.

The incomplete data collection process limits us in explaining **why** certain things happen. On a positive note, our current work still sheds light on **how** Jakarta's sanitation governance came into being.

8.1.3 Possibility of bias

Since we were originated from the country where the study took place, data collected from interviews are potentially filtered through our understanding. It is difficult to separate the research from the researcher, especially since the research is qualitative. Information collected in the Indonesian language may also lose in translation when being processed. We have tried to mitigate the bias by having the interview transcription both in Indonesia and English.

8.2 Recommendations for future work

Recommendation 1

The application of the NAAS framework could be improved by using more comprehensive sanitation key activities, such as nine building blocks of WASH developed by Huston et al. (2018). Huston et al. (2018) specified interactions between building blocks that build a better expectation of how the governance will correspond with the components. One of the personal challenges found during this research is overlapped functions, such as regulation that could imply constitutional aspect and monitoring aspect.

Recommendation 2

Once the NAAS frameworks have been applied to contextualize the current situation of sanitation governance in Jakarta, it would be easier to be reapplied in another similar context. Different metropolitan cities in Southeast Asia and other developing countries could benefit from this framework application.

Recommendation 3

The level of analysis could be lowered into actual implementation level to better capture influence between situations in the field and planned situations by the government. A lower level of analysis would further involve citizens as service consumers in an action situation and could explain why sanitation service consumption is lower than hoped.

Recommendation 4

The dilemma of choice arguably does not happen within the sanitation sector but happens in the cross-sector program. The decision-making process in one of the sanitation-related executive agencies is the potential to be studied.

8.3 Concluding remarks

Since I took notice of a dirty river, a dim wastewater concern lit inside me. It refuses to be extinguished. The sanitation issues take my attention now and then, and yet… I do not have much understanding about sanitation issues. It bothers me. I wanted to understand the nuance of sanitation sector development. I decided to study sanitation governance, where it is getting messy. Moreover, ever since I learned about knowledge or research disparity between developing countries and developed countries, researching my country as a case study seems like the logical conclusion.

Initially, social network analysis of the sanitation sector was what I had in mind. The lack of official contact complicates the data collection method, then the COVID-19 pandemic hit and spelled the end of my plan. A qualitative study became the alternative since the data collected can be less.

Acknowledging that a qualitative study was not my strong suit, I brace myself for upcoming adversities. In the end, being lost or clueless might be the right word to describe the research process. Even things that might be simple such as distinguishing the notion of “research step”, “research approach”, “research design”, and “research method”, became difficult to me.

Gaps undoubtedly remain, which can be attributed to my lack of experience in doing scientific research, in using the NAAS framework, and the lack of data being collected. However, if I am going to redo the research, I might repeat the same mistakes and making sure that they were mistakes. Otherwise, they are happy little accidents.

The thesis adventure brought the darkest side of me that I have not seen for a long time. As the end of my second academic year approached, the stress got even worse when financial constraints started to creep in. Convincing myself that my work and I will make it to the finish line becomes a must. As I conclude this work, I am amazed that I manage to stay afloat. My work might not be good, but it is enough for me to graduate.

I am grateful nonetheless that this qualitative nature allowed me to understand more nuance in sanitation governance. Much work remains to be done to provide sanitation access for everyone. Here is another small step towards that dream.

Bibliography

Abeysuriya, K., Willetts, J., Carrard, N., & Kome, A. (2019). *City Sanitation Planning Through a Political Economy Lens*. *12*(3), 23.

Abfertiawan, M. S. (2019). Studi Kondisi Eksisting Sistem Pengelolaan Air Limbah Domestik Setempat di Kota Denpasar. *Jurnal Ilmu Lingkungan*, *17*(3), 443. https://doi.org/10.14710/jil.17.3.443-451

Afifah, T., Nuryetty, M. T., Cahyorini, Musadad, D. A., Schlotheuber, A., Bergen, N., & Johnston, R. (2018). Subnational regional inequality in access to improved drinking water and sanitation in Indonesia: Results from the 2015 Indonesian National Socioeconomic Survey (SUSENAS). *Global Health Action*, *11*(sup1), 31–40. https://doi.org/10.1080/16549716.2018.1496972

Akhmaddhian, S., Handayani, I. G. A. K. R., & Hartiwiningsih. (2017). *The Government Policy of Water Resources Conservation to Embodying Sustainable Development Goals: Study in Kuningan, Indonesia*. 10.

Al'Afghani, M. M., Kohlitz, J., & Willetts, J. (2019). Not built to last: Improving legal and institutional arrangements for community-based water and sanitation service delivery in Indonesia. *Water Altern*, *12*, 285–303.

Andrews, M., Pritchett, L., & Woolcock, M. (2013). Escaping Capability Traps Through Problem Driven Iterative Adaptation (PDIA). *World Development*, *51*, 234–244. https://doi.org/10.1016/j.worlddev.2013.05.011

Bappenas. (n.d.). *Function and Primary Job Ministry of National Development Planning/ National Development Planning Agency*. Retrieved May 24, 2021, from https://www.bappenas.go.id/en/profil-bappenas/tupoksi/

Bappenas. (2019). *Rencana Pembangunan Jangka Menengah Nasional IV 2020-2024: Indonesia Berpenghasilan Menengah-Tinggi Yang Sejahtera, Adil, Dan Berkesinambungan*. https://www.bappenas.go.id/files/rpjmn/Narasi%20RPJMN%20IV%202020-2024_Revisi%2028%20Juni%202019.pdf

Bayu, T., Kim, H., & Oki, T. (2020). Water Governance Contribution to Water and Sanitation Access Equality in Developing Countries. *Water Resources Research*, *56*(4). https://doi.org/10.1029/2019WR025330

BPS Provinsi DKI Jakarta. (2021). *Hasil Sensus Penduduk 2020 Provinsi DKI Jakarta*. https://jakarta.bps.go.id/backend/images/infografis-sp2020-ind.png

Cameron, L., Olivia, S., & Shah, M. (2019). Scaling up sanitation: Evidence from an RCT in Indonesia. *Journal of Development Economics*, *138*, 1–16. https://doi.org/10.1016/j.jdeveco.2018.12.001

Carlisle, K., & Gruby, R. L. (2019). Polycentric Systems of Governance: A Theoretical Model for the Commons. *Policy Studies Journal*, *47*(4), 927–952. https://doi.org/10.1111/psj.12212

Carter, R. (2013). Editorial: Researching 'how' rather than 'why.' *Waterlines*, *32*, 3–4. https://doi.org/10.3362/1756-3488.2013.001

Castro, J. E. (2007). Water governance in the twentieth-first century. *Ambiente & Sociedade*, *10*(2), 97–118. https://doi.org/10.1590/S1414-753X2007000200007

Chong, J., Abeysuriya, K., Hidayat, L., Sulistio, H., & Willetts, J. (2016). Strengthening Local Governance Arrangements for Sanitation: Case Studies of Small Cities in Indonesia. *Aquatic Procedia*, *6*, 64–73. https://doi.org/10.1016/j.aqpro.2016.06.008

Cisneros, P. (2019). What makes collaborative water governance partnerships resilient to policy change? A comparative study of two cases in Ecuador. *Ecology and Society*, *24*(1). https://doi.org/10.5751/ES-10667-240129

Crona, B. I., & Parker, J. N. (2012). Learning in Support of Governance: Theories, Methods, and a Framework to Assess How Bridging Organizations Contribute to Adaptive Resource Governance. *Ecology and Society*, *17*(1), art32. https://doi.org/10.5751/ES-04534-170132

Dewati, P., Fatiara, N., & Iqbal, M. (2017, November 21). *Mengenal Perbedaan Tim Gubernur di Era Jokowi, Ahok, hingga Anies*. kumparan.

https://kumparan.com/kumparannews/mengenal-perbedaan-tim-gubernur-di-era-jokowi-ahok-hingga-anies

Dickson, E. (2006). *Management Models of Water and Sanitation: Approaches to Decentralization in Honduras*. International Development Research Centre, Canada. http://web.idrc.ca/uploads/user-S/118347449412007_Final_Edit_Management_Models_of_Water_and_Sanitation_Approaches_to_Decentralization_in_Honduras.pdf

Dinas SDA Jakarta. (n.d.). *Struktur Organisasi Dinas Sumber Daya Air DKI Jakarta*. Retrieved March 5, 2021, from https://sumberdayaair.jakarta.go.id/index.php/frontend/struktur_org

Dinas SDA Jakarta. (2017). *Rencana Strategis Dinas Sumber Daya Air Provinsi DKI Jakarta Tahun 2017-2022*. https://sumberdayaair.jakarta.go.id/assets/uploads/informasi_publik/Renstra_2017_2022.pdf

DLH DKI Jakarta. (n.d.-a). *Air | Dinas Lingkungan Hidup DKI Jakarta*. Retrieved July 26, 2021, from https://lingkunganhidup.jakarta.go.id/program/air

DLH DKI Jakarta. (n.d.-b). *Home | Dinas Lingkungan Hidup DKI Jakarta*. Retrieved August 1, 2021, from https://lingkunganhidup.jakarta.go.id/

Dye, C. (2008). Health and Urban Living. *Science*, *319*(5864), 766–769. https://doi.org/10.1126/science.1150198

Ekane, N., Kjellén, M., Westlund, H., Ntakarutimana, A., & Mwesige, D. (2020). Linking sanitation policy to service delivery in Rwanda and Uganda: From words to action. *Development Policy Review*, *38*(3), 344–365. https://doi.org/10.1111/dpr.12428

Engel, S., & Susilo, A. (2014). Shaming and Sanitation in Indonesia: A Return to Colonial Public Health Practices?: Shaming and Sanitation in Indonesia. *Development and Change*, *45*(1), 157–178. https://doi.org/10.1111/dech.12075

Ermiza, Z. (2018, December 20). *Pemerintah Kota Medan Bermitra dengan PDAM Tirtanadi untuk LLTT*. USAID IUWASH PLUS. https://www.iuwashplus.or.id/arsip/3745

Ferriman, A. (2007). BMJ readers choose the “sanitary revolution” as greatest medical advance since 1840. *BMJ*, *334*(7585), 111–111. https://doi.org/10.1136/bmj.39097.611806.DB

Fischer, M., Nguyen, M., & Strande, L. (2019). Context matters: Horizontal and hierarchical network governance structures in Vietnam’s sanitation sector. *Ecology and Society*, *24*(3), art17. https://doi.org/10.5751/ES-11036-240317

Galli, G., Nothomb, C., & Baetings, E. (2014). *Towards systemic change in urban sanitation*. 36.

GDRC. (n.d.). *International Decade for Clean Drinking Water, 1981-1990*. Retrieved January 29, 2021, from http://www.gdrc.org/uem/water/decade_05-15/first-decade.html

Gumilangsari, S. (2020). *Business Model Development of Scheduled Desludging Service Program Under Local’s Work Units and Regional/Locals Owned Enterprises (Case study: Bekasi, Makassar, Medan, and Surakarta City)*. Bandung Institute of Technology.

Hadipuro, W. (2010). *Indonesia’s Water Supply Regulatory Framework: Between Commercialisation and Public Service? 3*(3), 17.

Herrera, V. (2014). Does Commercialization Undermine the Benefits of Decentralization for Local Services Provision? Evidence from Mexico’s Urban Water and Sanitation Sector. *World Development*, *56*(C), 16–31.

Herrera, V., & Post, A. E. (2014). Can Developing Countries Both Decentralize and Depoliticize Urban Water Services? Evaluating the Legacy of the 1990s Reform Wave. *World Development*, *64*, 621–641. https://doi.org/10.1016/j.worlddev.2014.06.026

Huston, A., & Moriarty, P. (2018). Understanding the WASH system and its building blocks. *IRC*, 40.

Iribarnegaray, M., & Seghezzo, L. (2012). Governance, Sustainability and Decision Making in Water and Sanitation Management Systems. *Sustainability*, *4*(11), 2922–2945. https://doi.org/10.3390/su4112922

JICA. (1991). *The Study on urban drainage and wastewater disposal project in the city of Jakarta. Master plan study. Main Report.* https://openjicareport.jica.go.jp/618/618/618_108_10898773.html

JICA. (2012). *The Project for Capacity Development of Wastewater Sector Through Reviewing the Wastewater Management Master Plan in DKI Jakarta, The Republic of Indonesia*. https://openjicareport.jica.go.jp/pdf/12078630_01.pdf

JICA. (2018). *Project Completion Report on The Project for Improving Planning Capacity for the Sewerage System in DKI Jakarta in the Republic of Indonesia* (p. 288). https://openjicareport.jica.go.jp/pdf/12303160_01.pdf

Johnston, D., & Budiman, J. (2007). *Reform of the Water Supply Institution of Aceh Province, Indonesia*. 4.

Kemendagri. (n.d.). *Tugas dan Fungsi Ditjen Bina Pembangunan Daerah*. Retrieved July 29, 2021, from https://bangda.kemendagri.go.id/kontent/baca_kontent/12/tugas_dan_fungsi

Kementerian Kesehatan Republik Indonesia. (n.d.). Retrieved July 29, 2021, from https://www.kemkes.go.id/article/view/13010100002/kemkes-struktur-organisasi-2014.html

PermenLH Nomor 68 Tahun 2016 tentang Baku Mutu Air Limbah Domestik. Retrieved July 23, 2021, from https://environmentalchemistry.files.wordpress.com/2018/02/permenlhk-no-68-tahun-2016-baku-mutu-air-limbah-domestik1.pdf

Kementerian Lingkungan Hidup dan Kehutanan. (2016, March). *Direktorat Jenderal Pengendalian Pencemaran dan Kerusakan Lingkungan—Kementerian Lingkungan Hidup dan Kehutanan*. https://ppkl.menlhk.go.id/website/index.php?q=127&s=008451a05e1e7aa32c75119df950d405265e0904

Kementerian PUPR. (n.d.). *Tentang Program Kota Tanpa Kumuh (Kotaku)*. Kotaku. Retrieved May 3, 2021, from http://kotaku.pu.go.id/page/6880/tentang-program-kota-tanpa-kumuh-kotaku

Permen PUPR Nomor 04 Tahun 2017 tentang Penyelenggaraan Sistem Pengelolaan Air Limbah Domestik, (2017). https://peraturan.bpk.go.id/Home/Details/104453/permen-pupr-no-04prtm2017-tahun-2017

Kementerian PUPR. (2020, September 10). *Struktur Organisasi Direktorat Jenderal Cipta Karya*. Profil Direktorat Jenderal Cipta Karya. https://pu.go.id/struktur-organisasi/direktorat-jenderal-cipta-karya

Kerstens, S. M., Spiller, M., Leusbrock, I., & Zeeman, G. (2016). A new approach to nationwide sanitation planning for developing countries: Case study of Indonesia. *Science of The Total Environment*, *550*, 676–689. https://doi.org/10.1016/j.scitotenv.2016.01.104

Kimmich, C. (2013). Linking action situations: Coordination, conflicts, and evolution in electricity provision for irrigation in Andhra Pradesh, India. *Ecological Economics*, 9.

Kimmich, C., & Tomas, S. V. (2019). Assessing Action Situation Networks: A Configurational Perspective on Water and Energy Governance in Irrigation Systems. *Water Economics and Policy*, *05*(01), 1850005. https://doi.org/10.1142/S2382624X18500054

Laquian, A. A. (2005). Metropolitan governance reform in Asia. *Public Administration and Development*, *25*(4), 307–315. https://doi.org/10.1002/pad.384

Larson, S., Alexander, K. S., Djalante, R., & Kirono, D. G. C. (2013). The Added Value of Understanding Informal Social Networks in an Adaptive Capacity Assessment: Explorations of an Urban Water Management System in Indonesia. *Water Resources Management*, *27*(13), 4425–4441. https://doi.org/10.1007/s11269-013-0412-2

Mason, N., Oyaya, C., & Boulenouar, J. (2020). Reforming urban sanitation under decentralization: Cross-country learning for Kenya and beyond. *Development Policy Review*, *38*(1), 42–63. https://doi.org/10.1111/dpr.12408

McGinnis, M. D. (2011). Networks of Adjacent Action Situations in Polycentric Governance. *Policy Studies Journal*, *39*(1), 51–78. https://doi.org/10.1111/j.1541-0072.2010.00396.x

Mitte Team. (2018, May 30). The human water cycle. *Mitte*. https://mitte.co/2018/05/30/human-water-cycle/

Morrison, T. H., Adger, W. N., Brown, K., Lemos, M. C., Huitema, D., & Hughes, T. P. (2017). Mitigation and adaptation in polycentric systems: Sources of power in the pursuit of collective goals. *WIREs Climate Change*, *8*(5), e479. https://doi.org/10.1002/wcc.479

Muhtada, D. (2016). Daerah Otonomi Khusus: Jakarta dan Yogyakarta – Agama dan Negara [University blog]. *Agama Dan Negara*. http://blog.unnes.ac.id/muhtada/2016/03/13/daerah-otonomi-khusus-jakarta-dan-yogyakarta/

Mulyana, W., & Prasojo, E. (2020). Indonesia Urban Water Governance: The Interaction Between the Policy Domain of Urban Water Sector and Actors Network. *International Journal of Sustainable Development and Planning*, *15*(2), 211–218. https://doi.org/10.18280/ijsdp.150211

Mwihaki, N. J. (2018). Decentralisation as a tool in improving water governance in Kenya. *Water Policy*, *20*(2), 252–265. https://doi.org/10.2166/wp.2018.102

Nalle, V. I. W., & Syaputri, M. D. (2019, July 12). Sanitation Regulation in Indonesia:Obstacles and Challenges to the Achievement of SDGs Targets. *Proceedings of The International Conference on Social Sciences in the 21st Century*. International Conference on Social Sciences in the 21st Century. https://doi.org/10.33422/ics21.2019.07.363

Narayan, A. S., Fischer, M., & Lüthi, C. (2020). Social Network Analysis for Water, Sanitation, and Hygiene (WASH): Application in Governance of Decentralized Wastewater Treatment in India Using a Novel Validation Methodology. *Frontiers in Environmental Science*, *7*. https://doi.org/10.3389/fenvs.2019.00198

Odagiri, M., Cronin, A. A., Thomas, A., Kurniawan, M. A., Zainal, M., Setiabudi, W., Gnilo, M. E., Badloe, C., Virgiyanti, T. D., Nurali, I. A., Wahanudin, L., Mardikanto, A., & Pronyk, P. (2020). *Achieving the Sustainable Development Goals for water and sanitation in Indonesia – Results from a five-year (2013–2017) large-scale effectiveness evaluation*. https://doi.org/10.1016/j.ijheh.2020.113584

Ostrom, E. (2005). *Understanding institutional diversity*. Princeton University Press.

Ostrom, E. (2010). Beyond Markets and States: Polycentric Governance of Complex Economic Systems. *American Economic Review*, *100*(3), 641–672. https://doi.org/10.1257/aer.100.3.641

Pahl-Wostl, C. (2009). A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, *19*(3), 354–365. https://doi.org/10.1016/j.gloenvcha.2009.06.001

Pahl-Wostl, C., Craps, M., Dewulf, A., Mostert, E., Tabara, D., & Taillieu, T. (2007). Social Learning and Water Resources Management. *Ecology and Society*, *12*(2). https://doi.org/10.5751/ES-02037-120205

Patunru, A. A. (2015). Access to Safe Drinking Water and Sanitation in Indonesia: Water and sanitation in Indonesia. *Asia & the Pacific Policy Studies*, *2*(2), 234–244. https://doi.org/10.1002/app5.81

PD PAL Jaya. (2021, April 29). *PD PAL Jaya Berbagi Pengalaman di The 6th Faecal Sludge Management | Pal Jaya*. https://paljaya.com/pd-pal-jaya-berbagi-pengalaman-di-the-6th-faecal-sludge-management/

Pemprov DKI Jakarta & Kedeputian Gubernur Bidang Tata Ruang dan Lingkungan Hidup. (2017). *Desain Besar Penyediaan Layanan Air Minum dan Air Limbah Domestik Provinsi DKI Jakarta 2018-2022*.

Peraturan Presiden Nomor 185 Tahun 2014 Tentang Percepatan Penyediaan Air Minum dan Sanitasi, Pub. L. No. 185 (2014).

Pokja AMPL Nasional. (n.d.-a). *Program Percepatan Pembangunan Sanitasi Permukiman (PPSP)*. Retrieved March 17, 2021, from http://www.ampl.or.id/program/program-percepatan-pembangunan-sanitasi-permukiman-ppsp-/1

Pokja AMPL Nasional. (n.d.-b). *Sanitasi Berbasis Masyarakat (SANIMAS)*. Pokja AMPL : Air Minum dan Penyehatan Lingkungan. Retrieved March 8, 2021, from https://www.ampl.or.id/program/sanitasi-berbasis-masyarakat-sanimas-/3

Pokja AMPL Nasional. (n.d.-c). *Struktur Pokja AMPL Nasional*. Kelompok Kerja Air Minum dan Penyehatan Lingkungan. Retrieved March 4, 2021, from http://www.ampl.or.id/about/-9632-/35

Polski, M. M., & Ostrom, E. (1999). *An Institutional Framework for Policy Analysis and Design*. 35.

PERGUB Prov. DKI Jakarta No. 41 Tahun 2016 tentang Rencana Induk Pengembangan Prasarana dan Sarana Pengelolaan Air Limbah Domestik, (2016). https://peraturan.bpk.go.id/Home/Details/61461/pergub-prov-dki-jakarta-no-41-tahun-2016

Purbo, R. K., Smith, C., & Bianchi, R. (2019). Lessons Learned from Public–Private Partnerships in Indonesia's Water Sector. *Bulletin of Indonesian Economic Studies*, *55*(2), 193–212. https://doi.org/10.1080/00074918.2018.1550250

Romano, O., & Akhmouch, A. (2019). Water Governance in Cities: Current Trends and Future Challenges. *Water*, *11*(3), 500. https://doi.org/10.3390/w11030500

Strande, L., Ronteltap, M., & Brdjanovic, D. (Eds.). (2014). *Faecal Sludge Management – Systems Approach for Implementation and Operation* (Vol. 13). IWA Publishing. https://iwaponline.com/ebooks/book/384/

Susilo, A., & Vidyattama, Y. (2020). Water and Sanitation Program in Decentralised Eastern Indonesia: The Roles of Community and Social Dynamics. *Australasian Journal of Regional Studies*, *26*(1), 30.

Trieputra, A. A. (2017). *Understanding persistent faecal sludge management challenges in selected low-income urban neighbourhoods* [IHE Delft].

https://www.narcis.nl/publication/RecordID/oai:cdm21063.contentdm.oclc.org:masters2%2F101882

UN. (n.d.). *The Human Right to Water and Sanitation*. Retrieved August 17, 2021, from https://www.un.org/waterforlifedecade/pdf/human_right_to_water_and_sanitation_media_brief.pdf

UN. (1983). *Mar del plata action plan, united nations water conference, mar del plata, argentina, 14-25 march 1977.* (p. 78 p.). Division for Economic and Social Information, DPI,. http://digitallibrary.un.org/record/136713

Whittington, D., Davis, J., Miarsono, H., & Pollard, R. (2000). Designing a “Neighborhood Deal” for Urban Sewers: A Case Study of Semarang, Indonesia. *Journal of Planning Education and Research*, *19*(3), 297–308. https://doi.org/10.1177/0739456X0001900309

WHO. (2018). *Guidelines on sanitation and health*.

WHO. (2019, June 14). *Sanitation*. World Health Organization. https://www.who.int/news-room/fact-sheets/detail/sanitation

Wieriks, M. (2011). *Water Governance and Policy Networks in Indonesia: The challenges of a decade of water sector reformation*. https://repository.tudelft.nl/islandora/object/uuid%3A98bd6995-3085-4e24-84e6-6a2cd8bec8b5

Wilderer, P. A., & Schreff, D. (2000). Decentralized and centralized wastewater management: A challenge for technology developers. *Water Science and Technology*, *41*(1), 1–8. https://doi.org/10.2166/wst.2000.0001

Willetts, J., Mills, F., & Al’Afghani, M. (2020). Sustaining Community-Scale Sanitation Services: Co-management by Local Government and Low-Income Communities in Indonesia. *Frontiers in Environmental Science*, *8*. https://doi.org/10.3389/fenvs.2020.00098

Winters, M. S., Karim, A. G., & Martawardaya, B. (2014). Public Service Provision under Conditions of Insufficient Citizen Demand: Insights from the Urban Sanitation Sector

in Indonesia. *World Development*, *60*, 31–42. https://doi.org/10.1016/j.worlddev.2014.03.017

World Bank Group. (1993). *Project Completion Report Indonesia: Jakarta Sewerage and Sanitation Project* (PCR No. 12150). https://documents1.worldbank.org/curated/en/453801468283484856/pdf/multi-page.pdf

World Bank Group. (2015). *Water Supply and Sanitation in Indonesia: Turning Finance into Service for the Future*. https://www.wsp.org/sites/wsp/files/publications/WSP-Indonesia-WSS-Turning-Finance-into-Service-for-the-Future.pdf

Appendix A. Literature Summary

Table 5 Indonesia literature summary

No.	Source	Highlight
1	(Abeysuriya et al., 2019)	Explained how planning does not necessarily translate to implementation in urban sanitation service according to political economy perspective.
2	(Afifah et al., 2018)	Explored inequalities within provinces in Indonesia regarding access to improved drinking water and sanitation.
3	(Akhmaddhian et al., 2017)	Evaluated local government policy in Kuningan Regency, East Java regarding water resources. It is indicated the policy is not effective to achieve the intended goals.
4	(Al'Afghani et al., 2019)	Analyzed legal and institutional arrangements limitation in empowering community-based water and sanitation in Indonesia. Authors proposed legal reforms and using co-management approach with the community.
5	(Chong et al., 2016)	Investigated governance and institutional arrangements for planning, budgeting, and implementing sanitation services in small cities and town in Sumatra, Indonesia. Three barriers that were found in order to deliver sanitation service effectively: prescriptive financing; constrained cross-sector sanitation committee authority; and unaligned planning and actual investment.
6	(Hadipuro, 2010)	Discussed water supply regulatory framework impact to municipal drinking water company (*Perusahaan Daerah Air Minum* - PDAMs). Result indicates the possibility of the existing framework promotes commercialization of water instead of nurturing the drinking water municipality company.
7	(Johnston & Budiman, 2007)	Developed water supply systems of Aceh reconstruction planning including corporate planning, institutional reform, and capacity building.
8	(Kerstens et al., 2016)	Developed a national sanitation planning framework to link government policy or decision to nationwide planning.
9	(Larson et al., 2013)	Examined formal and informal network in urban water management in Makassar city, Indonesia. Informal social network based on the survey is looked more closer to the desirable network compared to formal social network.
10	(Mulyana & Prasojo, 2020)	Shown urban water governance network in Bandung Metropolitan Area, West Java Province, Indonesia. Actors tend to be divided by subsectors in urban water policy domain, namely surface water, groundwater, drinking water, and wastewater.
11	(Nalle & Syaputri, 2019)	Assessed sanitation regulation on districts level. Only 34 out of 541 regencies/cities have developed sanitation regulations in 2017.
12	(Odagiri et al., 2020)	Evaluated water and sanitation SDGs goal in Indonesia on districts level. Districts with more supports related to political commitment, planning, coordination within, financing, monitoring, and supervision were more likely to be open defecation free (ODF) and have long-lasting impact.
13	(Patunru, 2015)	Inspected Indonesia water and sanitation metric related to Millennium Development Goals (MDGs). It revealed that access to drinking water is mostly through protected well and

		pump, and yet at the same time 25 per cent of those are located close to septic tank (less than 10 meters).
14	(Purbo et al., 2019)	Examined several Indonesian actors motivation in adopting public private partnership (PPP) and also discuss vertical coordination challenges in water sector.
15	(Susilo & Vidyattama, 2020)	Assessed the Community-Led Total Sanitation (CLTS) program implementation in eastern Indonesia. Local governments still considered as essential to enable community development and empowerment.
16	(Whittington et al., 2000)	Suggested a demand-driven planning approach for urban sewerage in Semarang, Indonesia. It benefits in increased and stable revenue. On the other hand, the complexity of network design increase and it brings access fairness concern.
17	(Wieriks, 2011)	Explored water (policy) network based on the role of knowledge of information. The water policy structure has been developed but it lacked acceptance in Indonesia itself.
18	(Willetts et al., 2020)	Developed co-management model between communities and local government to provide and sustain sanitation service. The article listed four minimum responsibilities for local government to have proper co-management system.
19	(Winters et al., 2014)	Discussed the equilibrium state of urban sanitation sector in Indonesia. Insufficient citizen demand met reluctant politicians to supply sanitation service limit the progress.

Appendix B. Interview

B.1 Interview procedure

The interviews in this research are executed as qualitative data collection from involved stakeholders in Jakarta domestic wastewater treatment system development to map sanitation NAAS.

Interview run-down plan

1. 5-10 minutes of introduction
    a. Introduce the researcher and goal of the interview
    b. Confirm consent and anonymity
    c. Seek permission to record
2. 30-50 minutes of interview
    a. Summarize now and then to confirm understanding
3. 5-10 minutes of wrap up
    a. Summarize what has happened during interview
    b. Remind them for the updates regarding the research
    c. Ask if a future follow-up interview would be possible if it is considered necessary
    d. Closing statement and thank you

Interview technical aspect

- Online interview using Zoom/Microsoft teams
- Video and audio record
- Anonymized transcript
- Interviewee may use screen sharing or annotation feature (exclusive to zoom software) to explain using visuals

C.1 Interviewee Credentials

- Name
- Affiliation
- Occupation and position
- Years of experience in sanitation sector

C.2 Interview Questionnaire Prerequisite

It should answer at least one of the following (Polski & Ostrom, 1999)

1. Actors' component
    - Resources
    - Values
    - Perceptions
2. Action situation component
    - Position: what are the *positions* or roles that actors play in this situation?
    - Participant: Who are the *participants*?
    - Action and linkage: What *actions* can participants take, and *how are actions linked to outcomes*?
    - Level of control: What is the level of *control* that each participant has over action in this situation?
    - Outcomes: What *outcomes* are possible in this situation?

- Information: What *information* about the action situation is available to participants?
- Costs and benefits: What *cost and benefits* do participants incur when they take action in this situation?

C.3 Interview Questionnaire

General

1. What are the main roles and responsibilities for your agency in providing sanitation services? (position)
2. Which of the three aspects, policy, regulation, and financing, do you perceive to be the most important?
3. What is going well in the aspect of these sanitation facilities in Jakarta, and what are some of the challenges? (outcomes)
    a. Why is it a problem? What is at stake? (actor's values)
4. What do you think causes these problems? (action and linkages)
    a. How the cause linked to the problem? (perception)
5. What can your organization do to address some of the identified challenges?
6. What can or should other stakeholders do? (level of control, participants, and actor's resources)
7. What would be the advantages and disadvantages of certain actions? Both for your own organization, and more generally for the stakeholders involved in sanitation service provision in Jakarta? (costs & benefits, actor's selection process)

Translation to Indonesia

1. Apa peran dan tanggung jawab utama dari organisasi anda dalam menyediakan akses sanitasi?
2. Dari ketiga aspek berikut: kebijakan, regulasi, dan pembiayaan, aspek manakah yang menurut anda paling penting dalam menyediakan akses sanitasi?
3. Apa yang berjalan dengan baik terkait aspek sanitasi di Jakarta dan apa yang menjadi tantangan?
    a. Mengapa disebut sebagai tantangan? Mengapa ini penting bagi organisasi anda?
4. Apa yang menyebabkan tantangan tersebut, menurut anda?
    a. Bagaimana faktor penyebab ini berakhir pada tantangan yang disebutkan?
5. Apa yang bisa dilakukan oleh organisasi anda terkait beberapa tantangan tersebut?
6. Apa yang bisa atau sebaiknya dilakukan oleh organisasi lain?
7. Apa saja keuntungan dan kerugian dari tindakan tertentu? Apa resikonya bagi organisasi anda sendiri, dan secara umum terhadap pemangku kepentingan yang terlibat dalam penyediaan akses sanitasi di Jakarta?

B.2 List of interviews

- Jakarta Sewerage System - zone team leader
- PD PAL Jaya director
- IUWASH Indonesia coordinator
- IUWASH Jakarta coordinator
- Ex-Ministry of Public Works and Housing
- Ministry of Public Works and Housing

Appendix C. Document Summary

Project Completion Report on The Project for Improving Planning Capacity for the Sewerage System in DKI Jakarta in The Republic of Indonesia (JICA, 2018)

Policy

- Position
  - Central government, such as Ministry of Public Works and Housing, Ministry of National Development Planning, Ministry of Environment and Forestry, and Coordinating Ministry for Economic Affairs.
    - "The state institutions related to sewerage sector are 1) Ministry of Public Works and Housing, Directorate General of Human Settlements (hereinafter referred to as "DGHS"), 2) BAPPENAS, 3) Coordinating Ministry for Economic Affairs (Kementerian Koordinator Bidang Perekonomian) (hereinafter referred to as "KEMENKO"), which is responsible for coordinating large-scale national projects such as NCICD etc., and 4) Ministry of Environment and Forestry (Kementerian Negara Lingkungan Hidup dan Kehutanan) (hereinafter referred to as "KEMENLHK")." (pg 1-18)
  - DKI Jakarta government, such as Development Planning Agency and Water Resources Agency.
    - "In the stages of sewerage development plan and legal system development, the main counterpart institutions are Regional Development Planning Board (Badan Perencanaan Pembangunaan Daerah) (hereinafter referred to as "BAPPEDA") and Dinas Sumber Daya Air" (pg 1-23)
  - Project Implementation Unit in Jakarta, namely PD PAL Jaya
    - "…PD PAL Jaya was stipulated in PIU (Project Implementation Unit) concerning sewerage projects throughout DKI Jakarta." (pg 1-23)
- Boundary Institutions related to sewage sector in DKI Jakarta (pg 1-17 – 1-18)
- Choice -
- Aggregation
  - Revised Master Plan must be incorporated for sewerage development planning. "The basis of the sewerage development of DKI Jakarta is the New Master Plan for Wastewater Management in DKI Jakarta (March 2012) formulated with the support from JICA." (pg 2-76)
  - Mid-term sewerage development plan must reflect strategic program created by Water Resource Agency and five-year plan by PD PAL Jaya. "The mid-term sewerage development plan will be formulated reflecting the data of the strategic program (5-year Strategic Program) created by Dinas Sumber Daya Air (Dinas Sumber Daya Air, former Dinas Tata Air)." (pg 2-79) "PD PAL Jaya has also formulated its own long-term five-year plan. This content will be reflected in the Strategic Program of Dinas Sumber Daya Air and the Mid-Term Sewerage Development Plan of BAPPEDA." (pg 2-80)
  - NCICD plan must be incorporated into the mid-term plan. "Incorporating the NCICD plan into the mid-term plan means introducing advanced treatment process to many wastewater treatment plants, and it is under discussion whether or not facility plan of wastewater treatment plants is possible in the currently proposed lands." (pg 2-81)
- Information -

- Payoff DKI Jakarta Mid-Term Development Plan (RPJMD) 2018-2022: Sewerage edition (pg 2-80)
- Scope Sewerage development planning

Regulation

- Position Water Resource Agency, Environment Agency (table 2-6 in page 2-10)
- Boundary Administrative agency related to sewerage work in DKI Jakarta (table 2-6 in page 2-10)
- Choice -
- Aggregation -
- Information -
- Payoff -
- Scope Monitoring/ inspection and regulation/standard

Financing

- Position Overseas donors, such as ADB, World Bank, JICA, Australia, and South Korea (table 1-4 in pg 1-7), implementing agency, such as Ministry of Public Works and Housing
- Boundary -
- Choice -
- Aggregation -
- Information -
- Payoff -
- Scope -

Project for Capacity Development of Wastewater Sector through Review of Wastewater Management Master Plan in DKI Jakarta (JICA, 2012)

Policy

- Position Existing institution/agencies related to wastewater and sludge treatment (pg G-9)
- Boundary Jakarta province (pg G-9)
- Choice -
- Aggregation -
- Information -
- Payoff cost: existing agencies staff secondment to institutional reform committee. (pg G-9)
- Scope New task configuration (pg G-9)

Regulation

“Preparation of water quality standard for wastewater discharge to sewerage” (table A2-2 in pg A-3)

- Position -
- Boundary -
- Choice -
- Aggregation -
- Information -
- Payoff -

- Scope Wastewater law formulation.

Financing (investment)

“Since the local governments do not favor to get a loan for the construction of sewerage works as they consider that the sewerage works is not a profitable business. Financial resources such as the JICA loan for sewerage plan in DKI Jakarta will be arranged by the MPW (Ministry of Public Works) of the central government as a grant.

… “Matching grant” principle is applied. On a condition that the local government shoulder some part of the project cost, the central government will bear the same scale of cost as the grant.

In addition, the facilities for which the central government can finance are limited to the facilities that the central government can manage such as the wastewater treatment plant, main trunks and the important environmental facilities, and the facilities that the central government cannot manage such as the house connection must be covered by the local government.” (pg B-22)

- Position Three position. DKI Jakarta (main investor), MPW (loan taker, investor or grant giver), JICA (loaner)
- Boundary -
- Choice Regional level stakeholder can commit some amount to construction of sewerage works (“On a condition that the local government shoulder some part of the project cost, …”), MPW can decide matching grant and look for donor that is willing to loan or grant (“Financial resources such as the JICA loan for sewerage plan in DKI Jakarta will be arranged by the MPW of the central government as a grant”).
- Aggregation Regional must commit to the investment of construction before MPW match the grant to meet the budget needed.
- Information -
- Payoff DKI stakeholders received budget to execute sewerage projects.
- Scope Facilities that the central government can manage. (“the facilities that the central governance can finance are limited to the facilities that the central government can manage ….”)

Financing (operational)

“Sewerage tariff (for revenue calculation) is based on the sewerage tariff stipulated in the order of the governor of DKI Jakarta in 2011, …”

“As of 2011, PD PAL JAYA is presenting a proposal for revised sewage charges to the Governor of DKI Jakarta. It is anticipated that the Governor’s approval will be received and a gubernatorial ordinance concerning charge revision will be issued in 2012.” (pg E-34)

- Position Two position. PD PAL Jaya (sanitation operator), Governor of DKI Jakarta (Region leader).
- Boundary -
- Choice PD PAL Jaya can set sewage charge by presenting a proposal for revised sewage charges. Governor can approve the proposed charge by issuing charge revision.
- Aggregation New tariff is implemented when proposed charge is accepted by governor.
- Information -
- Payoff -

- Scope Sewage tariff.

Program Management Manual (MPP) for the Acceleration of Residential Sanitation Development (PPSP) 2020-2024 (PMU PPSP,2020)

Policy

- Position Bappenas (Program Management Unit), PUPR (Technical Program Implementation Unit), Kemendagri (Institutional and Financing Program Implementation Unit), and Kemenkes (Advocacy and Empowerment Program Implementation Unit) (pg 23)
- Boundary Ministry that related with urban sanitation development
- Choice -
- Aggregation -
- Information -
- Payoff -
- Scope PPSP daily program management

Financing

- Position -
- Boundary potential source (pg 8)
- Choice -
- Aggregation -
- Information -
- Payoff -
- Scope sanitation development financial source (pg 8)

Analysis of Target Achievement and Domestic Wastewater Management Development Plan in Indonesia (Bemaco Rekaprima, 2018)

Policy

- Position Regional stakeholders (pg 7-10)
- Boundary -
- Choice Regional stakeholders can decide form of sanitation operator in the region: Dinas (Executive Agency), UPTD (Local Technic Implementation Unit), BLUD (Local Public Service Agency), or BUMD (Local Owned Enterprise). (pg 7-10)
- Aggregation -
- Information -
- Payoff -
- Scope Regional sanitation stakeholder role and responsibility mapping (pg 7-10)

Regulation

- Position Regional leader, and Ministry of Environment and Forestry (pg 3-44)
- Boundary -
- Choice Ministry of Environment and regional leader can tighten the standard. (pg 3-44)
- Aggregation Standard made by regional leader must stricter than the standard made by ministry of environment. (pg 3-44)
- Information -

- Payoff -
- Scope Domestic wastewater effluent quality standard

Production

- Position Operator (UPTD, BLUD, BUMD) (pg 4-22)
- Boundary Indonesia sanitation operator (pg 4-22)
- Choice Operator can maintain treatment plant. (pg 4-22)
- Aggregation Operator can maintain treatment plant optimally when there is enough budget. (pg 4-22)
- Information -
- Payoff -
- Scope

Appendix D. Action situation component variables

National Policy

JICA, 2012

- Participants: Drinking water and environment preservation working group member:
  - Ministry of National Development Planning
  - Ministry of Public Works and Housing
  - Ministry of Environment and Forestry
  - Ministry of Internal Affairs
  - Ministry of Health
  - Ministry of Finance
  - Ministry of Education and Culture
  - National Bureau of Statistics
- Outcomes: National sanitation policy.

PMU PPSP, 2020

- Participants: Urban sanitation acceleration plan (PPSP) daily program manager
  - Ministry of National Development Planning – Program manager unit
  - Ministry of Public Works and Housing – Program Implementation Unit of technical aspect
  - Ministry of Health – Program Implementation Unit of advocacy and empowerment aspect
  - Ministry of Internal Affairs – Program Implementation Unit of institutional and financing aspect
- Choice:
- Outcomes:

Interview 1

- Participants:
- Choice:
- Outcomes: National sanitation policy as part of National Medium-Term Development (RPJMN)

Interview 4

- Participants:
  - IUWASH – advisor
  - Ministry of Public Works and Housing – Sanitation infrastructure supervisor
  - Ministry of National Development Planning – General policy director
- Choice:
- Outcomes:

Interview 5

- Participants:
  - Ministry of Public Works and Housing
- Choice:
  - Policy formulation, capacity building, and performance monitoring
- Outcomes:
  - Ministry of Public Works and Housing activity program

Interview 6

- Participants:
  - Ministry of Public Works and Housing – Supervisor of sanitation services technical aspect
- Choice:
  - Policy formulation, capacity building, and performance monitoring
- Outcomes:
  - Ministry of Public Works and Housing activity program

Table 6 National Policy Action Situation variables (italic words: assumption)

Participants	Choice	Benefit	Outcomes	Etc
PUPR (infrastructure)	*Technical (major infrastructure)*	*[infrastructure]*		*Position Control Information*
Bappenas (general planning)	*General planning*	*[national planning] [integrated plan]*		
Kemendagri (institutional capacity)	*Institutional capacity*	*[human resource capacity] [institutional capacity]*		
KLHK (environment monitoring)	*Environmental monitoring*	*[monitoring] [water body quality] [compliance]*		
Kemenkes (health and sanitation behavior)	*Advocacy and empowerment (behavior change)*	*[public health] [sanitation behavior]*		

Jakarta Policy

JICA, 2018

- Participants: (pg 2-12)
  - Ministry of Public Works and Housing (national sanitation PIC - observer),
  - DKIJ Regional Development Planning Agency (Jakarta policy director),
  - DKIJ Water Resource Agency (main regulator),
  - PD PAL Jaya (main operator),
  - DKIJ Environmental Agency (monitor water body quality),
  - DKIJ Spatial Planning Bureau (spatial planner),
  - DKIJ Permit and Investment Body,
  - DKIJ Housing and Settlement Agency (Jakarta housing and settlement PIC)
- Choice:
- Information:
  - Jakarta sanitation working group meet once every two weeks (pg 2-13)
- Outcomes:
  - Jakarta Sewerage System (JSS) project implementation guideline/coordination (pg 2-11)

JICA, 2012

- Participants: Existing institution/ agencies related to wastewater and sludge treatment in Jakarta (part-G)
- Choice:
- Outcomes:
    - Improved institutional framework plan

Bemaco Rekaprima, 2018

- Participants: Regional stakeholders
- Choice:
    - Regional stakeholders can decide form of sanitation operation in the region: (a) executive agency (*dinas*), (b) local technical implementation unit (UPTD), (c) local public service agency (BLUD), (d) local owned enterprise (BUMD).
- Outcomes:
    - Regional sanitation stakeholder role and responsibility mapping

Interview 1

- Participants:
    - Ministry of Development Planning
    - Ministry of Public Works and Housing
    - DKIJ Development Planning Agency
    - DKIJ Water Resource Agency
    - PD PAL Jaya
    - IUWASH
    - World Bank
- Choice:
    - All stakeholders are permitted to participate in planning discussion
- Benefit:
    - Clear task distribution
- Outcomes:
    - JSS project

Interview 2

- Participants:
    - IUWASH
    - Governor advisory team (TGUPP)
- Choice:
    - Governor advisory team can ask IUWASH for advice on how to improve the provision of sanitation services in Jakarta
- Outcomes:
    - Advice to DKIJ governor

Interview 3

- Participants:
    - PD PAL Jaya – technical operator
    - DKIJ Water Resource Agency – technical regulator
- Choice:
    - Coordination between participants
- Outcomes:
    - Business plan for PD PAL Jaya

- Medium-term plan for DKIJ Water Resource Agency

Table 7 Jakarta Policy Action Situation variables

Participants	Choice	Benefit	Outcomes	Etc
IUWASH	*Giving advice improving policy and operational plan*	*Improve sanitation access of Jakarta population*		*Position: Control: Information*
TGUPP	*Giving advice and input to governor and executive agencies related to strategic policy*	*[advice]*		
PD PAL Jaya	*Sustain sanitation access quality*	*[profit]*		
DSDA	*Improve sanitation access through infrastructure construction*	*[infrastructure] [access]*		
Bappeda	*DKI Jakarta Policy setting*	*DKIJ development plan [plan]*		
Governor	*Political will*	*[general welfare]*		
DLH	*Effluent monitoring*	*[effluent quality] [compliance]*		
PUPR	*Guarantee*	*National development*		

National Regulation

JICA, 2012

- Participants:
  - Ministry of Public Works and Housing
  - Indonesian Parliament
- Choice:
  - Ministry of Public Works and Housing may draft sanitation law
  - Indonesian Parliament may promulgate national law
- Control:
  - National law can only be promulgated by Indonesian Parliament
- Outcomes:
  - (missing) sanitation law

Bemaco Rekaprima, 2018

- Position:
  - Ministry of Environment and Forestry

- Choice:
  - Ministry of Environment and Forestry can set new effluent standard
- Outcomes:
  - Effluent standard and monitoring procedure

Table 8 National Regulation Action Situation variables

Participants	Choice	Benefit	Outcomes	Etc
Ministry of Public Works and Housing	Draft sanitation law, Promulgate ministerial decree of wastewater management system provision	*Legal ground for sanitation service development plan [infrastructure]*		*Posititon Control Information*
DPR RI	Promulgate sanitation law	*Legal ground for sanitation; [legal ground]*		
Ministry of Environment and Forestry	Promulgate ministerial decree of domestic wastewater quality standard	*Legal ground for wastewater treatment activity; [compliance], [water body quality]*		

Jakarta Regulation

JICA, 2018

- Participants:
  - DKIJ Water Resource Agency
  - DKIJ Environmental Agency
- Choice:
- Outcomes:
  - Monitoring and inspection for DKIJ Environmental Agency
  - Supervision for DKIJ Water Resource Agency

Interview 1

- Participants:
  - Governor
- Choice:
  - Governor can tighten the effluent standard
- Outcomes:
  - Regional quality standard of domestic wastewater effluent

Interview 3

- Participants:
  - DKIJ Environmental Agency
- Choice:
  - DKIJ Environmental Agency decide resources that will go to monitoring

    - DKIJ Environmental Agency can conduct unannounced inspection
- Benefit:
    - Compliance
- Outcomes:
    - Monitoring

Table 9 Jakarta Regulation Action Situation variables

Participants	Choice	Benefit	Outcomes	Etc
PD PAL Jaya	Violation or obedience	*Cost and treatment quality; [profit]*		*Position: Control: Information:*
Governor	Set effluent discharge standard	*[general welfare]*		
DKIJ Environmental Agency	Monitor, Punishment	*Lower water body strain; [compliance]*		

National Financing

JICA, 2018

- Participants:
    - Ministry of Public Works and Housing
    - Overseas donors, such as ADB, Australia, JICA, South Korea, and World Bank
- Choice:
- Outcomes:

JICA, 2012

- Participants:
    - Ministry of Public Works and Housing (loan taker and grant giver)
    - JICA (loaner)
- Choice:
    - Ministry of Public Works and Housing can pick whether to give a grant to the subnational government from their budget or from taking a loan
- Benefit:
    - Jakarta provincial stakeholders received budget to execute sewerage projects
- Outcomes:
    - Loan to construct major infrastructure

PMU PPSP, 2020

- Participants:
- Choice:
- Outcomes:
    - Sanitation development financial source, such as regional budget (APBD), national budget (APBN), public private partnership, corporate social responsibility, crowd funding, donor, micro credit

Table 10 National Financing Action Situation variables

Participants	Choice	Benefit	Outcomes	Etc
PUPR (loan taker and grant matcher)	Find donor	*[Grant] [Infrastructure]*		*Position: Control: Information:*
JICA (overseas donor)	Giving loan	*[bilateral relationship]*		

Jakarta Financing

Interview 1

- Participants:
  - Jakarta provincial government
- Choice:
- Outcomes:
  - Provincial budget proportion for sanitation sector

Interview 2

- Participants:
- Choice:
- Outcomes:
  - Provincial budget proportion for sanitation sector

Interview 3

- Participants:
  - PD PAL Jaya
  - Jakarta provincial government
- Choice:
  - Jakarta provincial government can choose to grant PD PAL Jaya a regional investment budget
- Outcomes:
  - Regional investment budget given to PD PAL Jaya

Interview 5

- Participants:
  - Governor/District mayor
- Choice:
  - Setting tariff
- Outcomes:
  - Cost recovery of the local owned enterprise

Table 11 Jakarta Financing Action Situation variables

Participants	Choice	Benefit	Outcomes	Etc
PD PAL Jaya	Improve efficiency to reduce expenses	*[profit]*		*Position: Control Information*

DKIJ Water Resource Agency	Request budget	*[infrastructure]*		
Governor	Grant budget request	*[general welfare]*		

Jakarta Production & Provision

Table 12 Jakarta Production & Provision Action Situation variables

Participants	Choice	Benefits	Outcomes	Etc
PD PAL Jaya (operator)	Service operation			Position Control Information
Water Resource Agency (regulator)	Activity program			
IUWASH PLUS (development partner)				