

FSM

INNOVATION

**Moving Towards Improved Urban Septage
Management at Scale in Indonesia**

A. K. MARDIKANTO, A. INDIYANI, M. LISTYASARI, R. SIREGAR

Moving Towards Improved Urban Septage Management at Scale in Indonesia

A. K. Mardikanto, A. Indiyani, M. Listyasari, R. Siregar

EXECUTIVE SUMMARY

Indonesia made substantial progress towards achieving its sanitation targets leading to the Millennium Development Goals (MDGs). This encouraged the national government to set universal access targets for sanitation in the 2015–2019 National Medium Term Plan. Recognizing affordability constraints, onsite systems will remain the main wastewater management option in most urban (and rural) areas, making improved urban fecal sludge management essential. Fecal sludge management (FSM) will also be a key factor in Indonesia meeting the Sustainable Development Goal (SDG) targets for sanitation.

One key lesson learned in the past five years is that high level local commitment, a clear institutional setting, and appropriate local regulations are essential foundations to improve FSM services. This is *the* key to the success of Indonesia's decentralized system. The commitment of local government must also be demonstrated through adequate budget support. The designated institution needs a clear mandate, and roles and responsibilities that are specified in local regulations. The city water utility is often the most appropriate institution to manage FSM – in cities where the water network serves most of the residents. Where this is not the case, alternatives need to be considered. A clear regulation must define the responsibilities of all stakeholders.

Another key lesson is the importance of the technical and financial aspects. The operational models (scheduled or non-scheduled emptying) should be selected to suit the conditions of local government, the capacity of the operator and treatment plant, and city conditions. Adequate revenue for operation and maintenance must be available to ensure sustainability. Local governments need to provide adequate funds to support the services until they achieve economies of scale and recover costs through tariffs.

A third lesson is that on-going promotion is not an optional extra. Although the customers in the pilot

stage were households with a standard septic tank, promotion to all households' is essential to ensure that the services can be delivered at scale. Therefore, raising public awareness and understanding, and people's willingness to engage desludging services is extremely important.

CONTEXT

Indonesia is the world's fourth largest country by population, with a population of 260 million people (2016). Its current population growth is at the rate of 1.38 percent per year, a decrease from 1.49 percent 10 years ago. The country's GDP is USD 725.6 billion or around USD 2,797/capita (2016), up from USD 528 billion in 2010 (USD 2,213.7/capita).¹

Urban areas in Indonesia are growing rapidly, and an estimated of two thirds of the population will be living in urban areas by 2035. Urbanization is a major factor contributing to the country's economic growth. However, Indonesia still needs to catch up on infrastructure development to transform the potential of its growing urban population into real economic growth. Currently, the urban poor population makes up 7.73 percent (10.48 million people) of the total 27.76 million poor people in the country (10.7 percent of the country's total population).

Urban sanitation and FSM services

Indonesia made good progress towards achieving its sanitation targets in the MDGs, and by 2015, 61 percent of the population had access to improved sanitation, up 36 percentage points from 1990.² This considerable achievement, along with other motivators has encouraged the national government to push the sanitation agenda forward by setting universal access targets for sanitation in its 2015–2019 National Medium Term Plan. The target recognizes the continued dominance of on-site sanitation systems, as well as the importance of improving these systems by employing fecal sludge management (FSM). Recognizing affordability constraints, onsite systems will continue to be the main wastewater management option in most urban (and rural) areas (Figure 2).

Consequently, improved urban FSM is essential. FSM is also recognized as the means for the country to move towards its SDG targets on sanitation.

URBAN SANITATION IS STILL UNDERDEVELOPED AND URBAN SEWERAGE ACCESS IS ONE OF THE LOWEST RATES IN ASIA

Urban sanitation is still underdeveloped and urban sewerage access is one of the lowest rates in Asia. Less than two percent of the urban population has access to a sewer connection despite an estimated 82 percent of the urban population having access to improved sanitation. The majority of urban residents use onsite sanitation systems with pour-flush pan toilets provided by the household. Despite having these so-called septic tanks ('tangki septik' in Indonesian), 84 percent of fecal waste is contained in soak-pits or unsealed tanks.³

Almost 70 percent of onsite units have never been desludged, and less than 5 percent are desludged at five-year intervals. Most sludge emptying services are

carried out by mechanical vacuum tankers operated by informal private businesses or local government departments and units. They operate on an on-demand basis, usually due to tank overflows, blocked toilets or bad smells. The typical cost of emptying is USD 15.00 – USD 50.00, but can be as high as USD 77.00.

Data from 2012 shows that around 90 percent of the 150 sludge treatment plants built since the 1990s are either no longer in operation or perform poorly.⁴ Overall, less than four percent of septage in Indonesia is safely treated (Figure 1).

The evidence of the poor condition of on-site systems and septage disposal and treatment has driven the national government to start improvements by reviewing and updating the institutional arrangements, regulations, financial resources, and operational aspects of the whole sanitation service chain, and to improve the existing on-demand desludging services and introduce scheduled desludging services, wherever possible.

FSM in National and city urban sanitation policy and regulation

In addition to the National Medium-Term Development Plan 2015-2019 a new environmental law (No.32/2009) on Environmental Protection and Management and a new regulation No. 68/2016 on effluent standards

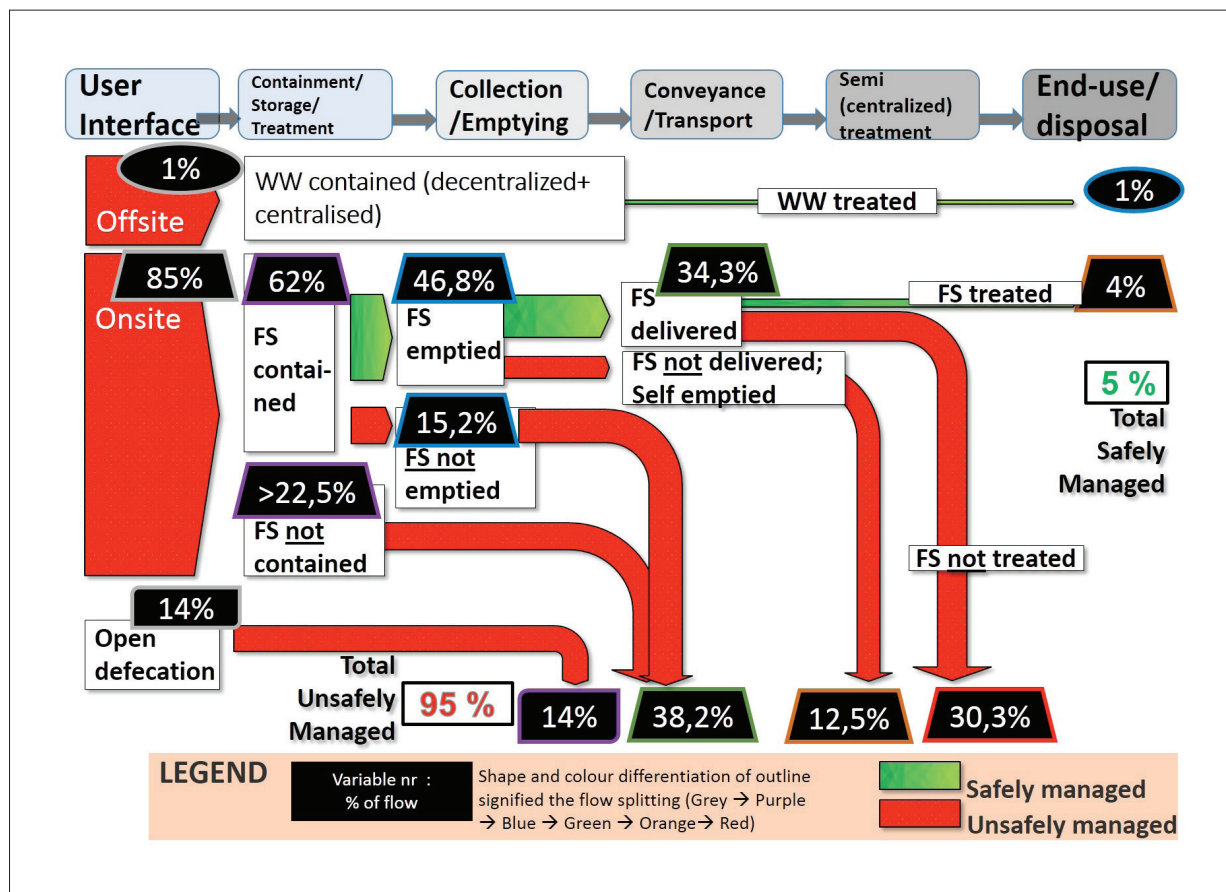


Figure 1: Fecal waste flow diagram for urban sanitation in Indonesia

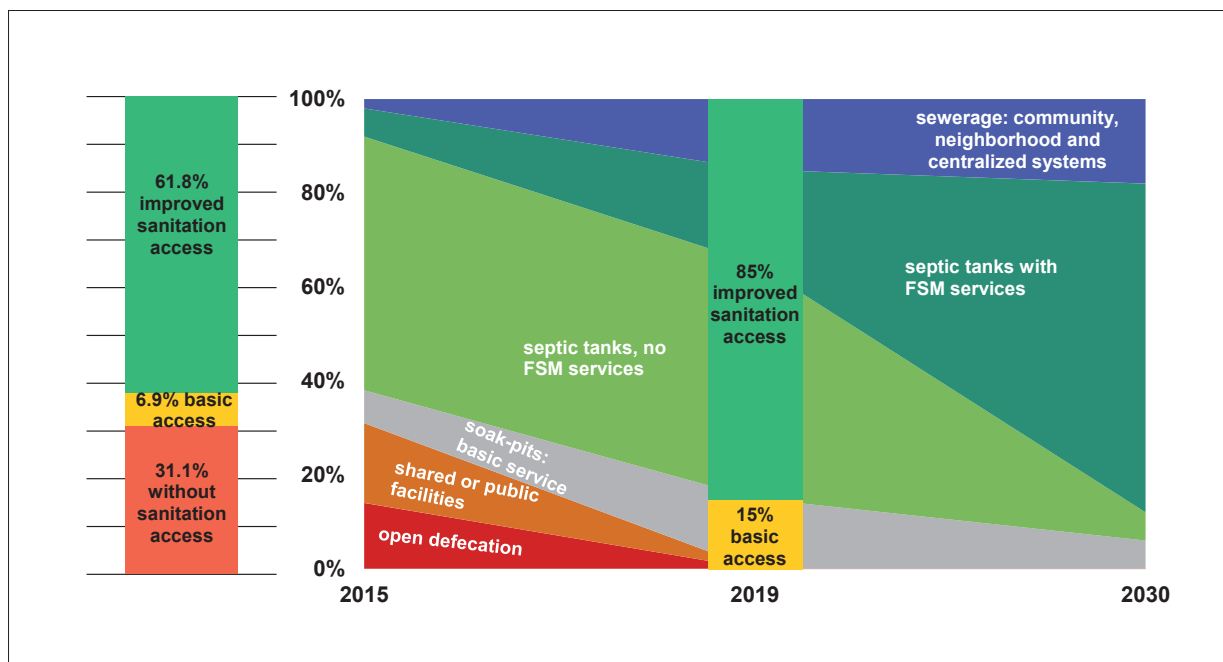


Figure 2: Schematic diagram of Indonesia existing-to-target sanitation access

issued by Ministry of Environment and Forestry have encourage the national government to push local governments to take responsibility for their wastewater management, including improving fecal sludge management. An upcoming regulation which reflects the national government's commitment to having safely managed sanitation creates is driving a systematic and comprehensive approach to FSM application in Indonesian cities.

Decentralization of government began in Indonesia in 1999. Under Law No. 23/2014 on Local Governance, wastewater management, and development, operation and improvement of FSM is the responsibility of local government (city and district governments). For this reason, national government initiated a facilitation process to strengthen the local governance of sixteen cities with the support of development partners. As of 2016 this process had been replicated in more than 20 cities and these cities are currently at different stages of implementation. This is due to the varying level of commitment of city decision-making stakeholders, development of city regulations and readiness of the designated institutions to be responsible for regular desludging or/and improving the on-demand emptying system. For this case study, four cities have been selected and from which the lessons learned on improving FSM are drawn. The cities are: Balikpapan, Bekasi, Malang, and Tabanan.⁵

FSM completes the current efforts by government to manage domestic wastewater. It provides an appropriate wastewater management option to complement offsite sewerage systems (Figure 2), which few cities have. As a system, FSM supports

government efforts to improve on-site sanitation, which until recently focused solely on the construction of sludge treatment plants. FSM in Indonesia aims to improve the institutional, regulation, financial, and operational aspects of the whole sanitation service chain, by improving existing on-demand desludging services and introducing scheduled desludging services.

SUMMARY OF FSM INTERVENTIONS

Together with several sanitation development partners, government has prepared and piloted models for a comprehensive approach to ensure that septage is safely and sustainably collected, transported, treated and reused. The national government promotes to local governments the importance of having improved FSM. As the first step on the advocacy agenda, an assessment of sanitation service delivery performance is conducted using a city Fecal Waste Flow Diagram or SFD. The fecal waste flow diagram for Balikpapan is shown in Figure 3. The diagram shows the proportions of fecal waste that are safely managed and discharged unsafely to the environment. It has been used in eight pilot cities and currently being shared with more local governments and city facilitators to scale up the application as an advocacy tool to highlight real challenges. It has also served as a tool to help local government to prioritize investments to improve the sanitation conditions.

FSM models

Two models for improved fecal sludge management are being used: scheduled and non-scheduled (also known as on-call, on-request, or on-demand)

emptying services. Although the government’s vision is to have the cities implementing scheduled desludging, the on-demand services will be used in the short to medium term as a transition to scheduled emptying and in places where there is insufficient capacity to develop and operate scheduled emptying services. Currently, Ministry of Public Works and Housing data (as of June 2017) show that out of 488 cities in Indonesia, only 15 percent has a unit responsible for wastewater management (through technical units or utilities) while most of them (75 percent) still use local government offices, which do not allow for separation of the role of regulator and operator.

NATIONAL GOVERNMENT REQUIRES LOCAL GOVERNMENTS TO PREPARE PLANS FOR IMPROVED FSM BEFORE THEY CAN ACCESS SUPPORT TO BUILD SEPTAGE TREATMENT PLANTS

Scheduled desludging has been introduced in these four cities while simultaneously improving the existing on-demand emptying system. Defined as mandatory regular desludging for all or targeted onsite units, implementation of the scheduled desludging has several prerequisites, including local regulation

requiring all onsite units to be emptied regularly. It also needs a well-organized and designated operator. To prepare for effective scheduled desludging, national government expects cities to first improve their on-demand desludging services, which includes preparing for and improving onsite units, septage treatment plants, payment mechanisms, and monitoring and evaluation processes.

Although initiatives on FSM are supported by a variety of institutions, including development partners, there is a common approach to providing technical assistance to the cities. The approach is divided into three steps: (1) formative research to assess the current situation and challenges, which are critical to design a response, (2) identify informed choices relevant to the city and also important for the national government to contribute to the development of policies and guidelines as well as contributing to other cities developing FSM approaches, and (3) improving the FSM services by working on different aspects, including as institutions, regulations, financial and operations, promotion programs and strengthening the private sector involvement. See Figure 4.

To reflect and incentivize the commitment of local governments, the national government requires local governments to prepare plans for improved FSM before they can access support to build septage treatment plants. This includes wastewater institutions

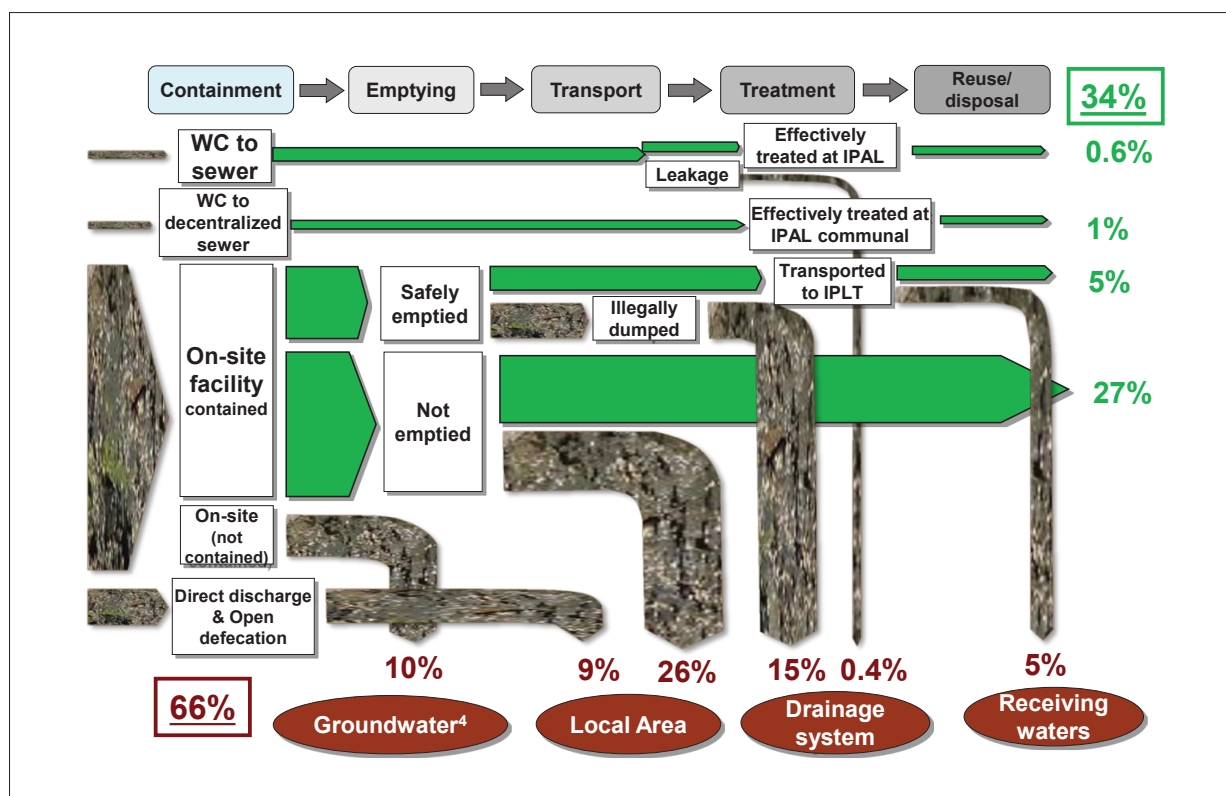


Figure 3: Fecal waste flow diagram for Balikpapan

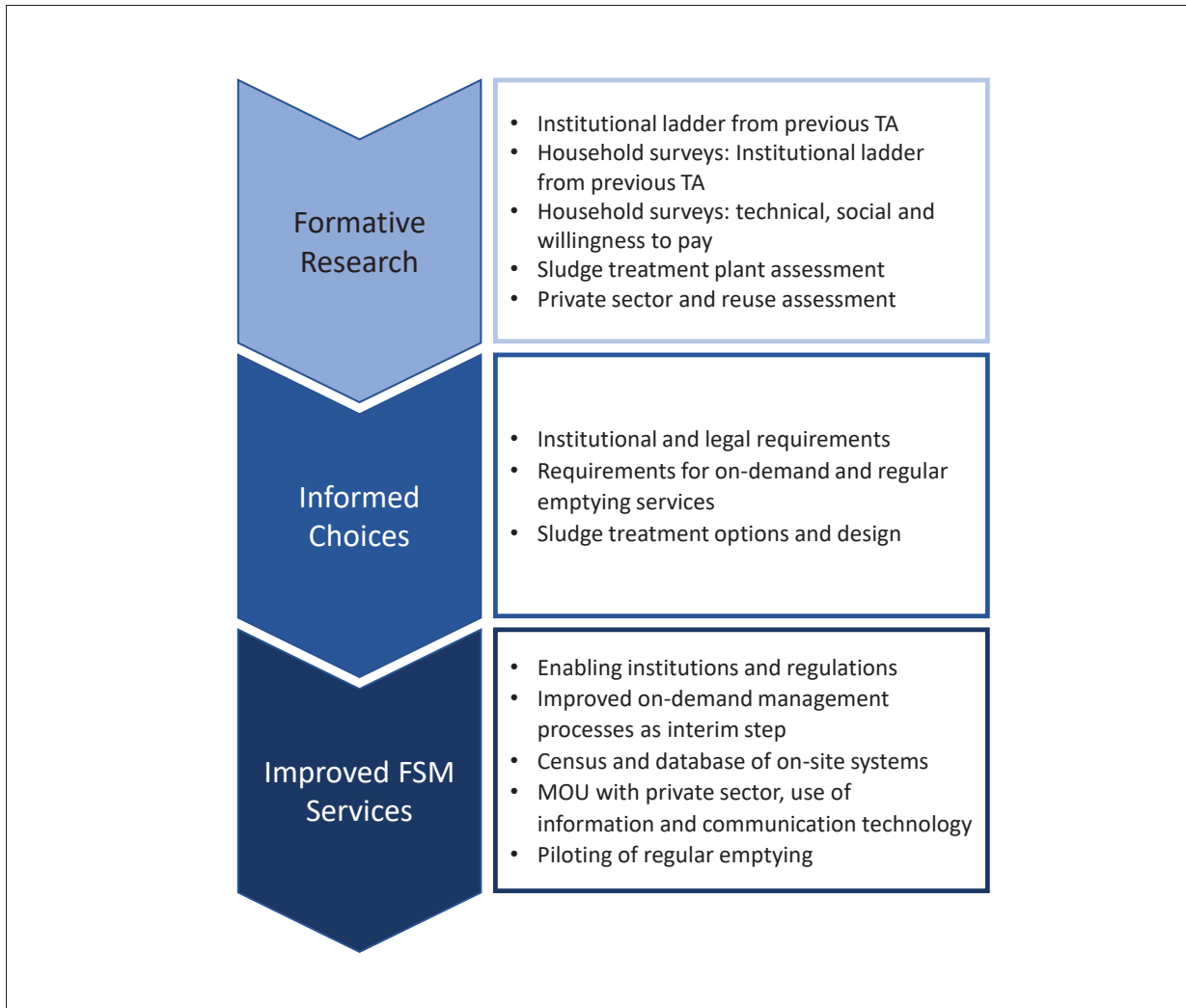


Figure 4: Typical technical assistance approach to improve FSM in cities

and local regulations being ready before support can be provided to the cities.

Enabling the managing institutions

Usually, FSM falls under the responsibility of the Office of City Cleanliness, which in some cities is also responsible for parks and cemetery management. However, FSM in this context is limited to the management of septage treatment plants and government desludging trucks. Another office, usually the Office of Public Works, or in some cities the Office of Human Settlements, deals with offsite sanitation systems, most of which are communal managed sanitation systems or other small systems at a community scale. Generally, an ongoing challenge is the uncertainty about institutional responsibility for sanitation at local level, along with the variety of departments involved, and frequent gaps in responsibility for some components in the sanitation service chain.

In 2016, Government Regulation 18/2016 on Local Government Apparatus brought about a rearrangement of offices at local level. This has

impacted the offices managing wastewater, septage treatment plants, and the environment. Although many cities are still adjusting to the new arrangements, it is expected that this will increase the efficiency of fecal sludge management at local level.

Therefore, one of the main activities of the national government is to support the local government to define the designated institutions, which differ from one city to the another. This requires a mandate from the Mayor, detailing the roles and responsibilities for FSM. Support has been given to the city of Balikpapan to improve their water utility to manage FSM and to the cities of Bekasi and Tabanan to improve their technical service units. In Bekasi, support was also helped to redefine the structural arrangement and the scope of tasks assigned to the technical service unit. This involved transferring management authority from the Office of City Cleanliness to the Office of Public Works and extending its tasks to manage all wastewater management of the city.

Malang would prefer to adopt the Balikpapan model of the water utility managing the city’s fecal sludge.

Despite its willingness, the utility is finding it difficult to extend its role to managing domestic wastewater due to its formal mandate. The city's existing technical service unit requires restructuring and capacity building to handle FSM implementation. Therefore, the Mayor needs to make a formal decision about which institution is responsible of FSM and overall city domestic wastewater management.

Preparing local regulations

Local sanitation regulations are very important to FSM implementation, due to the decentralized governance system. Most cities do not have a specific regulation for domestic wastewater management, let alone fecal sludge management. However, several cities have separate regulations covering onsite desludging arrangements and tariffs, although exact figures are unknown.

In Balikpapan, prior to 2014 there was no legal basis for a water utility managing a small sewerage system. This allowed the local government to legally clarify the mandate of the water utility to that of managing all wastewater, including FSM implementation. A local regulation (10/2014) states that the city water utility is the sole institution responsible for wastewater management in Balikpapan. Local regulation 8/2016 on wastewater management obliged building owners in non-sewered areas to build septic tanks that comply with the government technical standards and to desludge regularly. This provision also applies to communal decentralized wastewater systems. Mayoral Decree 24/2016 regulates the technical implementation of the law, for example the technical criteria for building permits for on-site sanitation systems area, the specifications for septic tank access lids and holes, the calendar for scheduled desludging, and that septage must be disposed of in the city's septage treatment plant.

Bekasi issued Mayoral Regulation 45/2015 on domestic wastewater management, and plans to issue a higher level local regulation. In Tabanan, the regulation existing prior to city facilitation regulates only the tariff for septic tank desludging services. Following facilitation, Tabanan has prepared a draft Mayoral Regulation on domestic wastewater management, including regular and on-call desludging, as well as draft revision to the local regulation on desludging tariffs and a draft of its implementing regulation in form of Mayor's Regulation.

In Malang, Local Regulation No. 2 on domestic wastewater management was issued in 2017. Other than requiring some time to see its impact on FSM implementation, the regulation appears not to provide clear directives on the role of the water utility in FSM.

Implementing the advocacy and promotion agenda

As local government has full authority for FSM, advocacy is necessary to get the top decision makers at city level on board for full improvement of FSM. Advocacy is usually carried out through courtesy visits to local government heads and heads of related offices in local government, especially the heads of the development planning agency, office of public works/human settlements, office of city cleansing, and water utilities, as well as technical consultation visits to technical personnel in those offices. Local working groups on water and sanitation have also been one of the entry points for advocacy with local governments, as seen in the case of Balikpapan case. The SFD was also used in Balikpapan to present field research data to the local working group on water and sanitation, helping the group to understand the scale and nature of the challenges and identify the urban sanitation priorities to address the challenges. Balikpapan, Bekasi, and Tabanan have prepared advocacy and promotion plans for improved desludging services. This includes planning, design and production of advocacy and promotion tools, and implementation of promotion events. Promotional videos were made for these cities, and some cities engage staff from the wastewater institutions as the talents. Discussions have also been held with mayors or district heads and with parliament members and media representatives.

PROMOTIONAL VIDEOS WERE MADE..., AND SOME CITIES ENGAGED STAFF FROM THE WASTEWATER INSTITUTIONS AS THE TALENTS

Since the advocacy, the mayors of Bekasi, Tabanan, and Balikpapan have committed to implementing FSM. In Bekasi, improvements to the technical unit include increasing the number of staff from 20 (on a salary of USD 60.00/month) to 45 (on a salary of USD 300/month). The former managed a 120 m³/day operation using conventional technology (not to full capacity); the latter, a 270 m³/day operation using a fully mechanical system to increase desludging, and provide additional customer services and marketing for expand its reach. Another key improvement was the increase in the local government budget for the technical unit to USD 540,000 (in 2017). This budget increase is clear evidence of support from decision makers, including the local parliament.

In Tabanan, however, the commitment has lacked follow up. For example, the FSM budget has not

changed despite the increase in income from on-call FSM services in 2016, and the annual plan does not include a regular desludging pilot for 2017. In addition, the local government has not made any progress with the draft regulations and has yet to firm up the decision on desludging tariffs and the institution responsible for fecal sludge collection.

Developing a census and database of on-site units

This will enable local governments to have a complete record of their scheduled and on-demand desludging customers. An Android app has been developed that allows the census enumerators to input data directly into their phones and send the data instantly to the central processing computer to be combined with other data. The tool has been used in selected cities, including Balikpapan, Tabanan and Malang and has made e-censuses quicker to complete. The app also allows operators managing the desludging operation to monitor the transport to, and discharge of septage at treatment plants (Figure 5). Bekasi and Balikpapan have already introduced the app. Other software been developed to support the payment system.

Improving septage treatment plants

The national government has assessed 150 septage treatment plants, and selected cities that need a more thorough assessment and support from donor programs. Engineering designs for their upgrading or replacement have been developed, based on the new design and operational guidelines for improved septage treatment plants. The national government has provided funding to develop the plant in Bekasi,

and has plans for two other locations, which will soon need to treat more sludge.

Establishing tariffs for scheduled and on-demand emptying services

The mechanism and method for calculating desludging tariffs for cities have been developed, factoring in all capital and operational expenditures and expected incomes. The tariffs also take into consideration financial support to be provided by local governments. Advocacy support was provided to the cities of Balikpapan and Tabanan to ensure the tariff is approved by local government and local parliament.

Preparing the operation design and management system

Standard procedures for desludging, transportation and treatment operations were developed based on an operational algorithm identified together with local actors. In Balikpapan and Tabanan, workshops were conducted to introduce, improve and formalize the SOPs. Technical and administrative SOPs are also established through the support from government's development partner.

Strengthening partnerships with the private sector

In many cities, private emptying services will remain an important element of the improved FSM. Considering the current condition of most private companies, basic requirements for future private partners must be formulated and agreed. This includes technical and administrative requirements. Memoranda of understanding or contracts governing these public-private partnerships have been signed

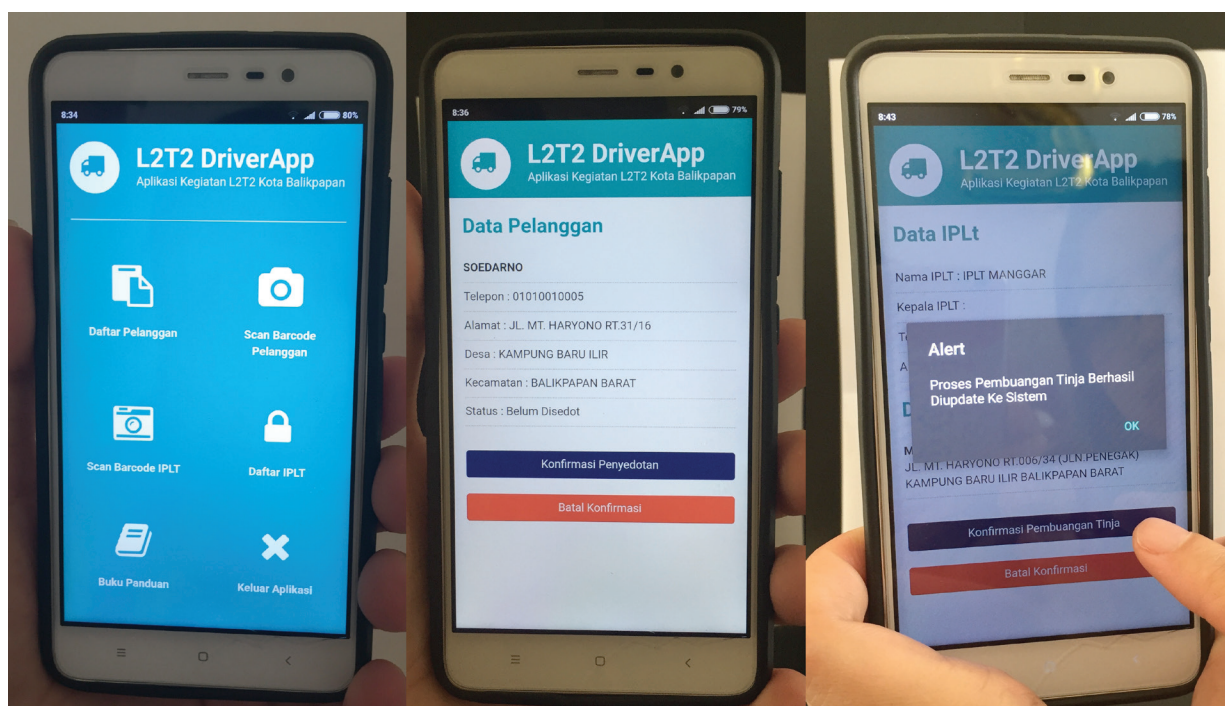


Figure 5: Android application for desludging operation made for the city of Balikpapan

	Balikpapan	Bekasi	Malang	Tabanan
Institutional arrangements (operators)	Water utility (mandated in local regulation in 2014)	Technical Unit for domestic wastewater management	Not yet firm between water utility and technical unit	Technical Unit for solid waste and septage management
Regulation	Local regulations on <ul style="list-style-type: none"> mandate of wastewater management to water utility sanitation, including domestic wastewater. and Mayor's Regulation on technical implementation	Mayoral decree for domestic wastewater management	Local Regulation on domestic fecal sludge and wastewater management including: <ul style="list-style-type: none"> rules for collection, desludging, transporting, and disposal/treatment permits for the private sector on fecal sludge and wastewater management tariff levels 	Not available; four regulations are still in draft, not yet legalized.
Tariff applied	<ul style="list-style-type: none"> Regular desludging USD 0.73/house/month On-demand desludging USD 38.00-46.00/service 	Different on-demand tariffs depending on type of building function served. For houses, the tariff ranges from USD 3.5 – 7/service.	On-demand USD 2.3/service based on Local Regulation 1/2008 on wastewater and fecal sludge management	Regular desludging USD 0.65/household/month On-demand desludging USD 15-23/service Both are not yet legal
Mechanism for Payment	Combined with water bill (for city water utility customers) and door-to-door (for other customers)	Payment made to the officer after service has been completed	Payment made to the officer after service has been completed	Uses local community organization as a third party to collect monthly payments
Commitment from Mayor	Local budget has been allocated for selected activities	High level of commitment from mayor. Significant increase in budget for fecal sludge management and in treatment capacity.	Not yet available Need more advocacy to convince the Mayor	Commitment from local government is limited, no budget was allocated, and difficult to finalized local regulations
Involvement of private sector in desludging	Yes	No	Yes	No

Table 1: Four city examples of implementation models of improving fecal sludge management in Indonesia

in Balikpapan. In Tabanan, private sector desludging companies has yet been involved in its FSM improvement scheme.

The national government through Ministry of Public Works and Housing conduct local government capacity building by providing consultants to assist the cities in developing FSM services. Technical capacity development is the responsibility of Ministry of Public Works and Housing, while general FSM management falls under the Ministry of Home Affairs. However, in practice, at the national level general FSM management is handled by both the Ministry of

Public Works and Housing and the Ministry of National Development Planning through a national water and sanitation working group the development of a City Sanitation Strategy.

FINANCIAL ASPECTS

Improvement of FSM requires capital and recurrent funding from a range of stakeholders. Even though the main responsibility for FSM lies with local government, currently the main source of capital funding to develop improved FSM comes from the national government. This includes funding for planning and preparation as

well as capital investment for major infrastructure. Thus, the Ministry of Public Works and Housing builds the treatment facilities, and these assets are later transferred to local government. Other capital investment, especially in tanker trucks, comes from the private desludging service provider or the local government.

A MODEL FOR CALCULATING REGULAR DESLUDGING TARIFFS WAS DEVELOPED TO ENABLE THE CITIES TO CALCULATE THEIR OWN TARIFFS

Capital funding

While the capital investments are funded by national government and/or the private sector, the cost of FSM operation and maintenance should as far as possible be covered by tariffs to ensure the sustainability of the operations. Thus, a model for calculating regular desludging tariffs was developed to enable the cities to calculate their own tariffs. This model also allows the cities to make financial projections from the current operation and maintenance costs of emptying, transport and treatment. It also includes management costs as a basis for tariff calculations, which are not usually taken into account in tariffs for unregulated services. Cities that manage both on-call and scheduled desludging, as in Balikpapan, typically apply a higher tariff for on-call desludging services to incentivize customers to sign up for regular desludging.

Recurrent funding for operation and maintenance

FSM operational costs are funded in part by local government, especially in the initial stage of implementation. The main source of funding for

operations is the revenue from the desludging service fees collected from building owners. A World Bank study in three cities suggests that the willingness of homeowners to pay for emptying services is relatively high (Figure 6).⁶ There is additional income from the fees trucks pay to discharge septage at a septage treatment plant. Local governments typically charge the trucks USD 0.77-1.15 per m³ of septage discharged. The potential for some extra revenue from treated and processed fecal waste being sold for compost or other products is yet to be fully explored.

An interesting aspect of the regular desludging, is the expectation that its operations should be financially self-sustaining. A conservative revenue projection for scheduled desludging suggests there would be sufficient income to finance the whole FSM operation, including the treatment and management costs. This projection is often used in advocacy material with local governments.

Improving the quality of on-site sanitation

As the government increasingly recognizes the poor quality of onsite sanitation, the Ministry of Public Works and Housing has taken up an agenda of significantly upgrading on-site sanitation. A performance- and output-based program for upgrading onsite sanitation was launched in 2015. The national government also uses a special allocation fund to support the improvement of septic tanks. The special allocation fund is a grant from the national government to local governments that can be used only to fund specific activities. National government decides the specific activities, and since 2015, the option of septic tank improvement has been included in the list of activities. The fund could also be used for procuring desludging trucks for cities that are in effort of improving its FSM.

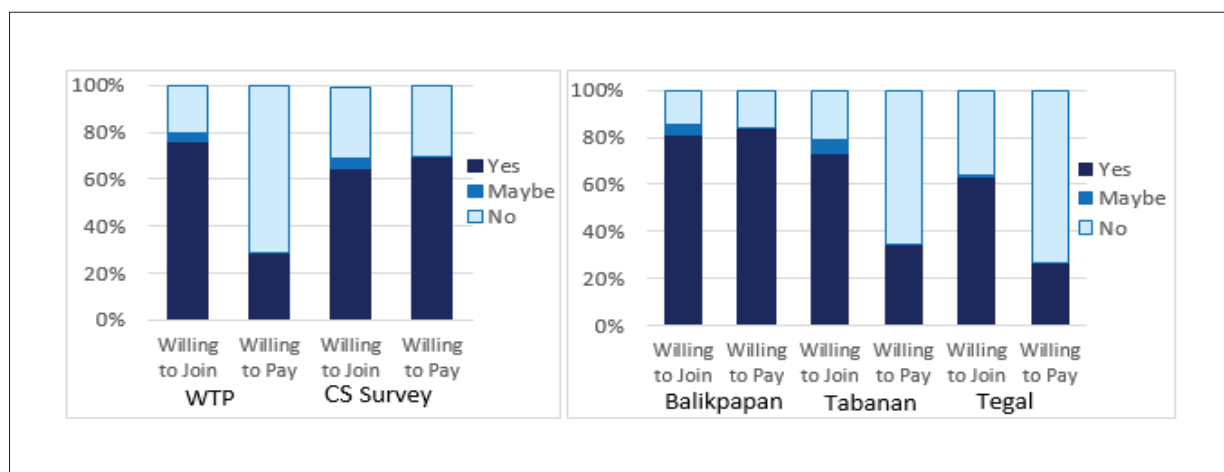


Figure 6: Willingness to join and pay for regular desludging⁴

DRIVERS OF CHANGE AND LESSONS LEARNED

From the implementation of FSM in the four cities, as well as in 12 other cities where the national government initiated the FSM, core lessons learned about what drives change, and for national scaling include:

High level local commitment through budgets, regulations and intuitional reforms is essential

The commitment of the head of the local government is absolutely crucial in the preparations for improved urban FSM, as is the willingness of designated institutions to realize this commitment. The commitment should be translated into actions, mainly allocation of sufficient funds, establishment of local regulations, clarifying the designated institution for FSM, and preparation of implementation plans. The delayed facilitation in half of the cities initially facilitated by the government in 2015–2016 was due to a lack of willingness to make a commitment. The cities did not allocate a budget for the pilot areas, including for operations and maintenance, and were reluctant to draft relevant regulations and improve their institutions.

Clarity on mandated operators and service providers

The designated institution need to have with a clear mandate, with roles and responsibilities as specified in local regulations. The capacity of the institution to manage monthly billing of customers is an important consideration in the selection of the appropriate service provider, as is the ability to introduce regular desludging. The city water utility is often the appropriate institution in cities that have a water network that serves the majority of residents. However, where this is not the case, alternatives may need to be considered.

Appropriate adequate regulations are needed

Local regulations are necessary to set the roles of local government in the provision of public wastewater services, including specifically septage management, and will be treated as the legal basis for local government in planning, implementing and monitoring the improved urban septage management, as well as in the budgeting process with local parliament. It is also important to have regulation defining the responsibilities of all stakeholders, for example: requiring building owners to have a proper septic tank, desludge periodically, and pay for the service.

Selecting operational models to suit local conditions matters

Implementing regular desludging is a more complicated operation than non-scheduled emptying, and must be suitable to meet the service coverage

target. Considerations include the emptying period, zoning and scheduling, as well as the ability to charge and a mechanism to collect monthly tariffs. Availability of sufficient trucks for desludging and transport from the containment location to the treatment plant is crucial, and these could be provided through partnerships with local private tankers service providers. Where scheduled services are not feasible, a well-managed non-scheduled service will be adequate to meet customer needs.

Finance for sustainable operation and maintenance must be available

Sustainability of the services should be established and maintained through adequate revenue for operation and maintenance. Although this should be covered by the tariffs paid by customers, local governments need to provide seed funds to cover costs until the services can achieve economies of scale and costs can fully recovered from tariffs. It is important to design a payment mechanism system that will ensure high billing efficiency.

Well designed, properly-operated and appropriate capacity septage treatment plants are crucial

Quite often current capacities limit the scale of FSM to be introduced. Therefore, the capacity of local government to operate and maintain, and design, the treatment plant need to be improved. Some evaluations have reported that technical failures related to the utilization of septage treatment plants are due to miscalculations by local consultants.

On-going promotion is not an optional extra

Although the customers in pilot stage are households that have standardized septic tanks, promotion to all households needs to be undertaken to ensure that the services can be delivered at scale. Therefore, improving public awareness and understanding, and people's willingness to engage desludging services is extremely important.

NEXT STEPS AND PLANS FOR GOING TO SCALE

The development of improved FSM in Indonesian cities will continue. National government plans to support more cities with support from donor-funded programs and the local governments. Next steps and plans include:

Creating a national FSM framework and a national roadmap for FSM. As FSM implementation requires close coordination between stakeholders, a framework is required to specify the roles and responsibilities of each stakeholder, especially at the national level, in pushing the FSM agenda at local level. The framework is intended to set out the indicators for each

stakeholder and the monitoring and reporting systems from local government to national government. A monitoring and reporting system will support the country's plan to monitor its progress towards achieving the SDG sanitation targets.

Developing, improving and promoting manuals and guidelines, not just on technical aspects (especially guidance on how to design, operate and maintain septage treatment plants) but also on how to develop local regulations, prepare the operational schemes, develop an effective promotion campaign etc.

Providing intensive and sustainable capacity building to local stakeholders, i.e. local governments, potential service providers, and local consultants, which make up the support system at city level. The capacity building should include both technical (septage treatment plant designs, operation and maintenance, system capacity design) and non-technical aspect, ranging from tariff calculation, business model development and financial management. Further partnership with local universities will be developed.

Making available a variety of sludge treatment technology options to local governments, taking into account land availability, electricity supply, service area coverage, etc. An incremental approach to developing treatment plants will also be introduced to local governments, as an option that can be adopted as the customer base grows.

Including FSM development in the city sanitation strategy and master plan for domestic wastewater management. This includes developing SFD in the strategy to be used as a diagnostic tool to address domestic wastewater management challenges.

Improving the criteria for cities to receive financial or technical assistance from national government or other sources of funds. Clear readiness criteria as the basis for selection will help enable smoother implementation. Opportunities for private participation, especially design-build-operate type of partnerships, will be explored.

Strengthening collaboration with relevant development partners and international NGOs, not only in support for implementation, but also in capacity building and advocacy agendas.

Continuing the onsite sanitation quality upgrading program, by increasing the involvement of authorized certification agencies to ensure the technical quality of the system provided, and providing other financial schemes for scaling up.

NOTES

- ¹ An exchange rate of USD 1.00 = IDR 13,000 is used for all GDP and GDP/capita calculations.
- ² 25 Years Progress on Water Supply and Sanitation, Update and MDG Assessment, UNICEF and WHO, 2015
- ³ Assessment of Sludge Accumulation and Pit Filling Rates in Indonesia, WSP-World Bank, 2013
- ⁴ Ministry of Public Works, Evaluation of Indonesian Septage Treatment Plants, 2012
- ⁵ Tabanan is a district, with 60 percent urban population. District is a local level of government beneath Province and has both urban and rural areas. It is headed by a district head. A district and city are on the same level, having their own local government and legislative bodies. In this case study, Tabanan will be referred to as "city" and its head of local government as "mayor".
- ⁶ Willingness-to-pay and Customer Survey for FSM, WSP-World Bank, 2014

REFERENCES

- Badan Pusat Statistik (2017) *Profil Kemiskinan di Indonesia September 2016*. Jakarta: Badan Pusat Statistik. Available at <https://topnews2017.files.wordpress.com/2017/01/profil-kemiskinan-di-indonesia-september-2016-menurut-bps.pdf> (Accessed 1 May 2017)
- Badan Pusat Statistik (2017) *Badan Pusat Statistik*. Available at: <https://bps.go.id/> (Accessed 1 May 2017)
- Ministry of Public Works (2012) *Evaluation of Indonesian Septage Treatment Plants*. Jakarta: Ministry of Public Works
- UNICEF and World Health Organization (2015) *Progress on sanitation and drinking water – 2015 update and MDG*. United States of America: UNICEF and World Health Organization. Available at http://files.unicef.org/publications/files/Progress_on_Sanitation_and_Drinking_Water_2015_Update_.pdf (Accessed 1 May 2017)
- World Bank Group (2016) *Septage Management Pilots and Capacity Building in Indonesia*. Jakarta: World Sanitation Program East Asia and Pacific. Available at <https://elibrary.worldbank.org/doi/pdf/10.1596/24721> (Accessed 1 May 2017)

World Bank Group (2015) *Improving On-site Sanitation and Connections to Sewers in Southeast Asia – Insights from Indonesia and Vietnam*. Jakarta: World Sanitation Program East Asia and Pacific. Available at <https://wsp.org/sites/wsp.org/files/publications/WSP-Improving-On-site-Sanitation-Connections-to-Sewers-Southeast-Asia.pdf> (Accessed 1 May 2017)

Mills, F., Blackett, I. and Tayler, K. (2013) 'Assessment of Sludge Accumulation and Pit Filling Rates in Indonesia'. 37th WEDC International Conference, Hanoi, Vietnam, 2014.

World Bank Group (2013) *East Asia Pacific Region Urban Sanitation Review – Indonesia Country Study*. Jakarta: World Sanitation Program East Asia and Pacific. Available at <http://documents.worldbank.org/curated/en/764171468023379490/pdf/838770FA0WP0P10Box0382116B00PUBLIC0.pdf> (Accessed 1 May 2016)

ABBREVIATIONS AND ACRONYMS

MDG	Millennium Development Goal
FSM	Fecal sludge management
SDG	Sustainable Development Goal
SFD	Shit Flow Diagram or Fecal Waste Flow Diagram

ACKNOWLEDGEMENTS

Thank you to the World Bank and USAID for technical assistance on urban sanitation and to Foort Bustraan, Sofyan Iskandar, Immanuel Ginting and Rudy Yuwono.

AUTHORS

Aldy Mardikanto, Ministry of National Development Planning/National Development Planning Agency, aldy.mardikanto@bappenas.go.id, amardikanto@gmail.com, +62818853692

Maraita Listyasari, Water and Sanitation Specialist, the World Bank, mlistyasari@worldbank.org, +6281288116860

Asri Indiyani, Ministry of Public Works and Housing, asri_indiyani@yahoo.com, +6281319688773

Reini Siregar, World Bank, reinifspb7@yahoo.com, rsiregar@worldbank.org, Tel No. +62-8121408721

Published by the Bill & Melinda Gates Foundation

This publication was funded in part by the Bill & Melinda Gates Foundation. The narrative, findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.

Digital versions of this publication and the complete volume of case studies (ISBN 978-1-5136-2513-3) are available at www.susana.org.

August 2017