SANIMAS

FINAL REPORT
FEBRUARY 2021

Independent Evaluation of SANIMAS Model as an Approach for Providing Decentralised Sanitation

Kementerian PPN/ Bappenas

KEMENTERIAN PUPR

IsDB البنك الإسلامي للتنمية Islamic Development Bank

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DALCO POINT

CITY-WIDE INCLUSIVE SANITATION
TECHNICAL ASSISTANCE HUB IN SOUTH ASIA

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Authors: Paul Bulson, Dr. Susilawati Muslimah, Dr. Nicolas Reynaud, Isabel Blackett, Alexander Viwat Campbell, Inni Arsyini

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Photographs: All photographs are courtesy of Dalco Point and SANIMAS KPPs unless indicated otherwise.
Front Cover: Opening all the manholes for a technical inspection. Aceh Besar, KPP Harapan Sari

DISCLAIMER

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SSS infrastructure integration into the community. Jakarta Pusat, KPP SANIMAS Menteng 1

FOREWORDS

TRI DEWI VIRGIYANTI, ST, MEM

Director of Housing and Settlements

Ministry of National Development Planning/Bappenas Republic of Indonesia

Jakarta, February 2021

It gives me great pleasure to welcome the publication of the *Independent Evaluation of the SANIMAS Model as an Approach for Providing Decentralised Sanitation.* This report is the result of a collaboration between the Ministry of National Development Planning/National Development Planning Agency and the Islamic Development Bank, along with support from the Bill and Melinda Gates Foundation, and contributions from line ministries in Indonesia. Through comprehensive information on Sanitasi Berbasis Masyarakat (SANIMAS) as an approach to provide sanitation access in Indonesia, this report can serve as a foundation to improve the way forward in sanitation development.

As one of the key development priorities, the Government of Indonesia is very committed to achieving universal access to sanitation, through increasing access to improved and safely managed sanitation (domestic wastewater), as well as eradicating the practice of open defecation. To achieve the targets in the National Medium-Term Development Plan 2020-2024, acceleration of all kinds of strategies is needed, including SANIMAS as one of the approaches for providing sanitation access in urban areas.

The implementation of SANIMAS over the last two decades has evolved from a small pilot project in 6 sites into a nation-wide program, with various sources of funding, including state budget (APBN), local budget (APBD), special allocation budget (DAK), and external funding.

This report evaluated past SANIMAS projects and took a deeper look at SANIMAS project delivery performance indicators. The study findings show that the rapid progress of sanitation infrastructure construction must be accompanied by post-construction support to maintain the sustainability of the infrastructure. Therefore, the study recommends cross-stakeholder collaboration in improving institutional, technical, and financial aspects of SANIMAS, to ensure sustainable positive impacts are delivered to communities, as the main beneficiaries.

Through the adoption of the Sustainable Development Goals (SDGs) into the national development targets, the Government of Indonesia aims to provide inclusive services that can be accessed by all. In the sanitation context, this cannot be achieved by one strategy alone. Hence, we must start looking at the bigger picture with SANIMAS as part of a national programmatic approach. This requires SANIMAS, as a community-based urban sanitation development concept, not only to be upgraded as a standalone project, but also to start looking for ways to integrate it with other sanitation strategies.

Appreciation goes to all stakeholders involved in the preparation of this report, who have provided countless hours of support throughout the process. It has been a fruitful experience for us all, and hopefully, we can continue working hand in hand to improve sanitation development in Indonesia.

Kementerian PPN/ Bappenas

FOREWORDS *continued*

AMADOU THIERNO DIALLO

Director, Global Practices

Economic and Social Infrastructure Department

Chief Products & Partnership Directorate

Islamic Development Bank

With rapid and unplanned urbanization, issues related to urban sanitation have been escalating. Improper solid and liquid waste management, including unsafe disposal of wastewater and faecal sludge, is highly predominant in many cities in Islamic Development Bank (IsDB) member countries. These have serious detrimental effects in terms of environmental pollution and public health threats. Improving urban sanitation can result in the reduction of incidences of waterborne diseases, such as diarrhoea, cholera, typhoid, particularly in urban poor communities. Further, clean and healthy cities can generate positive outcomes for the urban economy, environmental sustainability and climate & disaster resilience.

The IsDB's commitments to support its member countries in realizing the SDGs have been well articulated in its strategic and operational documents. As a result, IsDB has been collaborating with governments and sector stakeholders, to implement several urban initiatives, including urban WASH projects in member countries. Since 2002, the Government of Indonesia, with the support of different agencies, have implemented nearly 22,000 SANIMAS projects serving more than 6 million people. No other country has implemented non-sewered sanitation projects on this scale before.

In 2014, IsDB joined hands with the Government of Indonesia to implement the SANIMAS (community-based sanitation) project in more than 1800 urban poor communities in Indonesia, providing improved sanitation services to more than 350,000 people.

In December 2019, considering the rapid evolution in the sanitation sector and to identify new strategic directions for sanitation investments, the Ministry of National Development Planning (Bappenas) and IsDB invited the Bill and Melinda Gates Foundation (BMGF) to collaborate in conducting an independent evaluation of decentralised wastewater management and sanitation sector, with a special focus on SANIMAS as one approach for decentralised sanitation in Indonesia. **This final SANIMAS Independent Evaluation report is the result of successful tripartite collaboration among the Government of Indonesia, IsDB and BMGF,** and huge efforts made by the consultant team due to the difficult working conditions generated by the COVID-19 pandemic.

The report has highlighted key findings, learnings, and recommendations that have helped for a better understanding of the sanitation situation on the ground, the required changes to be implemented, both at the institutional and management levels, as well as key strategic directions for future SANIMAS investments in Indonesia. Henceforth, an efficient collaboration of all key stakeholders, as well as solid planning, will be required to develop the next phase of the SANIMAS programme that will contribute to achieving the safely managed sanitation targets in Indonesia.

The IsDB is committed to join hands and work together with the Government of Indonesia, International Development Partners, and sector stakeholders in the next sanitation journey to support the successful achievement of SDG 6.2 by its largest member country.

IsDB
البنك الإسلامي للتنمية
Islamic Development Bank

FOREWORDS *continued*

DR. ROSHAN RAJ SHRESTHA

Deputy Director,
Global Growth & Opportunity
Water, Sanitation and Hygiene
Bill & Melinda Gates Foundation

About 4.5 billion people—more than half the world's population—either practice open defecation or use unsafe sanitation facilities and services. As a result of unsafe drinking water, sanitation, and poor hygiene, more than 1,200 children under five-years-old are dying every day, which is more than AIDS, measles, and tuberculosis combined. To be effective, sanitation must be safely managed at all stages, from the point that waste is collected and contained, to how it is transported and treated. If there are gaps or breaks at any stage, then harmful human waste can flow into the open environment, including water sources, which can cause widespread waterborne diseases.

Solving the sanitation challenge in the developing world will require breakthrough innovations in technologies as well as systems that are practical, cost-effective, and replicable on a large scale. Government leaders, the private sector, and technologists all have a role to play in advancing promising new toilet and waste treatment technologies, service delivery models, and policies with the greatest potential to revolutionize sanitation standards and practices, at the local and national level.

The Bill & Melinda Gates Foundation is pleased to support and collaborate with the Government of Indonesia and the Islamic Development Bank (IsDB) on this independent evaluation of the decentralised wastewater management and sanitation sector, with a special focus on SANIMAS as one approach for decentralized sanitation in Indonesia.

The final Independent Evaluation report on the decentralised wastewater management and sanitation sector has highlighted key strategic directions and recommendations for future Urban Sanitation programming in Indonesia that can help deliver sustainable sanitation systems and services contributing to safely managed sanitation as defined by SDG6.2.

We look forward to a continued partnership in support of safely managed sanitation for all.

BILL & MELINDA GATES *foundation*

EXECUTIVE SUMMARY

SANIMAS Background

According to RPJMN 2020–2024[1] figures, in 2018 almost 75 percent of the Indonesian population has access to improved sanitation nationally. This includes almost 7.5 percent classified as safely managed sanitation services based on Sustainable Development Goals (SDGs) 2030 definitions. These figures are impressive considering the low base of sanitation coverage with which the country has been evolving from.

Since the early 2000s, the Indonesian government has implemented important policy interventions and made significant investments to increase sanitation access across the nation, especially in the area of community-based decentralised small-scale sanitation systems (SSS).[2] The SANIMAS, or 'Community-Based Sanitation' (Sanitasi Berbasis Masyarakat), approach offered the Indonesian government a sanitation service option that had not been used anywhere else at scale before. The approach provides technical and institutional assistance to poor urban communities to develop sanitation infrastructure, which targets 50 to 200 households in urban areas; and includes decentralised SSS, for the collection and treatment of domestic wastewater, or a combination of SSS and a toilet block (MCK).

By the end of 2019, almost US $1 billion has been invested through six key SANIMAS programs with various funding sources including the Indonesian government, the World Bank, the Asian Development Bank (ADB) and the Islamic Development Bank (IsDB). Through these programs, 21,832 SANIMAS decentralised SSS were built, serving an estimated 6 million people, and MoPWH was responsible for implementing 97% of them.

The vast majority, about 21,000, were built in the last ten years; or an average of 2,300 SSS each year until 2019. Therefore, it is not surprising that there are service delivery and sustainability issues. Huge increases in SANIMAS investment from 2010 were not always accompanied with sufficient skilled staff to manage and implement projects at the local level. The systems have been built based on the assumption that most communities will manage and undertake the operation and maintenance of the system alone. The 2020–2024 RPJMN target of potentially 5750 new SANIMAS/SSS units per year (based on 50 HH per location) represents a very significant investment and a considerable increase in implementations. This scaling up will require new approaches to be taken for planning, implementation and monitoring, to ensure future operation and maintenance leading to improved inclusion and sustainability.

The SANIMAS Independent Evaluation

The Indonesian government, IsDB, Bill & Melinda Gates Foundation (BMGF) and other stakeholders recognise that the sanitation sector has been rapidly evolving with (i) innovative technologies; (ii) new water and sanitation ecosystem services delivery models; (iii) new public-private partnerships (PPP) business models; and (iv) new financial models, sector players and financial investors. In this regard, the

SSS infrastructure inspection for the evaluation.
Sumatera Selatan, Kabupaten OKI, KPP Karya Bersama

[1] National medium-term planning 2020–2024 (PP No.18/2020)

[2] Classified in Indonesia as communal scale off-site system (IPAL) or Sistem Pengolahan Air Limbah Domestik Terpusat (SPALD-T) Skala Permukiman according to GoI MoPWH of Permen PUPR No. 04/PRT/M/2017

EXECUTIVE SUMMARY *continued*

Ministry of National Development Planning (Bappenas) and IsDB sought support from BMGF for conducting a decentralised wastewater management and sanitation sector assessment; and to seek comprehensive recommendations for Indonesia's approach, with a special focus on SANIMAS as one approach for decentralised SSS.

Dalco Point was engaged at the end of June 2020, to carry out the *'Independent Evaluation of SANIMAS model as an approach for providing decentralised sanitation'*. This evaluation aims to assess the success and limitations of the SANIMAS approach; to assess the lessons learned from the IsDB and the other SANIMAS investment programs; and assess the feasibility of introducing an updated SANIMAS or a next phase of the program as a sustainable approach for providing decentralised sanitation in future sanitation access investments.

This evaluation report includes a review of the successes, challenges and opportunities for expanding SANIMAS approaches; and integration of SANIMAS into a more City-Wide Inclusive Sanitation (CWIS) approach. It also provides 15 specific recommendations for an improved scope, financing and coverage for upscaling more sustainable SANIMAS investments in the future.

Setting the Evaluation Objectives

In line with the independent evaluation objectives, the evaluation team developed an Overall Research Question (ORQ) and seven contributing sub-questions to focus the survey framework design and evaluation implementation strategy (see Diagram A). The ORQ references almost 20 years of SANIMAS related experience and five detailed previous SANIMAS studies.

DIAGRAM A

Overall Research Question and Contributing Sub-Questions

EXECUTIVE SUMMARY *continued*

Diagram B summarises the independent evaluation survey framework. Based on the research questions, three key research components were developed with two structured research methodologies (see Section B). The Governance Review analysed almost 20 years of different SANIMAS programs and five detailed SANIMAS studies. These studies provided a wealth of findings and recommendations representing all key SANIMAS programs since 2002. To provide the deepest possible investigation of current SANIMAS implementation practices, the Program Delivery Review looked only at the IsDB SANIMAS program. Eighteen performance indicators were developed to align with IsDB SANIMAS outputs, outcomes and impacts.

DIAGRAM B

SANIMAS Independent Evaluation Survey Framework

OVERALL RESEARCH QUESTION

What governance arrangements are necessary for implementation and sustainable operation of community-scale sanitation systems to improve safely managed sanitation access, health and environmental impact, and the effectiveness of the investments made?

and

7 sub-research questions

RESEARCH COMPONENTS

SANIMAS GOVERNANCE
(Institutional and Finance)
'rules, roles, relations' that make sanitation systems work

ENABLES AND SUSTAINS

IsDB PROGRAM DELIVERY
Program outputs, outcomes and impacts from IsDB SANIMAS log-frame:
- Infrastructure, technology, etc.
- Training of local Gov't staff
- Training of beneficiaries

INTERNATIONAL REVIEW OF SMALL SANITATION SYSTEMS (SSS)

RESEARCH METHODOLOGY

SANIMAS GOVERNANCE REVIEW
Investigation method — mix of **qualitative methods:**
- Review prior SANIMAS studies (WSP-World Bank, ISF-UTS, MoPWH, ADB, IsDB, MEC)
- Review relevant policies, laws, regulations and standards relating to SANIMAS
- 'Governance survey framework'
- Onsite and remote semi-structured stakeholder interviews (National, provincial, local, non-government, sector experts)

IsDB PROGRAM DELIVERY REVIEW
Investigation method — **mix of qualitative and quantitative methods:**
- Review of existing evaluations (by MoPWH and MEC)
- 'IsDB program delivery survey framework' with performance indicators:
  - Treatment plant survey, on-site/remote (270/45 sites)
  - Beneficiary interviews/FGD (45 sites)
  - LG interviews (on received trainings and capacity)
- Treatment performance study (3 sites)

RESEARCH RECOMMENDATIONS

RECOMMENDATIONS
based on findings and discussion on:
1. **Institutional arrangements**
2. **Technology**
3. **Funding**

Evaluation field team training exercise, survey practice with a local SANIMAS community in Yogyakarta

EXECUTIVE SUMMARY *continued*

Governance Review

Primary data collection was carried out by experienced consultants conducting in-depth interviews and focus group discussions (FGDs). Ten provinces and 13 cities/regencies were targeted. Four levels of respondents were targeted: national government (Bappenas, MoPWH, MoHA, MoF, MoH and MoEF), provincial government, city/regency government and other stakeholders, all involved in various SANIMAS and related sanitation programs. Fifty-five respondents were interviewed online; and 5 city/regency level FGDs were conducted, three onsite and two online.

IsDB Service Delivery Review

Five experienced field teams, each comprising of one social and one technical expert, conducted the remote and on-site data collection. For the remote data collection, two survey tools (interviews and observation) with 83 parameters were used across 236 sites in 25 cities and 13 provinces. For the on-site data collection six survey tools (interviews, observation, measurement and FGDs) with 175 parameters were used across 59 sites in 15 cities and 7 provinces. Additionally, an in-depth technical site analysis was performed at three of the on-site survey sites.

Evaluation Findings

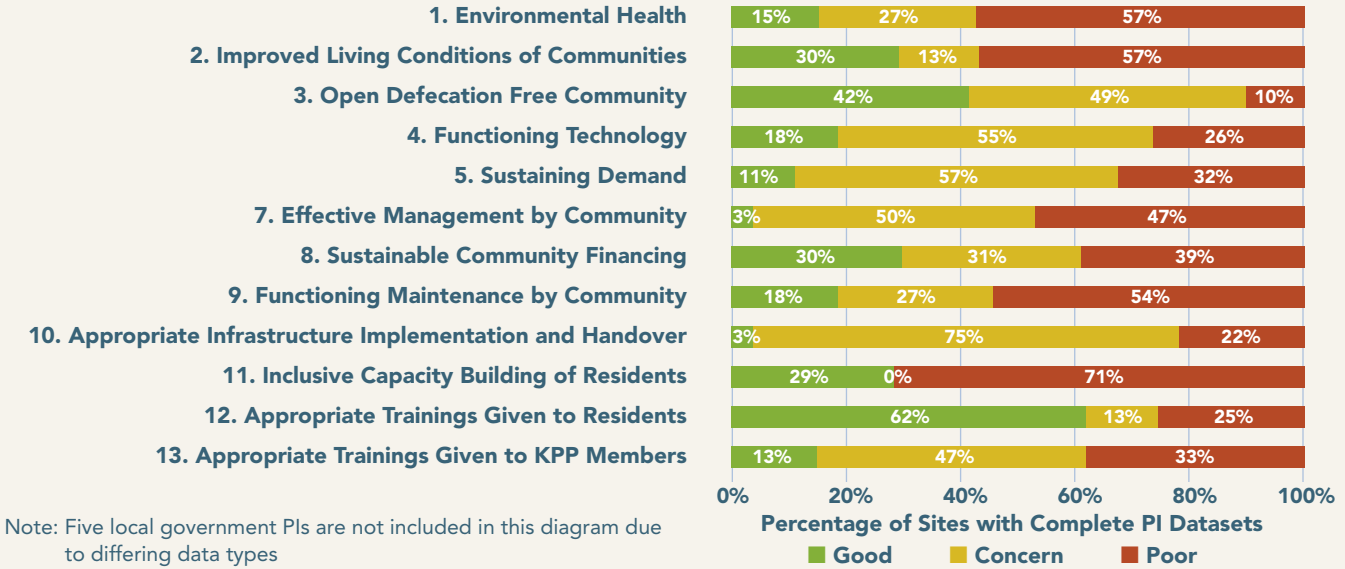
Diagram C presents the IsDB service delivery review average performance indicator scores of 236 investigated sites. Each performance indicator listed in the chart below has sub-indicators and this detailed data is used in the discussion (see Section D) and recommendations (see Section E).

The Governance review found city and regency governments lacked the mandate, the management systems and budgets to effectively manage the SANIMAS systems after infrastructure implementation. All post-construction responsibilities are handed over to KPP[3] and SANIMAS assets are owned by communities (usually on an informal basis) limiting budget allocation for ongoing or longer-term O&M support by local governments. Isolated monitoring activities were conducted by some LGs,[4] but in general regular system maintenance supported by LGs does not exist. Data management for the IsDB SANIMAS program focused on project implementation progress and did not support post construction evaluation and management.

The findings show that there are service delivery challenges and significant sustainability issues post construction. There is a need to improve the management, training, operation and inclusiveness of SANIMAS project planning, implementation and systems. These findings are similar to five previous studies carried out reviewing SANIMAS systems built under ADB, IsDB and other investments.

DIAGRAM C

Summary of Average Performance Indicator Scores



Note: Five local government PIs are not included in this diagram due to differing data types

[3] Beneficiary Maintenance Group: A community group created under the SANIMAS program to operate and maintain the SANIMAS facilities

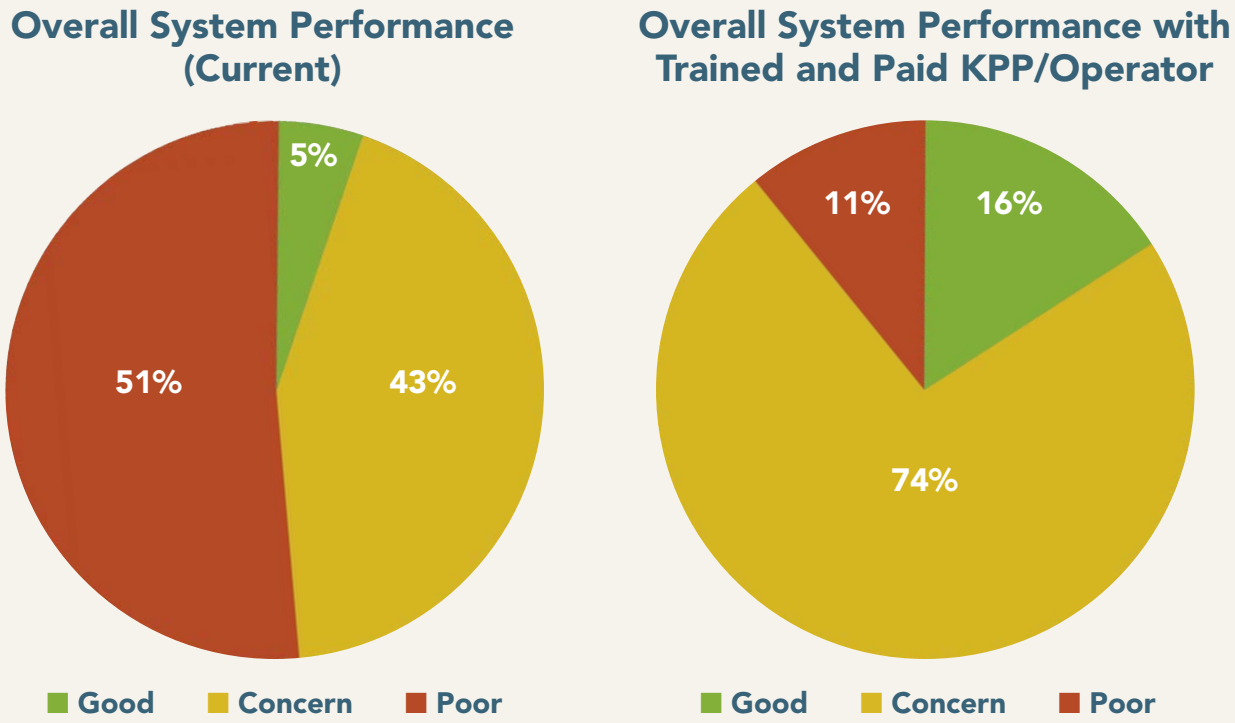
[4] Local Government: For the purpose of this report, LG refers to Provincial and City/Regency levels of government

EXECUTIVE SUMMARY *continued*

Figure A (left side) shows that the overall system performance is poor at 51%, and of concern at 43%, of the investigated sites. At 48% of the investigated sites, one or more signs of serious management challenges were observed. These included: 37% of the KPPs with no income source for O&M costs; 20% had no operator assigned to do regular O&M activities; 7% of sites were abandoned before completion; and 3% showed signs of major physical damage which affected operation or safety. Other issues such as poor or limited O&M, technology design issues, lack of desludging, low connection rates and poor network design all contributed to the under-performance identified by the performance indicators. While these findings are focused on the IsDB SANIMAS investments, previous reviews and evaluations have found similar challenges with other SANIMAS programs.

However, Figure A (right side) shows that with trained and funded KPPs and trained and paid operators, the overall system performance can improve significantly such that only 11% of the systems were rated 'poor' and there was an increase to 16% for 'good' overall performance.

FIGURE A



Recommendations

Based on the findings and discussion in this report, the recommendations for future SANIMAS investments focus on how to revitalise the SANIMAS program and achieve more sustainable service delivery, while significantly up-scaling implementations and safely managed and sustainable sanitation access. Fortunately, there are practical and cost-effective solutions available to tackle these issues. Overall, the recommendations do not add significant cost increases to deliver SANIMAS programs, unless the MoEF 2016 effluent standards are applied.[5]

There are 15 recommendations which are grouped as follows (i) institutional arrangements; (ii) technology; and (iii) funding. These recommendations apply to all SANIMAS programs reviewed in this report, as well any future investments, such as the planned IsDB SANIMAS loan.

All 15 recommendations are summarised alongside the relevant findings in Table 1 (pages 12–15). They are further elaborated and explained in Section E in the body of the report.

[5] MoEF No. P.68/MENLHK-SETJEN/2016

EXECUTIVE SUMMARY *continued*

TABLE 1
Recommendations, Findings and Implementation Timeframe

The full report discusses these recommendations in-depth in Section E, followed by Annexes with further details

CAT.	NO.	RECOMMENDATIONS	FINDINGS	WHO	WHEN
INSTITUTIONAL	1	**Resolve** Asset Ownership with Cities/Regencies and Communities *Asset ownership is essential for establishing more appropriate and sustainable O&M systems.*	• Resolving asset ownership was a recommendation of previous SANIMAS studies and evaluations • Assets are not yet part of the city/regency fixed assets inventory • O&M financing is impeded by community asset ownership, limiting city/regency governments allocating O&M budget on a regular basis • No guaranteed LG budget to provide post construction support to KPP or for O&M of the sanitation facilities • Need clearer LG and community readiness criteria which is supported by an exit strategy focused on post-construction responsibilities • Overall Performance Indicators (PI) assessment on IsDB project: 51% Poor; 43% Concern; 5% Good	MoHA	Immediate to Short Term
	2	**Vary** the 2016 Discharge Standards *A variance of the domestic effluent standards offers a way to balance high costs and serving more people while protecting public health and the environment.*	• SANIMAS technology cannot meet the 2016 effluent standards • 66% of wastewater samples do not comply with the 2016 standards for COD • 97% of measured effluent COD concentrations meet pre-2016 standards • The cost of implementing the 2016 standards on SSS units will increase the cost of each system by 200–400% (over 10 years) and make management, O&M more complex • Internationally, many countries apply different effluent standards to legacy systems and/or small systems	MoEF	Immediate
	3	**Set** SANIMAS National to Local Key Performance Indicators (KPIs) *Common KPIs to be used by all stakeholders and reported in one national monitoring system. (See Recommendation #5)*	• Not all the relevant Ministries have been mandated to be involved in SANIMAS • A shared SANIMAS collaboration platform and database with relevant Ministries, Provincial and local Govt is required • There are no key performance indicators (KPIs) which are used by all stakeholders (universal, cross-agency, cross eco-system services) • There is minimal involvement of local government in monitoring and supporting O&M • Government does not have a budget or provide ongoing support for annual O&M to ensure sustainability • SANIMAS should be integrated into CSS and coordinated with other sanitation related programs (STBM, FSM, LLTT, SAIIG programs) • Overall PI scores IsDB: 51% Poor; 43% Concern; 5% Good	Bappenas and MoPWH	Short Term

EXECUTIVE SUMMARY *continued*

TABLE 1 *continued*

Recommendations, Findings and Implementation Time Frame

The full report discusses these recommendations in-depth in Section E, followed by Annexes with further details

CAT.	NO.	RECOMMENDATIONS	FINDINGS	WHO	WHEN
INSTITUTIONAL	4	**Establish** or strengthen a sanitation management unit in all cities/regencies *A prerequisite for city sanitation investments needs to include a responsible authority with adequate capacity and budget in each kota/kab, e.g. UPTD, PDAM, PDPAL, or solid waste management.*	• There are no 'Cooperation Agreements' (Perjanjian Kerjasama) yet between the city/regency governments and KPPs to co-manage O&M, both technical and financial • Few government agencies have provided a budget for ongoing annual O&M of the SANIMAS infrastructure, to ensure sustainability • LG and community readiness criteria and preparations do not yet support an effective exit strategy for achieving sustainable, management, operations and maintenance responsibilities. • Overall PI scores IsDB: 51% Poor; 43% Concern; 5% Good • No operator at 54% of systems • No operator salary: 73% of operators • 37% KPP no support for major maintenance needs • No KPP complaint mechanism in 75% of LGs	MoHA and City/Regency	Short Term
	5	**Set-up** a national SANIMAS database and conduct an inventory of existing SANIMAS *Use new KPIs, consolidate existing data bases, maintain national database, update with survey and use to monitor KPIs. (See Recommendation #3)*	• There are multiple disconnected SANIMAS databases, which are not regularly updated and are incomplete • A shared SANIMAS collaboration platform with relevant Ministries is required • There are no key performance indicators for government and minimal or no involvement of government post construction • The CSS should enable SANIMAS to be integrated with other related programs: e.g. STBM, LLTT, SAIIG programs • Overall PI scores IsDB: 51% Poor; 43% Concern; 5% Good • 48% locations have one or more signs of serious management challenges	Bappenas and MoPWH	Short to Medium Term
	6	**Develop** and revise SANIMAS program and technical manuals *Update manuals for all SANIMAS programs (program and technical) and incorporate the recommended improvements to operations.*	• SANIMAS approach needs to be redesigned for future investments • Technical designs have flaws, construction supervision is poor making O&M difficult • LG and community readiness criteria, co-management agreements, preparation, and budgets are needed • Need annual budget for post construction O&M support • 75% of LG did not receive adequate SANIMAS training • 7% of systems do not treat any wastewater • 21% are used to less than half of their treatment capacity • 71% of systems were not implemented in a sanitation red or yellow zone. • Adequate trainings received by KPP: 5% • Adequate trainings received by system operator: 32% • Communities not knowledgeable about basic sanitation and O&M topics after training	Bappenas and MoPWH	Medium Term

EXECUTIVE SUMMARY *continued*

TABLE 1 *continued*

Recommendations, Findings and Implementation Time Frame

The full report discusses these recommendations in-depth in Section E, followed by Annexes with further details

CAT.	NO.	RECOMMENDATIONS	FINDINGS	WHO	WHEN
INSTITUTIONAL	7	**Integrate** SANIMAS in CSS and maximise use of infrastructure investment *Increase household connections and manage as part of a larger, city-wide plan.*	• The CSS should include SANIMAS to maximise house connections and use of investments • CSS will enable SANIMAS to be planned as a part of CWIS with other sanitation programs e.g. STBM, FSM, LLTT, SAIIG • 21% are used to less than half of their treatment capacity • 71% of systems were not implemented in a sanitation red or yellow zone	Bappenas and MoPWH	Medium Term
	8	**Develop** a communications strategy for LG and communities *Increase investment in addressing behavioural barriers at LG, KPP and community levels to manage, operate, maintain and pay for effective sanitation systems.*	• Communities were not knowledgeable on basic sanitation and O&M topics after training • 75% of LG did not receive adequate handover, O&M or SANIMAS training • Adequate training received by KPP: 5% • Adequate training received by operator: 32% • Can't cover regular O&M expenses: 52% of sites • SANIMAS should be integrated with other related programs: e.g. into CSS and linking it to other sanitation related programs e.g. STBM, FSM, LLTT, SAIIG, etc.	Bappenas and MoPWH	Medium Term
	9	**Strengthen** and improve capacity building of the LG (planning, operation and monitoring) *Strengthen LGs to take an active role operating as a utility service provider (UPTD, PDAM, PDPAL or related technical entities). The approach should be changed to 'LG managed and community supported'.*	• LGs require support, training and capacity building • Need improved building of capacity at LG level: for oversight and operational unit • Overall Performance Indictor (PI) scores IsDB: 51% Poor; 43% Concern; 5% Good • 48% one or more signs of serious management challenges • 75% of LG did not receive adequate SANIMAS training • No KPP complaint mechanism in 75% of LGs • 37% KPP no support for major maintenance needs	MoHA, MoPWH and LGs	Short to Medium Term
	10	**Establish** co-management arrangements for operation and maintenance *'Cooperation Agreements' are signed to define the mutual responsibilities of the Local Government and the KPP for monitoring, desludging, O&M, major repairs, etc.*	• There are no agreements between LGs and KPPs on: ◦ readiness criteria and longer-term operation and maintenance responsibilities ◦ asset ownership and parties' responsibilities ◦ financial arrangements, fees, payments, support ◦ budget for O&M, major repairs, effluent testing, etc. • No operator at 54% of systems • No Income source for O&M costs: 37% of KPPs • No operator salary: 73% of operators • Can't pay for regular O&M expenses: 52% of sites • 37% KPPs have no support for major maintenance needs • Overall PI scores IsDB: 51% Poor; 43% Concern; 5% Good • 48% one or more signs of serious management challenges • Communities are not knowledgeable on basic sanitation and O&M topics after training	MoPWH, MoHA and City/Regency	Short Term

EXECUTIVE SUMMARY *continued*

TABLE 1 *continued*

Recommendations, Findings and Implementation Time Frame

The full report discusses these recommendations in-depth in Section E, followed by Annexes with further details

CAT.	NO.	RECOMMENDATIONS	FINDINGS	WHO	WHEN
TECHNOLOGY	11	**Confirm** designs and design parameters *The current designs need technical improvements and construction supervision needs improvement.*	• Currently used designs do not function as intended and are unsuitable to meet 2016 effluent standards • Need to update designs to increase treatment efficiency, add more house connections and make O&M easier • 66% of wastewater samples do not comply with the 2016 standards • 21% are used to less than half of their treatment capacity • 95% of SSS were built larger than technical design guidelines	MoPWH	Medium Term
	12	**Pilot** new or innovative technologies and methods *Pilot new technologies at a limited number of sites and evaluate after 2–3 years of operation.*	• SANIMAS facilities cannot meet the 2016 effluent standards • 66% of wastewater samples do not comply with the 2016 standards • Pilot a few new technologies focusing on those that lower the O&M risk and cost; meet new effluent regulations; or meet climate targets	Bappenas and MoPWH	Medium Term
	13	**Rehabilitate** poorly operating and dysfunctional SANIMAS systems and increase house connections *This is the lowest cost option for increasing safe sanitation access, removing COD and reducing O&M costs.*	• On average the cost to rehabilitate an existing SSS is 8% of the total investment to build a new SSS • Significant 'idle capacity' in SSS and opportunities to increase HC. Average HC 52 per SSS, but the average capacity of SSS can serve up to 100 households • Expanding a network from 52 households to 100 households can reduce the O&M cost by 50% • 66% of wastewater samples do not comply with the 2016 standards • 21% of systems use under half of the treatment capacity • 95% of SSS were built larger than the technical design guidelines • 7% do not treat any wastewater • Limited number of NGOs/Associations implementing capacity building programs with existing SANIMAS KPPs post construction	MoPWH and LGs	Medium Term
FUNDING	14	**Establish** a model for CAPEX and OPEX financing *Use a new financial model that includes sustainable OPEX funding.*	• Contracts with suppliers/contractors should consider OPEX (5–10 years) and CAPEX in the selection process • No operator in 54% of systems • No operator salary: 73% of operators • No Income to cover O&M costs: 37% of KPPs • Can't cover regular O&M expenses: 52% of sites • 37% KPP no support for major maintenance needs • 48% systems have one or more signs of serious management challenges	MoF and MoPWH	Medium Term
	15	**Set-up** program financing with measurable outcomes and outputs *Finance soft components that will improve the use and sustainability of all systems.*	• Need to allocate 20 to 25% of future SANIMAS budgets for soft components (Include support for: survey platform, database, CB, technical certification, technical designs' PS piloting, media campaigns, longer TFL contracts, etc.) • An on-granting scheme to finance SANIMAS programs is being developed. It has clear regulations for the handover of SANIMAS assets to cities/regencies which can help ensure program sustainability	MoF and MoPWH	Medium Term

GLOSSARY TERMS, ABBREVIATIONS and ACRONYMS

ABR : Anaerobic Baffled Reactors
A tank with a series of baffles to treat wastewater

AD-ART : Articles of association

ADB : Asian Development Bank

AF : Anaerobic Filter
A form of anaerobic digester. The digestion tank contains a filter medium where anaerobic microbial populations organisms that live in the absence of oxygen can establish themselves.

AKSANSI : Association of SANIMAS community groups

APBD : Local Government Budget Allocation

APBN : National Government Budget Allocation

Bappeda : Local Government for Planning and Development

Bappenas : Ministry of National Development Planning/ Development Planning Agency

BEST : Bina Ekonomi Sosial Terpadu (Integrated Social Economic Development)
An NGO involved in SANIMAS pilot project and program

BKM/LKM : Self-Community Agency/Institution

BOD : Biological Oxygen Demand
Amount of oxygen consumed by bacteria and other microorganisms while they decompose organic matter under aerobic (oxygen is present) conditions at a specified temperature.

BORDA : Bremen Overseas Research and Development Association
An NGO from Germany involved in SANIMAS pilot project and program

BPKP : State Development Audit Agency

BPS : Badan Pusat Statistik (Central Statistical Bureau)

BUMDES : Village Owned Enterprise

CAPEX : Capital expenditures
(CAPEX) are funds used to acquire, build or upgrade physical infrastructure.

CPIU : Central Project Implementation Unit

COD : Chemical Oxygen Demand
An indicative measure of the amount of oxygen that can be consumed by reactions in a measured solution. It is commonly expressed in mass of oxygen consumed over volume of solution which in SI units is milligrams per liter (mg/L)

Co-Management : An arrangement, with responsibility divided between local government and communities, with communities responsible for day-to-day management and local government provides ongoing institutional, technical and financial support.
Financial support does not mean providing finance to the community, but rather local government needs to have a budgetline to pay for some aspects of SANIMAS operations

CSR : Corporate Social Responsibility

CSS : City Sanitation Strategy

DAK : Special Allocation Fund
A statutorily created and governed policy instrument enabling the central government to make 'specific' fiscal transfers to local and district governments that qualify for horizontal equalization assistance

DEWATS : Decentralised Wastewater System

DFAT : Department of Foreign Affairs and Trade of Australian Government
DFAT has a sanitation aid program in Indonesia

DINAS PU/PERKIMTA/DISPERKIM : Public Works Agency at local government level

DINKES : Health Agency at local government level

DLH : Environmental Agency at local government level

DPIU : District Project Implementation Unit
A unit created under a technical agency in city/regency level to implement SANIMAS program

EAWAG : Swiss Federal Institute of Aquatic Science and Technology

FGD : Focus Group Discussion
A qualitative research method and data collection technique in which a selected group of people discusses a given topic or issue in-depth, facilitated by a professional, external moderator

FOC : Frequency of Occurrence

FSM : Fecal Sludge Management

FWS : Free Water Surface

Gap Analysis : An examination of assessing the differences in performance between the optimised level and the current state

GESI : Gender and Social Inclusion

HC : House Connection

HH : Household

HHE : Health and Hygiene Education

HID : Hibah Insentif Desa (Village Incentive Grant)

HRT : Hydraulic Retention Time

IATPI : Ikatan Ahli Teknik Penyehatan/ Lingkungan Indonesia (Indonesia Association of Sanitary/Environmental Engineer)

IFAD : International Fund for Agricultural Development

IPAL : Wastewater Treatment Plant

IPLT : Fecal Sludge Treatment Plant

IsDB : Islamic Development Bank

ISF : Institute for Sustainable Futures

IUWASH : Indonesia Urban Water, Sanitation and Hygiene
An initiative designed by the USAID to assist the Government of Indonesia in increasing access to water supply and sanitation services

GLOSSARY TERMS, ABBREVIATIONS and ACRONYMS *continued*

IWK : Indah Water Konsortium
A company owned by Malaysia Minister of Finance Incorporated, awarded with the concession for developing and maintaining sewerage system for Malaysia nationwide

KIAT : Indonesia Australia Partnership for Infrastructure

KII : Key Informant Interview

KPP : Beneficiary and Maintenance Group
A community group created under SANIMAS program to operate and maintain the SANIMAS facility

KSM : Self-help Community Group
A community group created under SANIMAS program to construct SANIMAS facility

LG : Local Government
For the purpose of this report, LG refers to Province and City/Regency government

LLTT : A regular desludging program for on-site sanitation system

LPTP : Lembaga Pengembangan Teknologi Pedesaan (Institute for Rural Technology Development)
A non-government organization founded in Jakarta

MCK : Bathing, Washing, and Toilet
A public facility that is shared by several families for bathing, washing, and defecating in common areas with a fairly dense population and low economic capacity

ME : Monitoring and Evaluation

MEC : Monitoring and Evaluation Consultant
Consultant procured for monitoring and evaluation of SANIMAS funded by IsDB

MoEF : Ministry of Environment and Forestry

MoF : Ministry of Finance

MoH : Ministry of Health

MoH – Kesehatan Masyarakat : Ministry of Health — Directorate General of Public Health

MoHA : Ministry of Home Affairs

MoHA - Bangda : Ministry of Home Affairs — Directorate General of Regional Affairs

MoHA — Bina Pemdes : Ministry of Home Affairs — Directorate General of Village Development

MoPWH : Ministry of Public Works and Housing

MoPWH — Cipta Karya : Ministry of Public Works and Housing — Directorate General of Housing and Settlements

MoVT : Ministry of Village, Development of Disadvantaged Regions and Transmigration

MoVT — PPMD : Ministry of Village, Development of Disadvantaged Regions and Transmigration — Directorate General of Development and Empowerment of Village Community

NAWASIS : National Water and Sanitation Information Services
A collaboration platform for housing, settlement, water and sanitation sectors under Bappenas

NGO : Non-Government Organization

OD/ODF : Open defecation / Open defecation free

OM : Operation and Maintenance

OPEX : Operating Expense

PDAM : Local government owned enterprise acts as water utility

PD PAL : Local government owned enterprise acts as wastewater utility

PAMSIMAS : A Community-Based Water and Sanitation Supply Program
Implemented in rural areas, executed by Ministry of Public Works. Ministry of Health, Ministry of Home Affairs, and Ministry of Village, Development of Disadvantaged Regions and Transmigration

PCR : Project Completion Report

PERMENDAGRI : Minister of Home Affairs Regulation

PERMENLHK : Minister of Environment and Forestry Regulation

PERMENPUPR : Minister of Public Works and Housing Regulation

PI : Performance Indicator

PLN : State owned enterprise acts as electricity utility

PNPM/ PNPM MANDIRI: National Community Empowerment Program
A national program created to eradicate poverty

POKJA AMPL/PPAS : Water and Sanitation Working Group
A collaboration platform for all relevant ministries/agencies to coordinate issues related to water and sanitation sector

PPIU : Provincial Project Implementation Unit
A section created under Ministry of Public Works and Housing sanitation working unit at provincial level to implement SANIMAS program

PPP : Public Private Partnership

PPSP : Program Percepatan Pembangunan Sanitasi (Sanitation Development Acceleration Program)
A program to promote the creation of City Sanitation Strategy under Bappenas

PS : Private Sector

PTP : Petunjuk Teknis Pelaksanaan (Technical Guideline)

PTP 2 : Petunjuk Teknis Pelaksanaan (Technical Guideline — Book 2: Financial Management of SANIMAS IsDB Grant)

PTP 3 : Petunjuk Teknis Pelaksanaan (Technical Guideline — Book 3: Construction of SANIMAS IsDB Infrastructure)

RPJMN : National medium-term planning

SABERMAS : SANIMAS replication program funded by West Java Province

GLOSSARY TERMS, ABBREVIATIONS and ACRONYMS *continued*

SAIIG : Sanitation Australia-Indonesia Infrastructure Grant

SANIMAS : Community-Based Sanitation
A community-based sanitation program for urban areas, executed by Ministry of Public Works and Housing

SANIMAS Regular : A community-based sanitation program funded by national government, executed by Ministry of Public Works and Housing

SBR : Sequencing Batch Reactor

Settler : A primary treatment technology for wastewater
It removes suspended solids by sedimentation. It may also be referred to as a sedimentation or settling basin/tank, or clarifier

SK KUMUH : Mayor/Regency Decree on slum areas development

SNV : A not-for-profit international development organization from the Netherlands

SPALD-S : On-site sanitation system

SPALD-T : Off-site sanitation system
It is classified into 3: SPALD-T communal scale, SPALD-T regional scale and SPALD-T citywide scale

SPAN : National Water Services Commission (Suruhanjaya Perkhidmatan Air Negara) Malaysia

SPPL : Surat Pernyataan Perngelolaan Lingkungan (Statement Letter of Environmental Management)
The simplest form of environmental document, outlining the ability to manage and monitor the environmental impacts of a business/activity, that needs to be submitted to environmental agency

SSS : Small-scale Sewerage System

SSTP : Septic Sludge Treatment Plant

STBM : Sanitasi Total Berbasis Masyarakat (Community-Based Total Sanitation)
Sanitation community-based program under Ministry of Health, focuses on triggering community behavior change in rural areas

STFL : Senior Tenaga Fasilitator Lapangan (Senior Field facilitator)

TA : Technical Assistance

TAMK : Tenaga Ahli Manajemen Kota/Kabupaten (City/Regency Management Facilitator)

TFL : Tenaga Fasilitator Lapangan (Field facilitator)

UNICEF : The United Nations International Children's Emergency Fund

UPTD : Technical Implementing Unit
A technical unit created under a local government technical agency to operate and maintain local government asset/ facility

USAID : United States International Development Agency

USRI : Urban Sanitation and Rural Infrastructure

VF Wetlands : Vertical Flow Wetlands

WSP-WB : Water and Sanitation Program of the World Bank

WTP : Water Treatment Plant

WWTP : Wastewater Treatment Plant

ANNEX LIST

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A SANIMAS Introduction and Background

Brightly coloured mural promoting a clean environment and healthy life next to SSS infrastructure. Jakarta Utara, KPP At-Taubah

A INTRODUCTION AND BACKGROUND

SANITATION SITUATION

Today, 56% of Indonesia's population,[6] or about 153 million people, live in urban areas. By 2045, this will increase to around 220 million people, or over 70% the population (World Bank, 2019). According to RPJMN 2020–2024[7] figures, in 2018 almost 75 percent of the Indonesian population has access to improved sanitation nationally. This includes almost 7.5 percent classified as safely managed sanitation services based on SDGs 2030 definitions. These figures are impressive considering the low base of sanitation coverage with which the country has been evolving from.

However, in real terms, 68 million people still do not have access to improved sanitation and 26 million are still practicing open defecation (OD).[8] Further, currently less than 4% are connected to a sewer network and over 70% of toilets in urban areas are connected to unsealed septic tanks or soak pits that are not regularly desludged, and of the 150 Faecal Sludge Management Installations (IPLT) in Indonesia, less than 10% are functioning optimally. (Irawan, 2019)

Therefore, most domestic wastewater is discharged directly to the environment (groundwater or water bodies) untreated, contributing to environmental pollution and the contamination of water supplies for all users. Studies have shown that over 70% of rivers in Indonesia are heavily polluted, and with most people still drawing water from wells and boreholes, water pollution is an everyday part of life (JWRC, 2019). Poor water quality contributes to infant mortality, typhoid, dysentery and other waterborne diseases; and deteriorates the local environment. Further, poor sanitation impedes Indonesian economic development costing an estimated US $5.6 billion in losses annually (WB, 2008).

The Indonesian government is well aware of the sanitation issues and since the early 2000s it has implemented important policy interventions and made significant investments to increase sanitation access across the nation, especially in the area of community-based decentralised small-scale sanitation systems (SSS).

SANITASI BERBASIS MASYARAKAT (SANIMAS)

This national program evolved from 6 pilot sites in 2002–2004. SANIMAS or 'Community Based Sanitation', is an approach or model, which provided the basis for a sector reform initiative led by the Indonesian government to implement sanitation systems for domestic wastewater treatment. A key feature of SANIMAS are the community contributions of land, labour and money. Initially supported by Australian Aid (DFAT), NGOs provided technical and institutional assistance to the communities to develop sanitation infrastructure, which targeted 50 to 200 households in urban areas; and included decentralised SSS for the collection and treatment of domestic wastewater. In Indonesia, these decentralised systems have different names such as DEWATS and SPALD-T,[9] with different configurations; but the general characteristics of small scale decentralised passive wastewater treatment are the same.

Through the success of the initial projects the government saw community managed decentralised SSS as one of the key approaches for eradicating open defecation, improving sanitation and meeting national MDG targets. In 2006, MoPWH started to replicate SANIMAS more widely,

Poor water quality contributes to infant mortality, typhoid, dysentery and other waterborne diseases.

SSS infrastructure inspection for the evaluation.
Sumatera Utara, Kota Binjai, KPP Berbakti

[6] 274 million, 2020 (www.worldometers.info)

[7] National medium-term planning (PP No.18/2020)

[8] WHO/Unicef — JMP 2017

[9] Classified as communal scale off-site system (IPAL) or Sistem Pengolahan Air Limbah Domestik Terpusat (SPALD-T) Skala Permukiman according to GoI MoPWH of Permen PUPR No. 04/PRT/M/2017

A INTRODUCTION AND BACKGROUND

SANITATION SITUATION *continued*

working closely with NGOs to refine the implementation approaches and train staff.

In 2009, the Indonesian government announced a five-year national development plan, with substantially increased funding for urban sanitation. Bappenas and the MoPWH promoted SANIMAS as an intermediate solution to provide sanitation for poor residents living in high density, underserved urban and peri-urban communities. It was always seen as a temporary stop-gap solution, until full city-wide sewage and wastewater treatment was available, and the SSS were to be integrated into city-wide centralised systems when, and where possible.

Since then the SANIMAS program greatly expanded to over 21,000 locations, serving millions of users, with installations including community toilet blocks (MCK) with SSS, SSS with household connections (HC), or a combination of MCK with SSS and HCs. The intended outcome for the investments focused on meeting the National MDG targets and later the SDG's number 6 targets. The government engaged many partners and almost US $1 billion has been invested across several national, provincial and city SANIMAS programs since 2002. No other country in the world has implemented a community managed decentralised SSS on such a coordinated scale before.

Therefore, it is not surprising that there are program implementation and sustainability issues. Huge increases in SANIMAS investment from 2010 were not always accompanied with sufficient skilled staff to manage and implement projects at the local level. The systems have been built based on the assumption that most communities will manage and undertake the operation and maintenance of the system alone.

ABOUT THIS STUDY

The Indonesian government, IsDB, Bill & Melinda Gates Foundation (BMGF) and other stakeholders recognise that the sanitation sector has been rapidly evolving with (i) innovative technologies; (ii) new water and sanitation ecosystem service delivery models; (iii) new public-private partnership (PPP) business models; and (iv) new financial models, sector players and financial investors. In this regard, the Ministry of National Development Planning (Bappenas) and IsDB sought support from BMGF for conducting a decentralised wastewater management and sanitation sector assessment; and to seek comprehensive recommendations for Indonesia's approach, with a special focus on SANIMAS as one approach for decentralised SSS.

The *'Independent Evaluation of SANIMAS model as an approach for providing decentralised sanitation'* aims to assess the success and limitations of the SANIMAS approach; to assess the lessons learned from the IsDB and the other investment programs; and the feasibility of introducing an updated SANIMAS or a next phase of the program as a sustainable approach for providing decentralised sanitation in future sanitation investments.

Dalco Point was engaged by the Technical Assistance Hub in South Asia at the end of June 2020, to carry out the independent evaluation. This evaluation report includes a review of the successes, challenges and opportunities for expanding SANIMAS approaches; and integration of SANIMAS into a more City-Wide Inclusive Sanitation (CWIS) approach. It also provides 15 specific recommendations for an improved scope, financing and coverage for upscaling more sustainable SANIMAS investments in the future. These recommendations have been reviewed by all relevant stakeholders during a final online roundtable meeting on the 18th of December, 2020.

SSS infrastructure an everyday part of community life.
Aceh Besar, KPP Gampong Lamgapang

A INTRODUCTION AND BACKGROUND

1 THE SANIMAS PROGRAMS

1.1 2002 TO 2019 — 6 PROGRAMS

Over the last 17 years, there have been six key SANIMAS programs. They range from the very small-scale initial pilot project, in just two provinces, to the huge national DAK SLBM program, which serves every province in Indonesia, except for Jakarta (DKI). Table A1 provides a brief description of each SANIMAS program.

Utilizing SSS infrastructure for community purposes. Banten, Kabupaten Tangerang, KPP Bunder Berkarya

TABLE A1

SANIMAS Program Descriptions

NO.	PROGRAM	DESCRIPTION
1	**Pilots**	The Sanitation by Neighbourhoods Project (SANIMAS), implemented by WSP-BORDA, and integrated into the Water Supply and Sanitation Policy and Action Planning Project (WASPOLA). The aim of this SANIMAS demonstration project was to promote and develop models for community based sanitation and then to build on the lessons of implementation to fine-tune the program for replication in other communities. This project provided the springboard for SANIMAS to be refined and up-scaled on a national level.
2	**Regular**	The third largest program by implementations serving all provinces. Managed by MoPWH and funded through the national budget (APBN). The provincial level Satker[10] are responsible for overseeing implementation. Only community implemented constructions are supported.
3	**DAK SLBM**	This is the largest SANIMAS program. Funding is disbursed by the MoF from the national special allocation fund DAK SLBM (Special Allocation Fund, Community Based Environmental Sanitation).[11] MoPWH is responsible for management delegating to the Directorate of Sanitation who assigns the provincial level Satker to coordinate the implementation and monitoring with cities/regencies. Contractors or communities can be funded using DAK.
4	**USRI-ADB**	The Urban Sanitation and Rural Infrastructure (USRI) Support to the PNPM Mandiri Project[12] consisted of two main components, covering rural infrastructure and urban sanitation. One of the three main project outputs was to provide improved sanitation services, with SANIMAS, through neighbourhood development grants.
5	**SABERMAS**	SABERMAS was a SANIMAS replication project which used provincial funds (APBD). It was managed by the West Java provincial government and implemented by 11 cities/regencies in the province. One key difference with this program was that the cities/regencies hired private sector contractors to build the infrastructure.
6	**IsDB**	The second largest program by implementations. The 'SANIMAS Community Based Sanitation Project' was a community driven demand responsive approach implemented by MoPWH across 13 provinces. See Section 1.2 below for more details on IsDB SANIMAS.

[10] Technical Implementing Unit

[11] DAK SLBM — Dana Alokasi Khusus, Sanitasi Lingkungan Berbasis Masyarakat

[12] National Program for Community Empowerment (PNPM Mandiri)

A INTRODUCTION AND BACKGROUND

1 THE SANIMAS PROGRAMS

1.1 2002 TO 2019 — 6 PROGRAMS *continued*

The combined SANIMAS programs have gone through 3 distinct phases:

- Development (2002–2004)
- Adoption (2005–2010)
- Expansion (2011–2019)

Until the end of 2019, 21,832 SANIMAS decentralised SSS have been built and MoPWH implemented 97% of them. The vast majority, about 21,000, were built since 2011. This means that on average over 2,300 SSS were built each year until 2019. The average cost for construction at each location is about $32,000 and the average number of household connections per SANIMAS location is 54. Based on this data an estimated 6 million people are currently being served by SANIMAS investments (see Annex A1 for more details and references). Table A2 summarises the six SANIMAS programs.

TABLE A2

Overview of SANIMAS Programs

NO.	SANIMAS PROGRAM	IMPLEMENTOR	FUNDING SOURCE	YEAR(S)	SYSTEMS BUILT	AVG HC / SANIMAS	INVESTMENT ($'000)	COST PER LOCATION (USD)	PROVINCES SERVED	STATUS
1	Pilots	WSP-BORDA	DFAT/WB	2002–2004	6	N/A	$832	N/A	2	Closed
2	Regular	MoPWH	APBN/MoF	2003–2019	1,757	N/A	$52,500	$32,916	34	Ongoing
3	DAK SLBM	MoPWH	APBN/APBD	2010–2019	16,231	52	$680,000	$32,916	33	Ongoing
4	USRI-ADB	MoPWH	APBN/ADB	2012–2014	1,438	57	$59,500	$28,802	5	Closed
5	SABERMAS	West Java Province	APBD	2015–2017	635	N/A	$31,750	$32,916	1	Closed
6	IsDB	MoPWH	APBN/IsDB	2014–2019	1,765	52	$117,000	$34,974	13	Closed
					TOTAL 21,832	**AVERAGE 54**	**TOTAL $941,582**	**AVERAGE $32,505**		

Source: See Annex A1 for more overview details and references

A INTRODUCTION AND BACKGROUND

1 THE SANIMAS PROGRAMS

1.1 2002 TO 2019 — 6 PROGRAMS *continued*

Since 2002, almost US $1 billion has been invested in SANIMAS, 70% of this has been invested via the DAK program. Currently, the SANIMAS programs are funded from the national budget (APBN), through DAK, local government funds (APBD) and loans from the ADB and IsDB. Figures A1 and A2 show SANIMAS cumulative total implementations and total investment by program (see Annex A1 for more details and references).

FIGURE A1

SANIMAS Cumulative Total Implementations and Total Investment

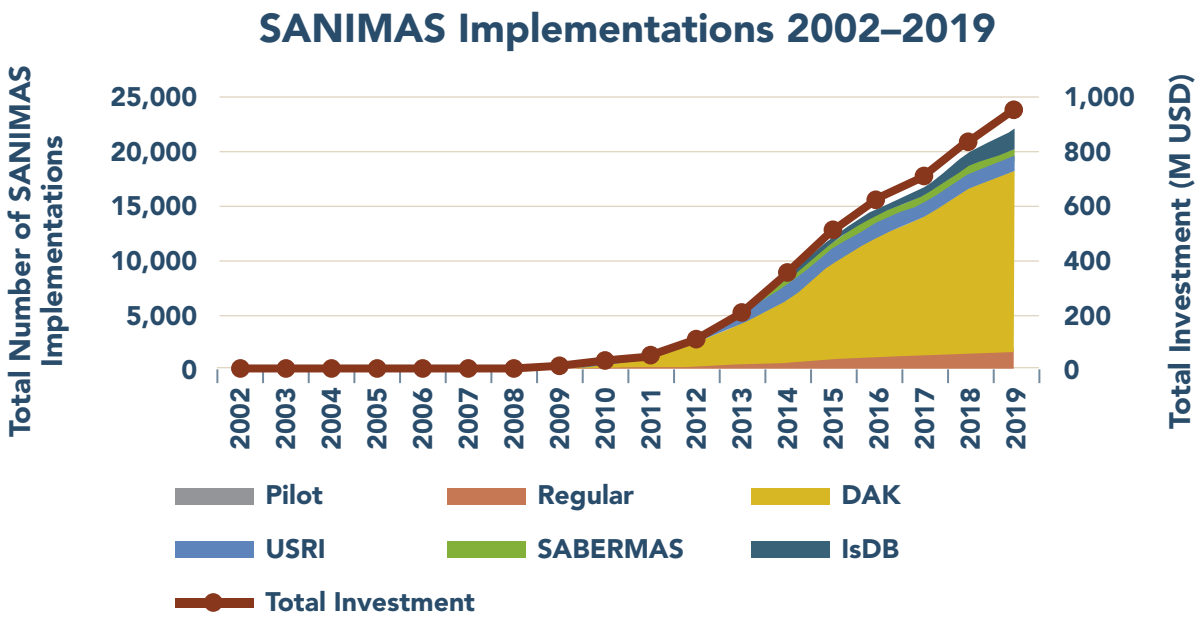
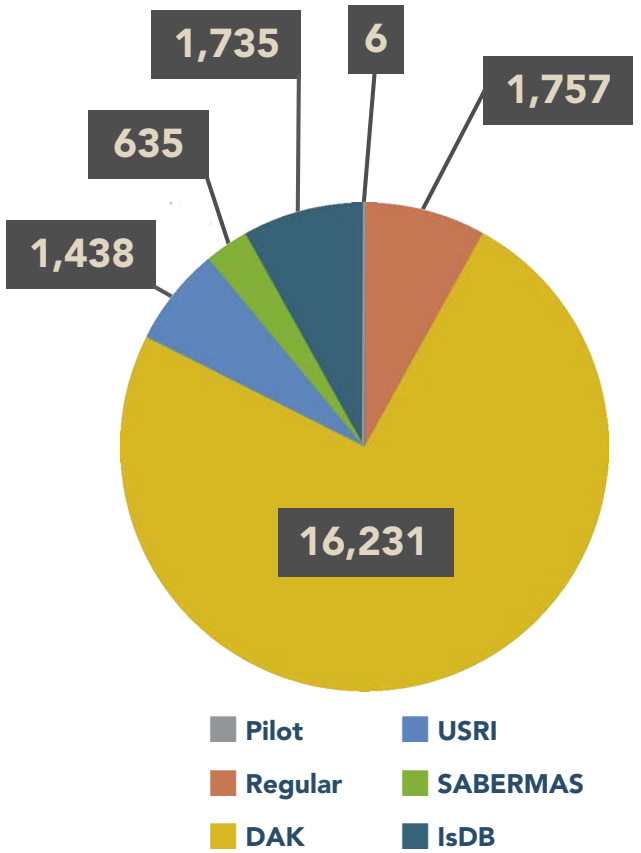


FIGURE A2

Total Implementations by SANIMAS Program



The major difference between the SANIMAS programs relates to the different funding sources and financing mechanisms. In most cases funds are transferred directly to community groups' (KSM/BKM/LKM) following approval by either provincial or regency/city agencies, as specified in the different program guidelines. (See Annex A2) Generally, the project implementation approach is the same or only slightly different, based again on the different program guidelines.

A INTRODUCTION AND BACKGROUND

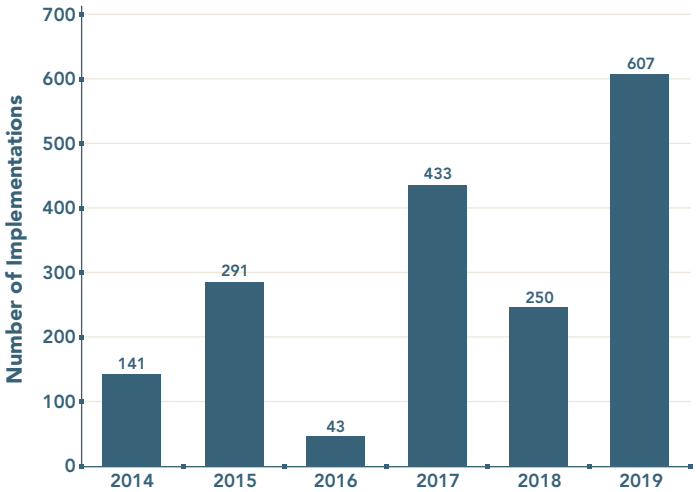
1 THE SANIMAS PROGRAMS *continued*

1.2 2014 TO 2019 — IsDB

Since 2009, IsDB has been assisting the PNPM Mandiri program[13] through the Integrated Community Driven Development (ICDD) program in stages, to build settlement infrastructure, implemented by communities, and to develop livelihoods in the target areas. Building on the success of the ICDD program, in 2013, IsDB approved US$ 100 million of financing for the 'SANIMAS Community Based Sanitation project'. This project was centred around a community driven demand responsive approach and focused in the same target areas of the previous ICDD program interventions (IsDB, 2018). See Table A3 for an overview of the project.

FIGURE A3

IsDB SANIMAS Implementations



Source: MoPWH (2020b)

TABLE A3

Overview IsDB SANIMAS Community-Based Sanitation Project[14]

Project Name	SANIMAS Community-Based Sanitation Project
Project Duration / Status	2014–2019 / Completed
Executing Agency	Ministry of Public Works and Housing
Implementation Agency	Directorate of Human Settlements
Sector(s)	Water, Sanitation and Urban Services
Source of Funding / Amount	IsDB: $100,000,000 Government of Indonesia: $17,000,000
Geographical Locations	• 13 Provinces in Western Indonesia: all provinces in Sumatera, West Java, Banten, DKI Jakarta and West Kalimantan • 52 cities/regencies • 970 villages/kelurahan
Linkages to Strategic Agendas	2015–2019 National Medium-Term Development Plan (RPJMN) which mandates a 100-0-100 program, which is 100% safe access to drinking water, 0% slums and 100% access to improved sanitation by the end of 2019. IsDB's Vision and Mission, which emphasises the achievement of full human development through poverty eradication and health improvement.
Objectives	To help address the health issues induced by open defecation and poor sanitation by providing community-based sanitation infrastructure, in 13 provinces, across 1800 locations, using a demand responsive approach. Sub-Objectives: (i) Increase the number of households in 13 provinces connected to an improved sanitation facility (ii) Install functional, but easy to use and maintain, wastewater treatment facilities in 13 provinces (iii) Improve the disposal of sewage and sludge and eliminate any potential contamination for human beings and the environment (iv) Train local communities for maintaining the facilities

[13] National Program for Community Empowerment (PNPM Mandiri)

[14] References: PT.Ciriajasa, 2020; BPKP, 2019; IsDB, 2018; IsDB 2013

A INTRODUCTION AND BACKGROUND

1 THE SANIMAS PROGRAMS *continued*

1.3 SANIMAS/SSS PROGRAM PLANNING (2020–2024)

In response to meeting its national and international targets on sanitation, the national government has made increasing sanitation access one of the 41 strategic major projects in the 2020–2024 RPJMN. The RPJMN represents the vision, mission and commitments of the President and Vice President to build a sovereign, independent and advanced country based on mutual cooperation (RPJMN 2020-2024: PP No.18/2020). Table A4 shows the key RPJMN strategic major project related to increasing sanitation access. This project represents planning and investment across the whole national sanitation chain, urban and rural, household, settlement, and regional and city level infrastructure.[16] However, for this report, the focus is on plans for small-scale residential sanitation (SSS/Skala Permukiman) investments. Table A5 shows the relevant indicators and targets from the RPJMN.

From this RPJMN planning information, and previous SANIMAS program data, projections of the number of SANIMAS, and other SSS projects, that need to be implemented, and the allocated budget, to fulfil the 2020–2024 RPJMN.

Targets are summarised in Table A6.

TABLE A4

2020–2024 RPJMN Major Project Sanitation

PROJECT	OBJECTIVE	EST. BUDGET (USD)	IMPLEMENTORS
Improved and safely managed sanitation access (domestic wastewater)	Increase improved sanitation access to 90% of households (including 15% safely managed sanitation access)	$10.06 billion[15]	MoPWH, MoH, MoHA, LG, Community and Private Sector (SOE/Private)

TABLE A5

2020–2024 RPJMN Indicators and Targets[17]

INDICATORS	HC TARGETS	TOTAL HC	LOCATIONS (City/Regency)	IMPLEMENTOR/PROGRAM
Number of house connections (HC), communal IPAL (SSS)	549,468	1,439,610	168	DAK
Number of HC, SPALD-T (SSS)	108,315		168	MoPWH
Number of HC, SPALD-T (SSS)	781,827		168	APBD; Community; Private Sector (CSR)

TABLE A6

2020–2024 RPJMN SANIMAS/SSS Projects and Costs

BAPPENAS DATA	2020	2021	2022	2023	2024	TOTAL
HC	303,028	284,145	284,145	284,145	284,145	1,439,610
SANIMAS[18]	6,060	5,683	5,683	5,683	5,683	28,792
COSTS (USD)[19]	$594,500,000	$574,285,000	$574,285,000	$574,285,000	$574,285,000	$2.89 billion

[15] IDR 140,9 Trillion (Funding sources: APBN: 73.5 T, APBD: 1.7 T, Community/Private Sector: 65.7 T)

[16] Septic tanks, centralised wastewater treatment systems (regional, city and settlement scales), FSM services, solid waste management

[17] SSS: Residential/Skala Permukiman

[18] Based on 50 HC per location; previous SANIMAS program data

[19] Based on RPJMN budget allocations

A INTRODUCTION AND BACKGROUND

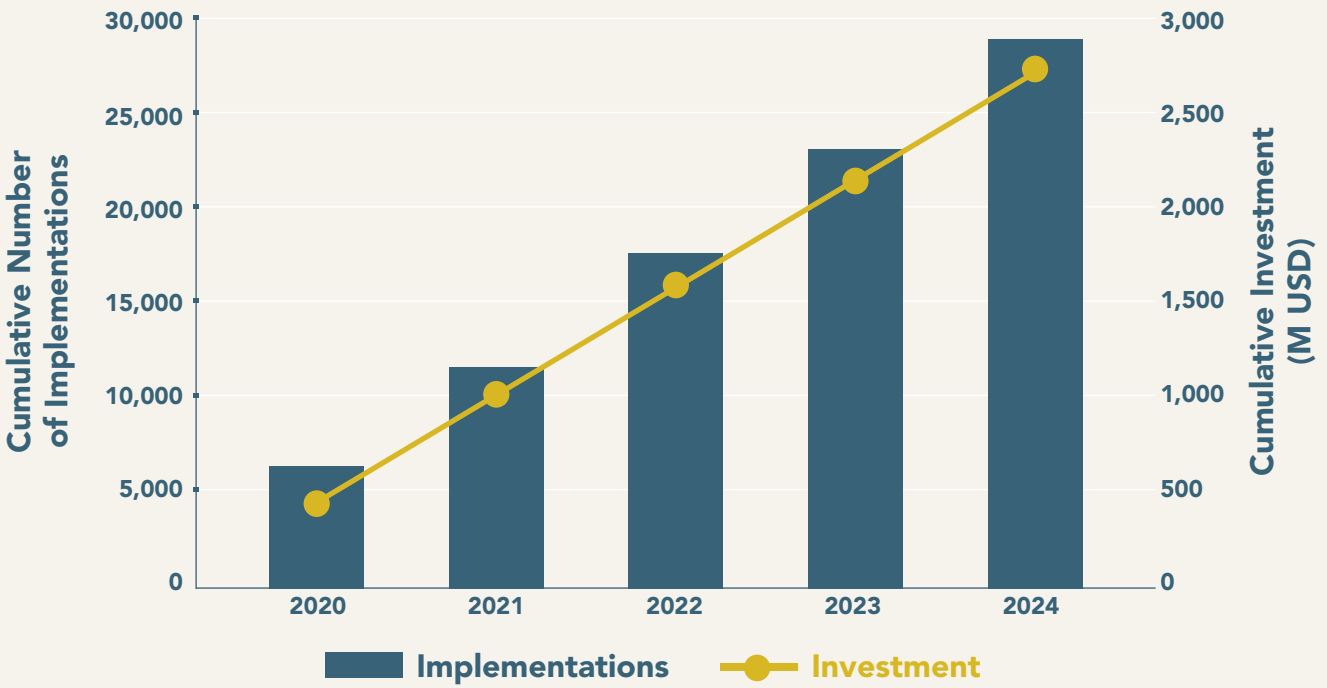
1 THE SANIMAS PROGRAMS

1.3 SANIMAS/SSS PROGRAM PLANNING (2020–2024) *continued*

Since 2011, on average, over 2,300 SANIMAS SSS were built each year until 2019. In 2015 a peak of about 4,000 SANIMAS SSS was reached, but this has never been repeated. The 2020–2024 RPJMN targets above, in terms of SANIMAS/SSS implementations,[20] represent a significant annual increase to an average of more than 5,750 units per year (based on 50 HH per location). Table A7 shows the cumulative number of implementations and funds allocated to achieve the RPJMN targets.

TABLE A7

RPJMN SANIMAS/SSS Planning 2020–2024



[20] SSS: Residential/Skala Permukiman

B OBJECTIVES AND METHODOLOGY

SSS infrastructure embedded in the community.
Sumatera Utara, Kabupaten Deli Serdang, KPP Seroja

B OBJECTIVES AND METHODOLOGY

1 EVALUATION OBJECTIVES AND RESEARCH QUESTIONS

1.1 OBJECTIVES

The overall objective of the Independent Evaluation is to critically assess the success of the SANIMAS approach and the feasibility of introducing the SANIMAS model as a sustainable approach for providing decentralised sanitation in future SANIMAS investments.

SSS infrastructure merging with the local environment.
Sumatera Barat, Kota Padang, KPP Air Pacah RW 7

The overall objective is broken down into five sub-objectives with outputs:

SANIMAS PROJECT PERFORMANCE REVIEW

- Review of projects' design framework, implementation, institutional arrangements and financing — Indonesia, regional and international
- Revision and validation of secondary data
- Field visits to project sites to conduct of group discussions, interviews, etc.

TECHNICAL ASSESSMENT

- Evaluate the performance and functionality of the sanitation infrastructure, compliance with national discharge standards, and operation and maintenance status
- Assessment of SANIMAS technologies in light of global advancements, changes and developments of new technologies, standards, cost and approaches

INSTITUTIONAL AND FINANCIAL ASSESSMENT

- Review of the current institutional and financial settings governing the sanitation sector with a special focus on SANIMAS approaches
- Review innovative institutional arrangements and successful policy measures from other countries around the world
- Review opportunities for new public-private partnerships (PPP) business models

RECOMMENDATIONS ON IMPROVED SERVICE DELIVERY MODEL

- Analyse SANIMAS service delivery model (wastewater) in comparison to new and emerging business models

STAKEHOLDER OPINION ASSESSMENT

- Seek feedback from all key stakeholders (in person or by video conference) on strengths, weaknesses and experiences of the SANIMAS approach

For more details related to evaluation objectives, please see Annex B1.

B OBJECTIVES AND METHODOLOGY

1 EVALUATION OBJECTIVES AND RESEARCH QUESTIONS *continued*

1.2 RESEARCH QUESTIONS

Overall Research Question

In line with the independent evaluation objectives, the evaluation team developed an Overall Research Question (ORQ) to focus the survey framework design and evaluation implementation strategy.

The ORQ references almost 20 years of SANIMAS related experience and five detailed previous SANIMAS studies. It should be noted here that the ORQ is based on the following assumptions:[1]

i. the existing arrangements are not delivering the intended outcomes in a sustainable manner,
ii. the specific challenges are clear from the SANIMAS survey findings and previous studies,
iii. both national government and IsDB are willing and able to make changes to SANIMAS implementation arrangements.

ORQ

What governance arrangements are necessary for implementation and sustainable operation of community-scale sanitation systems to improve safely managed sanitation access, health and environmental impacts, and the effectiveness of the investments made?

Sub-Research Questions

The seven sub-categories of questions summarised in Table B1 have been developed based on the five sub-objectives above, the extensive experience of the evaluation team, and the review of the five previous detailed SANIMAS studies. These questions were used to focus and sharpen the development of the survey framework design.

[1] See Governance Review Survey (Annex B4) for linkages with the interview questionnaires and Diagram B1 (page 31)

TABLE B1

Sub-Research Questions

NO.	CATEGORY	QUESTION(S)	LINKAGES
1	National Government	How should the national government develop, invest, prescribe (e.g. technology, operations, management best practices), monitor future SANIMAS programs, and communicate the co-management arrangements for implementation and service responsibility with provincial and local governments (LG)?	4 and 7
2	Co-Management and Accountability	What is recommended to better establish and embed accountable co-management? This includes roles, incentives and capacity of the community (KPP) and LG for a) design and construction phases and b) ongoing operation and maintenance. What capacity development is needed for a) and for b) and how can motivation be incentivised and sustained for b)? For community Sanitation Committee (KPP) development and inclusion, what adjustments need to be made to the community engagement project components to work with LG and fulfill agreed roles (2b) and deliver increased access and more sustainable and inclusive outcomes?	4
3	Private Sector Involvement	How could private sector service providers cost effectively support the role of LG in maintaining the sanitation infrastructure, based on the LG roles outlined in 2b?	4
4	Local Government Institutional and Regulatory Arrangements	Based on existing and new arrangements for FSM, and water and sewerage services, what institutional arrangements, functions and regulation are needed to enable LG to undertake the ongoing co-management roles outlined for sub-questions 2a and 2b?	6 and 3
5	Appropriate Technology Selection	How compatible are the implemented technologies with local conditions? Are they adequate in terms of (i) CAPEX/OPEX, O&M requirements and treatment performance, (ii) contracting (KPP, LG, private sector), (iii) asset management?	6 and 7
6	Financing Sustainable Operation and Maintenance	What is necessary for improved O&M to be financed and ensure long term viability of sanitation systems?	5
7	Funding for Implementation	What essential 'packages' of funding are required so that not only is construction (and training workshops) completed, but that well-maintained operational sanitation *services* are sustainably established utilising the infrastructure investment?	6

B OBJECTIVES AND METHODOLOGY

1 EVALUATION OBJECTIVES AND RESEARCH QUESTIONS

1.2 RESEARCH QUESTIONS *continued*

DIAGRAM B1

Overall Research Question and Contributing Sub-Questions

For more details related to evaluation objectives, please see Annex B1.

In line with the independent evaluation objectives, the evaluation team developed an Overall Research Question (ORQ) to focus the survey framework design and evaluation implementation strategy.

B OBJECTIVES AND METHODOLOGY

1 EVALUATION OBJECTIVES AND RESEARCH QUESTIONS *continued*

1.3 FRAMEWORK OVERVIEW

Diagram B2 provides an overview of the independent evaluation survey framework. Based on the research questions, three key research components were developed with two structured research methodologies.

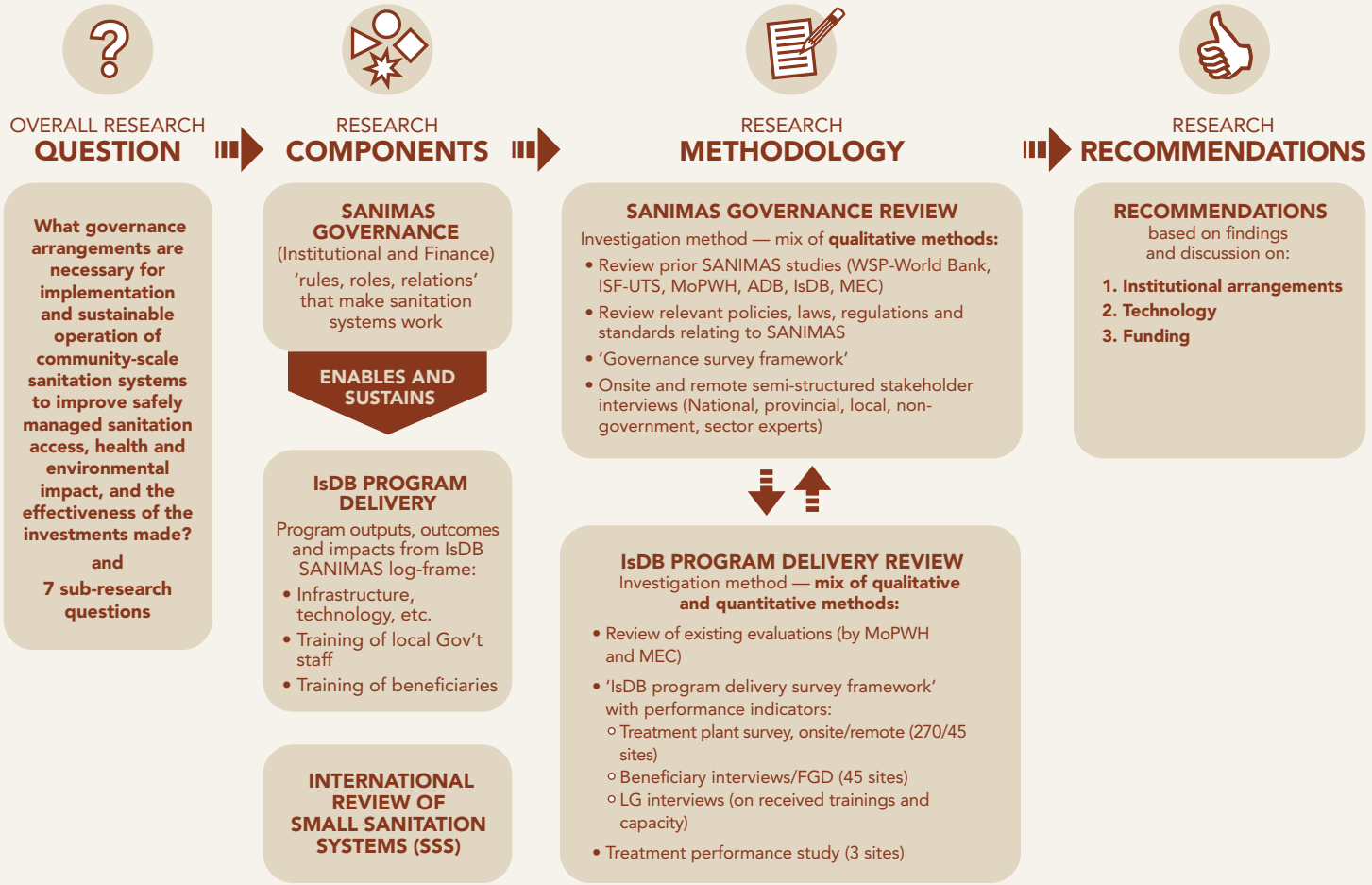
The Governance Review analysed almost 20 years of different SANIMAS programs and five detailed SANIMAS studies. These studies provided a wealth of findings and recommendations representing all key SANIMAS programs since 2002. This coupled with a review of relevant polices, laws and regulations, and in-depth, remote and onsite stakeholder interviews, provided a very broad investigation of the historical SANIMAS ecosystem and context.

To provide the deepest possible investigation of current SANIMAS implementation practices, the Program Delivery Review looked only at the IsDB SANIMAS program. 18 performance indicators were developed to align with IsDB SANIMAS outputs, outcomes and impacts. Remote and onsite interviews and technical surveys were conducted with beneficiaries and LG.

Findings from both the Governance Review and the IsDB Program Delivery Review were integrated with key findings from a review of similar international sanitation programs to develop recommendations for future SANIMAS investments.

DIAGRAM B2

SANIMAS Independent Evaluation Survey Framework



B OBJECTIVES AND METHODOLOGY

2 REVIEW OF EXISTING STUDIES

2.1 REsVIEW OF PREVIOUS SANIMAS STUDIES

The 18 performance indicators used to review the Impacts, Outcomes and Outputs of the IsDB project were each considered with regard to five previous SANIMAS studies. These are listed in Table B2.

The main findings and recommendations of the five studies are summarised in Annex B3, which compares these studies against the applicable IsDB project indicators.

TABLE B2

Previous SANIMAS Studies[2]

NO.	TITLE	AUTHOR	YEAR	PROGRAM(S)	SITE SAMPLE
1	Review of Community Managed Decentralised Wastewater Treatment Systems in Indonesia	WSP-World Bank (WSP, 2013)	2013	Pilots, Regular, APBN	388
2	Findings and Recommendations: A synthesis report for key stakeholders in community scale sanitation in Indonesia	Institute of Sustainable Futures (ISF), Sydney University	2016	DAK, Regular, USRI	31
3	Indonesia: Urban Sanitation and Rural Infrastructure Support to the PNPM Mandiri Project, Completion Report (PCR)	ADB	2017	USRI	560
4	Implementation of identification of development conditions of utilisation and maintenance groups (KPP)	MoPWH	2019	IsDB	1,132
5	Final Report: Monitoring and Evaluation Consultant (MEC)	MEC	2020	IsDB	154

[2] References: (WSP, 2013); (ISF, 2016); (ADB, 2017); (MoPWH, 2019b); (PT.Ciriajasa, 2020)

Aceh Besar, KPP Cot Lampaseh

B OBJECTIVES AND METHODOLOGY

2 REVIEW OF EXISTING STUDIES *continued*

2.2 REVIEW OF INTERNATIONAL EXAMPLES OF SSS PROGRAMS

The objective of this targeted international review is to identify key relevant lessons learned from the experience of using different types or components of small sanitation systems (SSS) in other countries, which could contribute to improving the use and management of SSS in Indonesia.

Given the range of governance, economic and socio-cultural contexts and the diversity of sanitation solutions, the review focuses on a few key aspects relevant to improving community systems in Indonesia that were identified in the evaluation:

i) Key SSS sustainability factors
ii) Financing operations (OPEX)
iii) Operation and maintenance (O&M) models
iv) Effluent standards

A global scan for independent reviews, studies and analysis on these three aspects was undertaken, and the findings of the most relevant examples for each aspect summarised. The following case studies in Table B3 were used to define the issues and the best practices for each of the key aspects relevant to Indonesia.

The case studies were used to define the issues and the best practices for each of the key aspects relevant to Indonesia.

TABLE B3

Reviewed International Examples of SSS Programs

NO.	TITLE[3]	YEAR	COUNTRY
1	Small-Scale Sanitation in India: Research Results and Policy Recommendations: Lessons learned from the use of small-scale sewerage systems (4S) focusing on the treatment aspects to serve low- and middle-income communities (EAWAG)	2020	India/Nepal
2	Use of different sanitation systems, evolution over time and mixed management models, funding OPEX cost (IWK, EAWAG material)	2020	Malaysia
3	Johkasou onsite treatment model for regulated private sector O&M models	2012	Japan
4	References drawn from effluent standards in Malaysia, UK & USA	Various	Malaysia, UK & USA

[3] References: (Eawag, 2020); (Eawag, Forthcoming); (L. S. Gaulke, 2006); (TMR, 2020); (SPAN, 2017); (UK Environment Agency, 2019); (USEPA, 2020)

Wastewater sampling for the evaluation.
Jawa Barat, Cirebon, KPP Semboja Putih

B OBJECTIVES AND METHODOLOGY

3 SANIMAS GOVERNANCE REVIEW

3.1 REVIEW OF RELEVANT POLICIES, LAWS, REGULATIONS AND STANDARDS

The assessment of policies, laws, regulations and standards involved a literature review of documents relevant to the various SANIMAS programs implemented by national government (SANIMAS-IsDB, USRI-ADB, DAK and Regular) and interviews with relevant ministries (Bappenas, MoPWH, MoHA, MoF and MoEF). The key legal and policy documents referred to in this study are presented in Table B4.

TABLE B4

Review of Reference Regulations/Documents

NO.	REGULATION/DOCUMENT	TARGET/CONTENT
1	2015–2019 RPJMN[4]	100–0–100 (100% access to clean water, 0% slum areas, 100% access to sanitation)
2	2020–2024 RPJMN	90% access to improved sanitation, including 15% access to safely managed sanitation
3	Law 23/2014 on Local Governance	Decentralisation principles; composition, duties and responsibilities of local governments
4	Regulation of the MoEF No. P.68/MENLHK-SETJEN/2016	National domestic wastewater effluent quality standards
5	MoPWH Regulation No. 29/PRT/2018	Minimum service standards for sanitation service delivery
6	MoHA Regulation No. 90/2019	Classification, coding and nomenclature of local government financial schemes
7	MoHA Regulation No. 13/2018	Guidelines on grants and social assistance funded by local government budgets

[4] National Medium-Term Development Plan 2020–2024 (PP No.18/2020)

Wastewater sampling for the evaluation.
Kalimantan Barat, Kota Pontianak, KPP Hidayah IV

B OBJECTIVES AND METHODOLOGY

3 SANIMAS GOVERNANCE REVIEW *continued*

3.2 GOVERNANCE SURVEY

3.2.1 Governance Survey Framework

The governance survey framework (Table B5) was developed based on the various SANIMAS programs implemented by national and local government. It takes into account the relevant policies, regulations, institutional arrangements, financial aspects and program technical guidelines. The SANIMAS IsDB logframe and guidelines were used specifically to evaluate IsDB program delivery. Development of the survey framework also took into account a review of the involvement of national government and LG, other stakeholders such as development partners (e.g. IsDB, ADB, DFAT), NGOs (e.g. SNV, AKSANSI, BORDA, LPTP), community associations/institutions, the private sector, and other sanitation programs.

The study was carried out by conducting in-depth interviews and focus group discussions (FGDs) covering four (4) main areas:

1) Supporting factors for improvement of the SANIMAS program from national government;
2) The capacity of provincial governments to support implementation and sustainability of the SANIMAS program and lessons learned from program replication;
3) SANIMAS institutional and financial arrangements, and lessons learned that have been implemented at city/regency level;
4) New financial models and opinions on the SANIMAS approach from relevant stakeholders.

TABLE B5

Institutional and Financial Review Framework

LEVEL	OBJECTIVE	INDICATOR
National Government	To identify supporting factors for improvement of the SANIMAS program	• Main institutional and policy constraints • Innovative institutional arrangements • New financial models • New SANIMAS service delivery models • Financial support • Capacity building
Provincial Government	To assess the capacity of provincial governments to support the SANIMAS program	• Financial support • Capacity building for cities/regencies • Program monitoring and evaluation
	To learn from SANIMAS replication in West Java province (Sabermas Program)	• SANIMAS replication using provincial APBD funds
City/Regency Government	To review SANIMAS institutional and financial arrangements	• Data management • Financial support • Capacity development • Community awareness raising • Monitoring and evaluation • Co-management between city/regency government and the community for operation and maintenance of SANIMAS
	To capture lessons learned from other SANIMAS programs	• SANIMAS replication using APBD Blitar City funds • Monitoring of effluent quality standards by Sleman Regency
Other Stakeholders	To identify new financial models and opinions for improvement of the SANIMAS program approach	• New PPP business models • Lessons learned from other sanitation programs

B OBJECTIVES AND METHODOLOGY

3 SANIMAS GOVERNANCE REVIEW

3.2 GOVERNANCE SURVEY *continued*

3.2.2 Selection of Stakeholders

Stakeholders for the survey were selected based on their involvement in the implementation of the SANIMAS programs, including those funded by the IsDB, ADB, national government (SANIMAS Regular, DAK) and local government (replication of SANIMAS by West Java province and Blitar city). The selected government stakeholders were divided into two groups:

- National government, represented by six ministries (Bappenas, MoPWH, MoHA, MoF, MoH and MoEF) involved in various SANIMAS and related sanitation programs.
- Local governments involved in the SANIMAS IsDB program and local governments involved in replicating SANIMAS using their own local budget (APBD).

The selection of local government stakeholders involved in the SANIMAS IsDB program also took into account their level of fiscal capacity to finance SANIMAS projects, and their performance, measured by the number of IsDB SANIMAS units constructed against the number initially planned. Applying these criteria, ten of the project's 13 provinces, and 13 of its 58 cities/regencies were selected.

Other stakeholders were selected based on their involvement in SANIMAS and other related sanitation programs, and included development partners, associations, NGOs, and private sector players. The selected stakeholders have experience in implementing similar programs and have developed innovations or new approaches that could be adapted to improve the current SANIMAS approach (for more details see Annex B4: Sample Selection Table).

Evaluation FGD with SANIMAS beneficiaries.
Sumatera Utara, Medan, KPP Sekar Melati

B OBJECTIVES AND METHODOLOGY

3 SANIMAS GOVERNANCE REVIEW

3.2 GOVERNANCE SURVEY *continued*

3.2.3 Stakeholder Interviews

Primary data collection was carried out by conducting in-depth interviews and FGDs. For targeted questioning, open-ended questions were derived from the specific indicators for each respondent group. The interviews were conducted to assess the rules, roles and relationships that help to make the SANIMAS program function.

Due to the COVID-19 pandemic, interviews were conducted online using Zoom, a video conferencing platform. Interviews were conducted at the four levels: national government, provincial government, city/regency government and other stakeholders. Table B6 summarises the number of interviews planned and those conducted.

Since all data collected from the interviews was qualitative, four FGDs were conducted to triangulate the data to ensure a high level of data validation. The FGDs were conducted in four of the 13 selected survey locations at the city/regency level. The FGDs were held either onsite or via Zoom, depending on the COVID-19 situation (Annex B4). An additional FGD was conducted to validate data from the SANIMAS IsDB program delivery survey field visits, because one of the locations had to be changed due to the COVID-19 situation.

Evaluation FGD with SANIMAS beneficiaries. Jakarta Utara, KPP At-Taubah

TABLE B6

Interviews Planned and Conducted

TARGET GROUP	NUMBER OF PLANNED INTERVIEWS/FGDS	NUMBER OF INTERVIEWS/ FGDS CONDUCTED	NOTES
National Government	6	6	All 6 ministries interviewed: Bappenas, MoPWH, MoHA, MoH, MoF, MoEF
Provincial Government	10	5	5 provinces interviewed: Bangka Belitung, West Java, West Kalimantan, West Sumatera, South Sumatera; 5 provinces gave no response
City/Regency Government	13	10	8 SANIMAS IsDB cities/regencies interviewed: Banda Aceh, Bangka Barat, Bengkulu Selatan, Jambi, Medan, Palembang, Singkawang, Solok 2 SANIMAS replication programs: Blitar, Sleman; 3 cities gave no response
Other Stakeholders	23	21	1 NGO (BEST) was not available and the team was unable to find any FSM service providers involved in SANIMAS
TOTAL INTERVIEWS	52	42	Some of the interviews involved more than one respondent or department: Total planned respondents: 72; actual respondents: 55; 76% response rate
Onsite FGDs	4	3	3 onsite FGDs: Palembang (25 participants), OKI (15 participants), Singkawang (10 participants)
Online FGDs	0	2	2 online FGDs: Banda Aceh (6 participants), Bandung (5 participants)
TOTAL FGDS	4	5	1 FGD at OKI was added to validate data from the IsDB program delivery survey field visits

B OBJECTIVES AND METHODOLOGY

3 SANIMAS GOVERNANCE REVIEW

3.2 GOVERNANCE SURVEY *continued*

3.2.4 Data Processing and Analysis

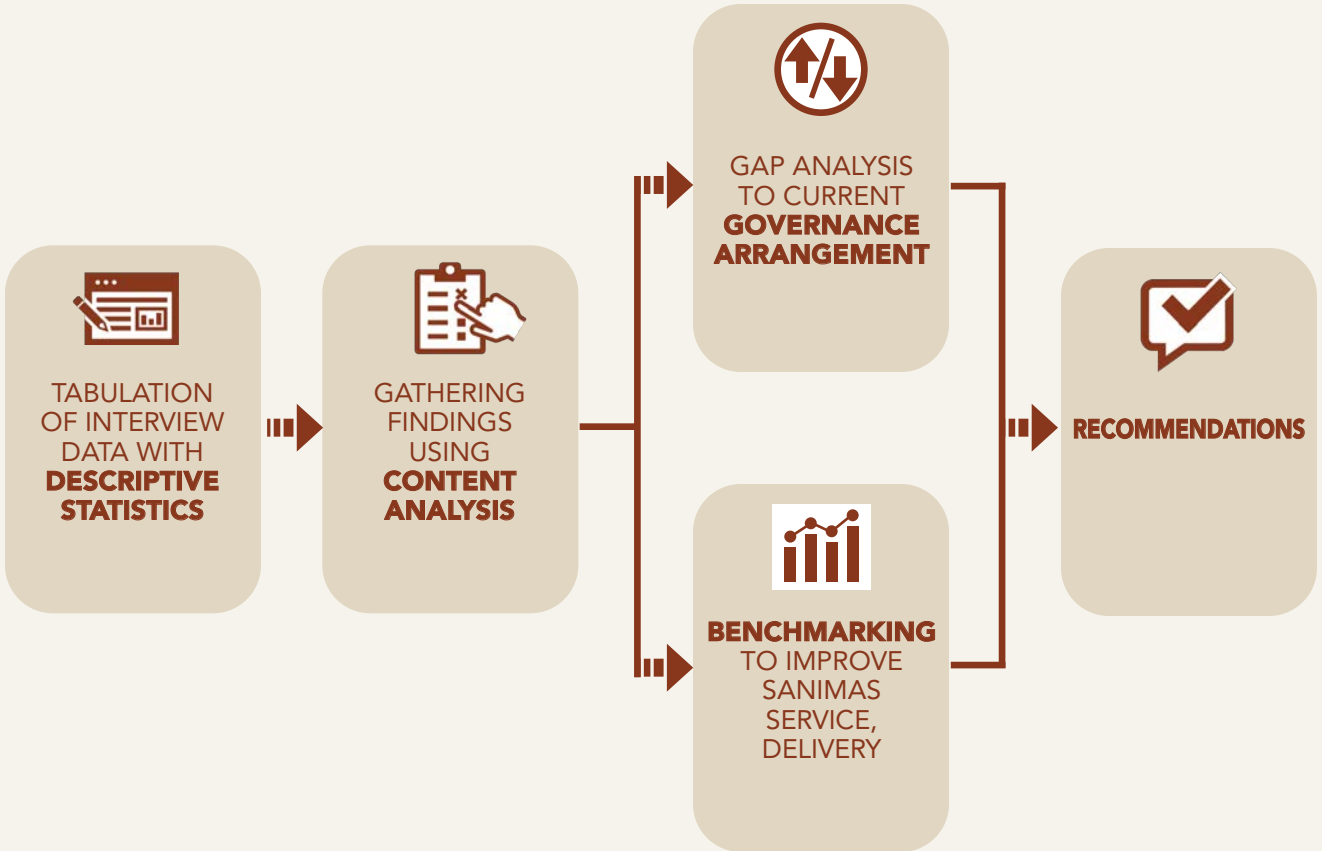
All data from the interviews was compiled using Google Forms and tabulated according to the indicators in the governance survey framework Tabulation was carried out using descriptive statistical techniques that aimed to test the frequency of occurrence and detect patterns and relationships between indicators (see Diagram B3).

To identify patterns and understand the content of the answers from respondents, the data was analysed using content analysis.[5] This method was specifically used for data analysis of institutional and policy constraints, innovative institutional arrangements and policies, and identification of new SANIMAS business models.

The analysis of local government involvement, related to co-management and collaboration with community groups (particularly KPP), was carried out by means of a gap analysis. Meanwhile, data related to new financial models, obtained from the experiences of other sanitation programs, was benchmarked against positive and negative practices from similar programs.

DIAGRAM B3

Governance Survey Methodology



[5] Content analysis is a popular and recognised method in information systems research that is useful for handling large volumes of text data to check trends and patterns in documents by summarising large volumes of text. For further information, see: A Content Analysis of Content Analyses in Research: Purposes, Data Sources, and Methodological Characteristics, Coners and Matthies, 2014

B OBJECTIVES AND METHODOLOGY

4 ISDB PROGRAM DELIVERY REVIEW

4.1. ISDB PROGRAM DELIVERY SURVEY

4.1.1 IsDB Program Delivery Survey Framework

The IsDB program delivery survey framework is based on the IsDB program logframe.

After a review of the IsDB log frame, in consultation with Bappenas, the applicability and feasibility of the framework was questioned, especially concerning certain performance indicators (PI) (Annex B5). Therefore, the PIs were adjusted to align with current state-of-the-art assessment frameworks for community sanitation programs (i.e. WSP, ISF, eawag, BORDA). The final PIs are listed in Annex B5, with those adapted by the survey team coloured in green. Most PIs are divided into two sub-dimensions, each investigated by one or several survey parameters. The guiding principles, below, were followed during the development of the assessment framework.

The complete assessment framework for the IsDB program delivery survey is attached in Annex B5.

GUIDING PRINCIPLES FOLLOWED DURING DEVELOPMENT OF
ASSESSMENT FRAMEWORK

The PIs cover **THE ESSENTIAL ELEMENTS FOR SUCCESSFUL GOVERNANCE** of community scale sanitation identified in previous work (i.e. technology, demand, management, financing, maintenance)

The PIs, PI subdimensions and survey parameters are **ALIGNED TO ENSURE A CLEAR AND DEFENSIBLE LINE FROM PARAMETERS TO PIS**

Parameters that could be relevant in the assessment of various PIs are — where possible — **NOT DUPLICATED BUT ASSIGNED TO ONLY THE MOST RELEVANT PI(S)**

FOCUS ON WHAT MATTERS: only PI subdimensions that assess performance and parameters and responses that distinguish between performance outcomes are used

Language used for parameters and responses is kept **AS SIMPLE AS POSSIBLE** while remaining operationally meaningful

The full range of possible responses was included (e.g. including 'not relevant')

B OBJECTIVES AND METHODOLOGY

4 ISDB PROGRAM DELIVERY REVIEW

4.1. ISDB PROGRAM DELIVERY SURVEY *continued*

4.1.2 Data Collection

Investigation Tools

Parameter responses were collected during site investigations and local government staff interviews through various key informant interviews (KII), observations and field measurements. Table B7 summarises the various investigation tools used.

In preparation for data collection, survey training for field staff was held in Yogyakarta in August, 2020. Trainings included conducting focus group meetings; collection of beneficiary data (remote and onsite), interview techniques (gender sensitive), inclusive approaches (gender sensitive); wastewater sampling protocols; M-Water; and health and safety, with a focus on COVID-19. COVID-19 advice and precautions were part of all training and field work SOPs. Measures included social distancing, wearing masks and regular hand washing or use of hand sanitiser. Necessary Personal Protective Equipment (PPE) was provided to all field staff, and they received and COVID-19 tests before and after travel. Further, related to the wastewater sampling all field staff received typhoid and hepatitis vaccinations.

The bulk of the data was gathered remotely through phone interviews. Selected field investigations to fewer locations and local government offices had two purposes:

1. to probe deeper into certain aspects under investigation, and
2. to validate the responses received through the phone interviews.

Evaluation field team training in Yogyakarta

TABLE B7

Overview of Investigation Tools Used for this Study

INVESTIGATION	REMOTE/ONSITE	TOOL	TYPE
SITE INVESTIGATIONS	Remote	KPP Phone Interview	Structured KII
		Remote Observations	Inspection Checklist
	Onsite	KPP Field Interview	Structured KII
		Operator Field Interview	Structured KII
		Field Observations	Inspection Checklist
		Field Measurements	
		Beneficiaries Field Interview	Inspection Checklist
		Beneficiaries — FGD	Semi-Structured FGD
	Desk-Based Review	Literature and Database Review	
LOCAL GOVERNMENT INTERIVEWS	Remote	KPP Phone Interview	Structured KII
	Onsite	Beneficiaries — FGD	Semi-Structured FGD

B OBJECTIVES AND METHODOLOGY

4 ISDB PROGRAM DELIVERY REVIEW

4.1. ISDB PROGRAM DELIVERY SURVEY *continued*

Site Investigations — Remote

Table B8 summarises details about the remote data collection tools that were used. Parameters of the 'Remote observations questionnaire' were answered with the help of pictures sent by the KPP. Twelve staff conducted the phone interviews, each with several years of working experience with decentralised sanitation programs in Indonesia.

Site Investigations — Onsite

Table B9 lists all parameters that were measured onsite. Analyses for COD and BOD concentrations were carried out.

Parameters measured on site were effluent pH and turbidity, settler sludge height, electric conductivity (EC) of main fresh water source, reactor dimensions and integrity of main sewer line. Parameters measured off site were BOD (selected sites only) and COD.

Wastewater testing equipment

TABLE B8

Data Collection Tools — Remote Investigations

TOOL	TYPE	NUMBER OF PARAMETERS PER TOOL	PARAMETER TYPE	DATASET SIZE	RELEVANT SOP (SEE ANNEX B6)
KPP Phone Interview	Structured KII	66	Quantitative	236	'KPP Interview'
Remote Observations	Inspection Checklist	17	Quantitative	236	'Observations', 'Leaflet for KPP Pictures'

TABLE B9

Measurements and Measurement Locations

PARAMETER	MEASUREMENT LOCATION
pH, turbidity, COD*, BOD*	SSS Effluent
EC	Main Fresh Water Source
Sludge Height	Settler
Reactor Dimensions	—
Integrity Testing	Main Sewer Line (one per site)

*Measured off site in certified laboratory

B OBJECTIVES AND METHODOLOGY

4 ISDB PROGRAM DELIVERY REVIEW

4.1. ISDB PROGRAM DELIVERY SURVEY *continued*

Table B10 summarises details about the onsite data collection tools that were used. Five highly experienced field teams, consisting of one social and one technical expert, conducted the onsite visits.

Other parameters listed in the national discharge standards (MoEF, P.68/MENLHK-SETJEN/2016) such as nutrient and pathogen effluent concentrations were not measured because of analytical challenges (proximity of certified laboratories to the sites) and because nutrient and pathogen removal through passive anaerobic treatment systems is very well understood and documented (see Table D11 in Section D).[6]

Investigations on gender and social inclusion (GESI) aspects were led by an expert from SNV with many years of experience in the field. Data was collected through focus group discussions (FGDs) and interviews with beneficiaries, including those considered vulnerable groups. The FGDs were planned for 6–8 beneficiaries in 50 locations. The aim was to investigate their motivations to use and connect to the sanitation facilities, their perspectives on the user's involvement in project stages, the accessibility and acceptability of facilities, and the benefit for their families and neighbourhoods. The individual interviews with the FGD participants aimed to investigate beneficiaries' knowledge and personal experience of using MCK or connecting to IPAL, as well as to score their satisfaction of the service.

Data was collected through focus group discussions (FGDs) and interviews with beneficiaries, including . . . vulnerable groups.

TABLE B10

Data Collection Tools — Onsite Site Investigations

TOOL	TYPE	NUMBER OF PARAMETERS PER TOOL	PARAMETER TYPE	DATASET SIZE	RELEVANT SOPS (SEE ANNEX B6)
KPP Field Interview	Structured KII	66 (as KPP phone interview) + 23	Quantitative	59	'KPP Interview'
Operator Field Interview	Structured KII	7	Quantitative	59	'KPP Interview'
Field Observations	Inspection Checklist	29	Quantitative	59	'Observations'
Field Measurements	—	—	Quantitative	48	'Composite Sampling and Onsite Measurements'
Beneficiaries Field Interview	Structured KII	32	Quantitative	45	'Community Interviews and FGDs'
Beneficiaries — FGD	Semi-Structured FGD	18	Quantitative	45	'Community Interviews and FGDs'

[6] Ranges based on Foxon, 2009; Reynaud and Buckley, 2015; Laramee et al., 2018; Kerstens et al., 2012; Bugey et al., 2011

B OBJECTIVES AND METHODOLOGY

4 ISDB PROGRAM DELIVERY REVIEW

4.1. ISDB PROGRAM DELIVERY SURVEY *continued*

Desk Based Investigations

The following parameters were investigated by reviewing existing literature and databases:

- IPLT existence: This parameter investigates the existence of an operational IPLT within 15 km of the SSS by comparing site location with (MoPWH, 2019a).
- Implementation within sanitation red zone: This parameter was investigated comparing the site location (kelurahan) with CSS data[7] on sanitation zoning.
- Population density: This parameter investigates the approximate population density of the connected community within 100 metres of the MCK or the service area of the SSS/IPAL, by comparing site location data with city level Central Bureau of Statistics (BPS) data on population density. If BPS data indicated high density, this was assumed to be true for the site. If not, the team used satellite imagery to estimate the population density. Annex B5 contains examples of type of density selected.

Local Government Interviews

For the methodology used during the local government interviews, please refer to Section 3.2.3 Stakeholder Interviews (page 38).

[7] National Water and Sanitation Information Services (online database)

4.1.3 Scoring

Table B11 gives an overview of the scoring options used for the quantitative parameter responses gathered during site investigations.

Responses are scored based on their meaning for that parameter. For example, the response 'don't know' is scored 'poor' when inquiring about regular income, but 'concern' when inquiring about cultural acceptability.

PI scores are calculated by averaging all relevant parameter response scores.

In overview figures (e.g. Figure C4, page 59) averaged scores smaller than 1.5 are rated as 'poor' (orange), scores of 1.5 to 2.5 as 'concern' (yellow) and scores greater than 2.5 are rated as 'good' (green).

If a relevant parameter response is not available, the affected PI average is presented as 'dataset incomplete' for that system.

Overall site performance scores are calculated by averaging all PI scores.

Taking part in the beneficiary survey. Sumatera Utara, Medan, KPP Al Amin

Some parameter responses are understood to indicate system failure. Affected PIs are scored as 'poor'. Other parameter responses are understood to indicate *probable* system failure. In this case, affected PI scores are at best 'concern', or below if other parameter scores lead to a lower score. Annex B5 summarises the 'indicators of system failure and probable system failure' and which PIs are affected by them.

TABLE B11

Quantitative Parameter Response Scores

SCORE AND COLOUR CODE	NUMERICAL SCORE	DEFINITION
GOOD	3	Functions Well and Sustainable
CONCERN	2	Partial Functionality, Unsustainable
POOR	1	Failed or Failure is Imminent
DATA NOT AVAILABLE (NA)	—	—
NOT RELEVANT (NR)	—	—

B OBJECTIVES AND METHODOLOGY

4 ISDB PROGRAM DELIVERY REVIEW

4.1. ISDB PROGRAM DELIVERY SURVEY *continued*

4.1.4 Selection of a Representative City and Site Sample

The representative selection of cities/regencies in the investigation sample was based on the selection criteria listed in Table B12. (For more details on the rationales for the inclusion of these criteria — and the exclusion of others — please refer to Annex B5). The city/regency selection is summarised in Annex B5.

All investigated sites are located within the jurisdiction of the selected cities or regencies. A preliminary selection of 326 sites was made during a stratified random sampling exercise based on the selection criteria listed in Table B11 (page 44). Of these 326 sites, through various channels, contact details of 236 KPPs were identified and 57 sites randomly selected for onsite investigations. Of the 59 visited sites, 57 were previously investigated remotely through phone interviews. In two cases, the research teams took advantage of the proximity to other SANIMAS IsDB sites to conduct spontaneous visits.

The target and actual distributions for each selection criteria are listed in Annex B5.

4.1.5 Data Validation, Processing and Analysis

Data Validation

The online platforms 'Google Forms' and 'mWater' were used as questionnaire- and data-management tools to reduce data input mistakes through skip-logic and predefined input characteristics. The submitted

TABLE B12

List of Selection Criteria for Cities/Regencies and Site Selection for Remote and Onsite Investigations

SELECTION CRITERIA	CITY/REGENCY SELECTION	SITE SELECTION (Remote and Onsite Investigations)
Regions/Provinces	X	X
Patrilineal/Matrilineal Culture	X	
Income Distribution		X
City (LG Performance Score from PU)	X	
Fiscal Capacity	X	
Cities/Regencies/Special Provinces (DKI, Aceh)	X	
Number of Planned but Not Yet Implemented Systems per City	X	
Performance of KPP Based on PU Scoring[8]		X
Project Type		X
Year of Implementation		X
Treatment Technology (with/without ABR)*		X
Treatment System Size		X

*Implicitly included by considering year of implementation

[8] (MoPWH, 2019b)

B OBJECTIVES AND METHODOLOGY

4 ISDB PROGRAM DELIVERY REVIEW

4.1. ISDB PROGRAM DELIVERY SURVEY *continued*

survey data was tested for consistency, outliers and plausibility. Implausible data and inconsistencies were discussed with the field team and corrected, if needed.

Remote survey data was validated using the onsite survey data by comparing the parameter response scores given for those 57 sites for which both datasets are available. Annex B5 summarises the results of this validation exercise.

Quality of effluent concentration data was ensured through composite sampling (mixed sample of three sub-samples taken at least five minutes apart — see Annex B6 for details) and sample stabilisation to enable all sample processing by one accredited laboratory (Intertek — Jakarta). Concentration values of duplicate samples (taken for every fifth sample and not declared) indicated good laboratory data quality (0 to 3% relative standard deviation in all cases except one in which the relative standard deviation was 8%).

Data Processing and Analysis

Quantitative data was processed and analysed with MS Excel.

GESI-related data collected from the FGDs and interviews was captured in a spreadsheet and grouped based on performance indicators. The findings were analysed against the SANIMAS IsDB technical guideline documents (MoPWH, 2018) to contribute to the overall performance indicators evaluation and recommendations.

Data gathered during local government interviews was processed and analysed as explained under Section 3.2.4 Data Processing and Analysis (page 39).

4.2 TREATMENT EFFICIENCY STUDY OF ISDB SANIMAS TECHNOLOGY

4.2.1 Objectives

The objective of this sub-study was to provide a preliminary technical assessment of the SPALD-T design (as described in SANIMAS IsDB technical guideline documents, MoPWH, 2018) with a description of its treatment performance potential and operating characteristics.

This was included in the assessment because the SPALD-T design is relatively new with undocumented treatment performance and is implemented at scale. Due to time and resource constraints it was only possible to conduct a limited preliminary study, although it is recognised that a longer, more detailed, investigation would be needed for a detailed technical assessment.

4.2.2 Site Selection

The treatment potential of any new reactor type is investigated under ideal operating conditions. Three sites were selected, and the following criteria were used for site selection:

- The number of connected households, and therefore the system load, had to be close to design assumptions
- Good OM indicators such as active and cooperative KPP and no known technical problems
- An operating period of at least two years
- Accessible effluent pipe for the connection of a mechanical water meter
- Proximity (allowing one or two teams of investigators to visit several sites each day)

Concentration values of duplicate samples indicated good laboratory data quality.

4.2.3 Site Investigations

All three sites were visited daily on five consecutive days by two field teams consisting of at least one social and one technical expert. The following activities were performed onsite:

- Daily composite sampling of first AF effluent (approximation of settler effluent) and plant effluent for COD laboratory measurements
- Daily onsite measurements of first AF effluent and plant effluent: pH, turbidity
- Settler sludge height measurements
- Daily effluent flow measurements with mechanical flow meters (see Annex B6)
- Daily onsite rain measurements
- Daily recording of onsite observations and information from community
- Leakage and blockage testing of all main sewer lines (see Annex B6)
- Detailed inventory of all grey- and blackwater household connections

C FINDINGS

SANIMAS evaluation FGD
with Palembang city officials

C FINDINGS

This section contains findings' summaries from the review of previous studies, including several, relevant international examples; the governance review that includes interviews with government stakeholders and examples from those interviews; and the IsDB program delivery review from the interviews, site visits and sampling exercises. The detailed analyses for each are lengthy and are therefore found in the annexes. Presented here are summaries of the key points that drive the ensuing discussion and recommendations.

1 FINDINGS OF THE REVIEW OF EXISTING STUDIES

1.1 SANIMAS STUDIES

The SANIMAS studies reviewed included studies from the World Bank (WSP), Institute for Sustainable Futures (ISF), ADB, MoPWH and IsDB (see Section B 2.1, page 33). All the studies had different purposes, but some used similar indicators for some aspects of their reviews.

The findings are summarised in Table C1 (page 49) and colour coded to represent the similarity or divergence of the different study findings and recommendations. The relevant detailed findings and recommendations are summarised in Annex B3 against the applicable IsDB project indicators.

Over a period of eight years and five different studies, the findings and the recommendations relating to management, operation and maintenance and financing indicators have been highly consistent. Other indicators (demand and use of system, commissioning, handover, O&M training, etc.) were not so readily comparable or were not reported on in such detail. The following discussion provides an overall view of all the different SANIMAS programs' findings for their impact and outcomes.

Impact

The impact findings appear broadly similar, although they were not reviewed in the same way. Where included, they reported that the community perception was of improved environmental health and improved living conditions. However, ISF noted that because there was no monitoring system in place, this could not be confirmed. The MoPWH KPP and IsDB MEC studies found cleaner environmental conditions through improved management of wastewater flows, and less pooling of water, but these were not presented compared to the project baseline situation. When these findings were reported most systems were 2–5 years old.

The findings and recommendations relating to management, operation and maintenance and financing indicators have been highly consistent.

Outcomes

Table C2 (page 50) summarises the multi-level findings and recommendations that were investigated in the studies and focuses on the results that were consistent between several studies [Number of studies with the findings or recommendation in brackets]. Many of the studies lacked full recommendations, as shown with an 'N'. Overall, the findings show that SANIMAS construction implementation and community involvement for all the programs were generally well executed; and the lack of sustainable O&M by communities and limited support from city/regency governments, negatively affected system sustainability.

SSS infrastructure, Jawa Barat, Cirebon, KPP Menjangan

C FINDINGS

1 FINDINGS OF THE REVIEW OF EXISTING STUDIES

1.1 SANIMAS STUDIES *continued*

TABLE C1

Comparison of Findings and Recommendations of 5 SANIMAS Studies Against IsDB Indicators

COLOUR CODE: INCONCLUSIVE | SIMILAR | CONSISTENT | DIFFERENT

LEVEL	HIERARCHY OBJECTIVES	PERFORMANCE INDICATORS INDICATORS (PIs)	WSP	ISF PCR	ADB ISdB	MoPWH /MEC	ISDB
IMPACT	To ensure sustainable development, reduction of water-borne diseases	**1** The sanitation service maintains or improves environmental health	SIMILAR	SIMILAR	SIMILAR	SIMILAR	SIMILAR
		2 The sanitation service improves the living conditions of communities	SIMILAR	INCONCLUSIVE	SIMILAR	SIMILAR	INCONCLUSIVE
OUTCOMES	Open defecation reduced	**3** Open defecation free community	INCONCLUSIVE	INCONCLUSIVE	CONSISTENT	INCONCLUSIVE	CONSISTENT
	Basic sanitation coverage increased in the project areas	**4** Functioning technology — systems are operating as intended	INCONCLUSIVE	INCONCLUSIVE	SIMILAR	SIMILAR	SIMILAR
		5 Sustaining demand and system accessible to all	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE
	Increased awareness water, sanitation, hygiene	**6** Community is knowledgeable on advantages wastewater treatment	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE
	Management, operations and maintenance of the public sanitation facilities in the project locations by both local governments and the communities	**7** Effective management by community: active, motivated, accountable and inclusive management	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT
		8 Sustainable community financing: Sufficient ongoing income to cover ongoing costs	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT
		9 Functioning maintenance by community: Systems are maintained as intended	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT
		LG-1 Effective management by LG: Active with clear responsibilities	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT
		LG-2 Sustainable financing by LG: ongoing costs and longer-term costs	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT
		LG-3 Functioning maintenance by LG as intended	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT	CONSISTENT
	Temporary job creation	**LG-4** 20,000 temporary jobs created during construction	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE
OUTPUTS	Public bathing, sanitation facilities constructed, well-functioning	**10** Appropriate infrastructure commissioning	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE
	Strengthened capacity of the LG for managing public sanitation services	**LG-5** Appropriate training given to LG staff	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE
	Strengthened communities operating and maintenance capabilities of public sanitation facilities	**11** Inclusive capacity building	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE	INCONCLUSIVE
		12 Appropriate HHE given to residents	INCONCLUSIVE	INCONCLUSIVE	DIFFERENT	DIFFERENT	DIFFERENT
		13 Appropriate OM training given to KSM/KPP	INCONCLUSIVE	INCONCLUSIVE	DIFFERENT	DIFFERENT	DIFFERENT

C FINDINGS

1 FINDINGS OF THE REVIEW OF EXISTING STUDIES

1.1 SANIMAS STUDIES *continued*

TABLE C2

Multi-Level Findings and Recommendations of Previous SANIMAS Studies

PIs	**FINDINGS** Number of studies with the findings or recommendation in brackets [ ]	**RECOMMENDATIONS** N = Study lacked full recommendations
PI-4 Functioning Technology	The SANIMAS systems were within five years of construction and mostly working adequately. Effluent quality deteriorated from WSP (10% do not comply) ADB/USRI designs (20% do not comply) and IsDB systems (60% below standard). [3]	N
PI-7 Effective Community Management	Most systems have no operators, or unpaid ad hoc operators; many systems have no KPP or the KPP is inactive. Most KPPs have no external support, monitoring or assistance. [5]	Ensure legal status of KSM/KPP
PI-8 Sustainable Community Financing	50–90% of communities have inadequate funds for O&M. A few KPP regularly collect user fees, but the number of users or the amount collected is insufficient. Most KPPs collect fees as needed. Only a few received external support. [5]	LG should assist with finance or comparable in-kind support. KPP's need for help in setting appropriate user fees levels and with capacity building
PI-9 Functioning O&M by Community	The communities keep simple systems operational, with ad hoc reactive measures. Very few systems are maintained on a regular basis, and some are dysfunctional. [5]	Change to formal co-management with LG [5], O&M roles better defined with LG
LG-1 Effective Management by LG	Consistently little support from or role played by most LGs, and the project facilitators are the main source of assistance that the communities have. This is limited to the implementation part of the project, with almost no support after that.	Defined co-management roles; MoU between LG and KPP; asset ownership with LG; LG to integrate sanitation planning and management; and they need a regulatory framework [5]
LG-2 Sustainable Financing by LG	There was practically no funding received for ongoing costs or any reported mechanisms to address longer-term costs. [3]	National government to require LG annual O&M budget; define responsibilities of KPP and LG; LG monitor/manage SANIMAS data; LG to provide support
LG-3 Functioning Maintenance by LG	There was practically no maintenance support by LG, except in a few cases where desludging had been carried out, although it was unclear who paid for it.	N
LG-4 Temporary Job Creation During Construction	This was not investigated in any report.	N
PI-10 Infrastructure Commissioning	'Commissioning' not mentioned however lack of a formal handover and clear asset ownership issues were cited.	N
LG-5 Training Given to LG Staff	One study noted that one-off project training is ineffective, and it needs a broader approach.	N
PI-11 Inclusive Capacity Building	This was not clearly reported in any report.	N
PI-13 O&M Training Given to KSM/KPP	This was not reported in many studies and where it was, it was a one-off workshop or meeting.	One-off project training is ineffective; need a broader approach with follow up

C FINDINGS

1 FINDINGS OF THE REVIEW OF EXISTING STUDIES *continued*

1.2 INTERNATIONAL STUDIES ON SMALL-SCALE SANITATION SYSTEMS

The following discussion looks at international examples and lessons learned for three key factors in the sustainability of SSS-O&M, financing OPEX, delivery models and effluent standards.

i) Key factor in the sustainability of small sanitation systems: O&M in India

A review of 9,500 small decentralised sanitation systems in India pointed to 14 factors that influence successful long-term operation (Eawag, 2020). These factors were in five areas: planning; design and implementation; O&M; management and monitoring; socio-cultural aspects; and finance. Figure C1 shows these 14 factors.

India is advanced in SSS planning, with SSS being integral to long-term development plans and the construction of SSTPs. However, the governance framework has not developed at the same pace as implementing small sanitation systems, causing sustainability issues. The review identified five key sustainability issues:

System start-up and handover: The formal handover of ownership and/or responsibility from the designer/builder to the management entity is essential. There was a lack of effective knowledge, transfer and support to the new managers and operators during handover.

Skills and knowledge of operation and maintenance (O&M) personnel and management entities: Operators and managers are often not adequately informed about the functioning of SSS systems and the requirements for good performance. Trouble-shooting skills are therefore weak.

Limited supervision of O&M activities: Operators are often not clearly instructed and supervised. This can result in unclear or neglected responsibilities and a lack of information exchange.

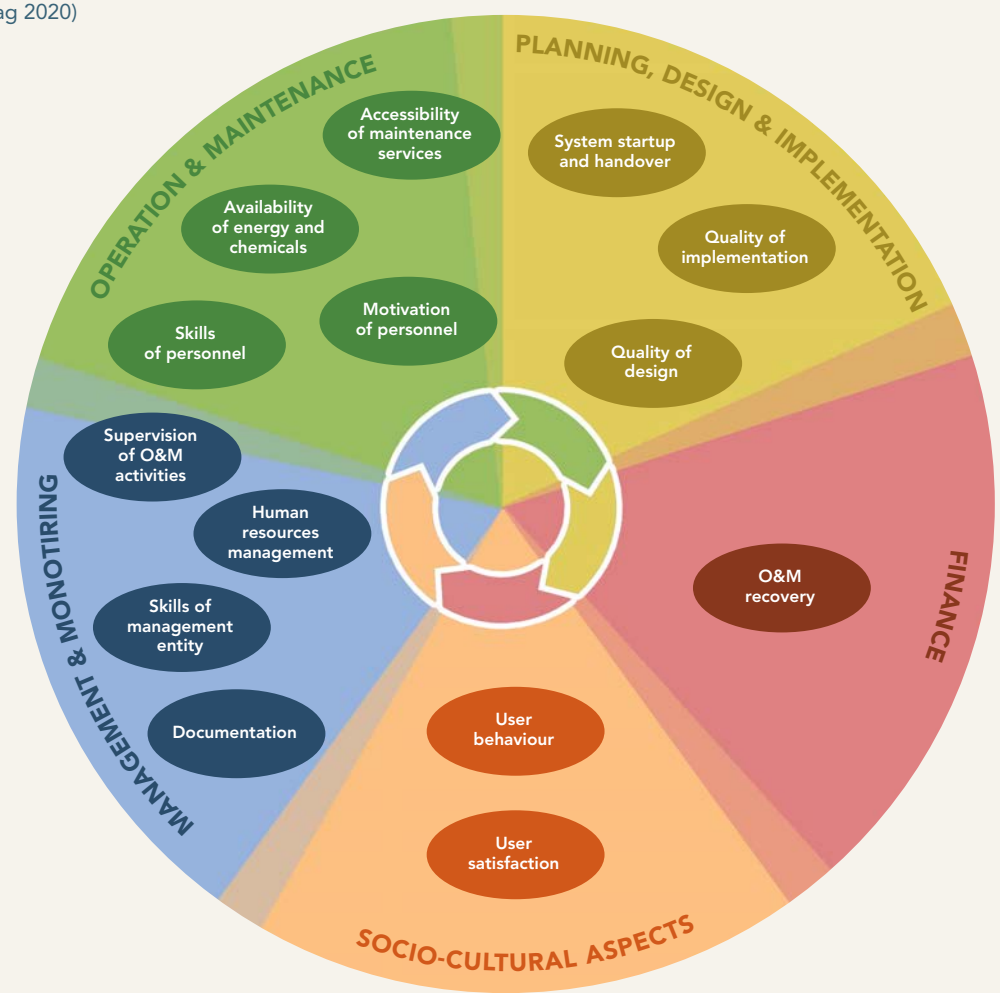
Weak documentation of O&M activities and financial flows: The absence of systematic documentation and archiving of data leads to the loss of knowledge and a lack of understanding of the systems' performance and history. Such data is crucial for decision-making.

Poor anticipation of maintenance and spares: Responsibility for organising

FIGURE C1

14 Success Factors for Sustainability Were Found in 5 Areas

(Eawag 2020)



C FINDINGS

1 FINDINGS OF THE REVIEW OF EXISTING STUDIES

1.2 INTERNATIONAL STUDIES ON SMALL-SCALE SANITATION SYSTEMS *continued*

spare parts, and planning and budgeting scheduled maintenance is lacking. There is a real risk of long-term failure.

The ***headline recommendations*** for improved SSS sustainability were:

A clear, standardised procedure for the handover to end-users and long-term owners. A systematic transfer of knowledge, design details, user-friendly operational manuals and other requirements is needed to ensure effective operation after designers and builders are not involved.

Mandatory training and licensing of operators should be established alongside technology, design and context-specific O&M requirements. Training for the personnel of management entities should also be promoted and incentivised, on aspects including life-cycle cost planning, O&M requirements, as well as performance monitoring and optimisation.

Mandatory documentation of financial details and O&M activities would allow the systems' operation and upkeep to be tracked. Analysis of this information should also become part of the monitoring procedures. In the long term, online logbooks should be established for all systems.

ii) Financing OPEX — Malaysia

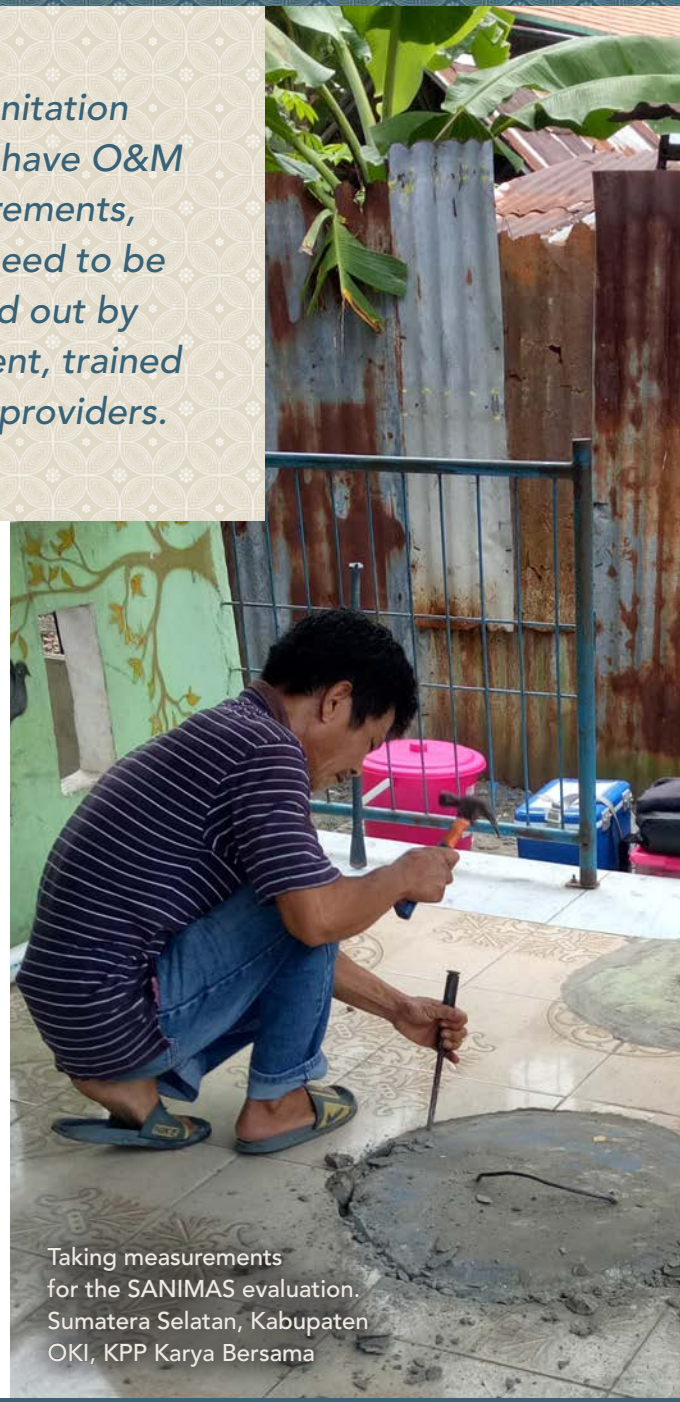
All sanitation systems have O&M requirements, which need to be carried out by competent, trained service providers. The service requires an operating budget to pay the service provider and for materials, spare parts, repairs and services. Simple sewerage and anaerobic treatment systems require intermittent O&M such as checking for leaks, clearing blockages, cleaning sumps and grease traps, and desludging the tanks. More complex systems additionally need to pay for electricity, mechanical equipment replacements, chemicals and more testing.

In Malaysia, the water regulator SPAN sets sewerage charges for all water customers receiving sewerage or FSM services. The monthly tariffs (SPAN, 2017), which were to be phased but have not risen for 20 years, are currently RM2-8/month/HH (US$2). While the onsite, decentralised SSS are designed and built by registered private sector suppliers; after a year of operation they are handed over for O&M by the national public utility, Indah Water Korporation (IWK). The actual O&M cost per household is RM18/month (US$4) and IWK (TMR, 2020) and the government wants to raise the tariff to full cost recovery.

This shows that:

- In countries with a high level of service, wastewater tariffs (for full cost recovery) are typically equal to or higher than water tariffs, but often are more difficult to sell to the consumer. Thus, most countries phase in wastewater tariffs, combining them with the water tariff and escalating them for full cost recovery.
- In most developing countries, sewerage customers typically pay a sewerage tariff but are not charged with the full cost of sewerage O&M (WaterAid, 2013). This is well-illustrated by the Malaysia example, where everyone pays something but the government, in the interest of public health and the environment, contributes substantially. Eventually, when the service is demonstrated and incomes rise, the tariff normalises.

All sanitation systems have O&M requirements, which need to be carried out by competent, trained service providers.



Taking measurements for the SANIMAS evaluation. Sumatera Selatan, Kabupaten OKI, KPP Karya Bersama

C FINDINGS

1 FINDINGS OF THE REVIEW OF EXISTING STUDIES

1.2 INTERNATIONAL STUDIES ON SMALL-SCALE SANITATION SYSTEMS *continued*

iii) O&M models — Malaysia and Japan

Malaysia experienced a scaling-up of SSS, similar to Indonesia and India. Initially, it found similar challenges with the O&M of existing systems, which had been built on an 'ad hoc' basis without effective governance, standards, capacity and institutions to sustain them (Eawag, forthcoming). When IWK was formed, a process was started to improve the management of all SSS and to ensure that once built, were better managed.

The key aspects of these interventions are listed below:

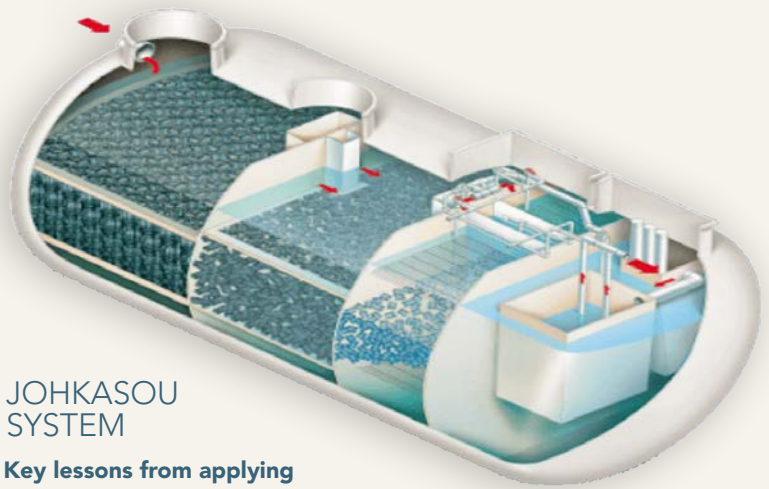
- At the beginning of the scaling-up process, all the local authorities lacked the capacity and knowledge to operate and maintain SSS, and this resulted in many deficient treatment plants. To address these poorly performing SSS, the Malaysian government centralised O&M in a dedicated private utility.
- As a first step, a merged SSS database was developed by the newly created utility.
- The O&M by the utility induces several economies of scale for equipment, human resources, training and customer response.
- Capacity building is centralised by the utility, which has a training centre where operators and managers are given training and accreditation internally or by relevant government agencies.
- Engineers and contractors need to be registered to design and implement SSS systems.
- Most small-scale facilities are unmanned, and operations are carried out on a ***maintenance visitation basis, with frequencies determined based on size and complexity of systems***. Some are also equipped with electronic monitoring systems for fault detection.

In Japan, Johkasou (onsite wastewater treatment) systems are used when 1) there is no access to sewers and 2) in high population density areas for onsite wastewater treatment including water reclamation.

Johkasou includes many types of systems, most of which are regulated, expensive, prefabricated and require mechanical expertise to maintain and a continuous power supply to operate. The 1983 Johkasou Law covers the regulation of manufacturers, and installation, maintenance and desludging of onsite sanitation; as well as registration of Johkasou installers, maintenance operators and licensing of Johkasou desludging vendors. The system generally applies to individual systems but is also used for small-scale treatment of multiple dwellings. The approach taken (rather than the technology) has valuable lessons learned for Indonesia that include:

- The regulatory and enforcement system address all aspects of design, manufacture, installation, O&M, sludge disposal and is tied to enforced building codes.
- Guarantees effluent quality from a unit without a drain field.
- Users can employ private sector O&M contractors to maintain the systems.
- Uses clear simple and institutional structures, which are well staffed and resourced; and regulations are enforced.

The box to the right outlines some lessons learned from applying the Johkasou system in Indonesia (ADBi, 2019).



JOHKASOU SYSTEM

Key lessons from applying the Johkasou system (ADBi, 2019 and L. S. Gaulke, 2006), Indonesia were:

- A major operating cost is electricity. This is noted because for the existing SPALD-T technologies to meet new Indonesia effluent regulations (2016), either final aeration or polishing (wetland, drain field, or lagoon) is needed. The cost of aeration includes the pump (small Johkasou pump is 1 hp, SPALD-T pump is 2–5 hp), electricity, maintenance and parts replacement (5–10 years).
- The Johkasou treatment system requires technical expertise. A larger number of skilled operators is required for the Johkasou system and SSTPs than for a centralised system (although the skills base is different).
- Enabling conditions support the Johkasou. The Johkasou system works in Japan because of the underlying support from regulations, monitoring, building codes and tariffs.
- Support systems are not yet available. The lack of O&M contractors, costly energy supply, lack of sludge disposal and adequate laboratories is not conducive to using the Johkasou system in Indonesia. Japan has regulated regional, private sector players.
- The construction cost is considered to be too high for low-mid income families. The willingness to pay (WTP) in Indonesia is much lower than in Japan which makes this system too expensive and too complicated for KPP applications.

C FINDINGS

1 FINDINGS OF THE REVIEW OF EXISTING STUDIES

1.2 INTERNATIONAL STUDIES ON SMALL-SCALE SANITATION SYSTEMS *continued*

iv) Effluent discharge standards — UK, Malaysia, USA

This section briefly reviews how, internationally, the regulator often applies mitigating factors when determining discharge standards for specific wastewater treatment plants based on the volume of wastewater, number of persons served, age and type of system, quality of the receiving water, sensitive environments, economic impacts, financial considerations and geographical challenges.

Wastewater volume. Many countries have wastewater discharge standards that taken into account wastewater source, volume and discharge point. Many countries have codes for design and installation of individual septic tanks, which generally discharge to ground via a drain field. Typically, these are not monitored since the technology is managed through the building codes. Larger, centralised sewer networks with treatment plants generally have more stringent requirements that include mandatory connections; industrial discharge (to the network) regulations and permits; and (over a certain size) WWTP discharge permit specific to the receiving water and continuous monitoring.

SSS fall between individual septic tanks and large sewer networks and although a variety of approaches are taken, in most cases higher effluent standards apply to a) larger treatment plants, b) ecologically sensitive areas, and c) sensitive water resources areas.

User equivalents or 'person equivalents' (PE). For example, the UK uses discharge levels that are based on 'person equivalents' of the treatment plan and vary according to the size of settlement (population) served. The UK has a complex set of regulations for the discharge of effluent from sewage treatment facilities (UK Environment Agency, 2019), however the relevant parts include:

- Secondary treatment is required for wastewater systems serving settlements of:
  - more than 2,000 PE to freshwaters (including groundwater) or estuaries
  - more than 10,000 PE to coastal water
- The secondary treatment process must meet the relevant look-up table (LUT) compliance limits and maximum compliance limits for BOD and COD.
- More advanced tertiary treatment is required for wastewater systems serving settlements of more than 10,000 PE.

Age and type of system. In Malaysia,[1] IWK, which controls more than 8,000 systems, negotiated with the department of environment to create **a new set of standards based on the operational age of systems** e.g. (>5 years, 10 years, 15 years), and includes:

- Most water quality monitoring is done by the utility, which has accredited laboratories. This is done under the control of the regulator SPAN, the department of the environment (equivalent to pollution control bodies in India or department of the environment in Indonesia). All monitoring results are geo-referenced and uploaded on to an online platform.
- There is a move towards soft monitoring methods such as measuring operational parameters and trained and accredited operators
- The older facilities would be gradually upgraded to meet the new standards.

SPAN
Suruhanjaya Perkhidmatan Air Negara

[1] Malaysia: Environmental Quality (Sewage) Regulations 2009

C FINDINGS

1 FINDINGS OF THE REVIEW OF EXISTING STUDIES

1.2 INTERNATIONAL STUDIES ON SMALL-SCALE SANITATION SYSTEMS *continued*

Malaysia took a pragmatic approach to improving sanitation system systems. It created a new set of discharge standards (Table C3), which were based on the location and age of the systems, the type of treatment system and provided with a timeframe to upgrade to the new standards.

Variance based on cost and social impact. In the United States, overall discharge standards and permitting are set by the United States Environmental Protection Agency (USEPA) however, variances are negotiated regionally with state governments and regional USEPA representatives. Generally, the variance requires the operator to; 1) justify that alternative treatment / control options have been considered and are not feasible to meet water quality standards; and 2) justify that all cost-effective and reasonable best management practices have been implemented (USEPA, 2020). One of the six following criteria needs to be met for a discharge variance (see USEPA Water Quality Standards Variance Building Tool):[2]

- Controls to reduce pollutant would cause substantial and widespread economic (cost) and social impact
- Naturally occurring pollutant prevent attainment of water quality standards
- Human-caused pollutants cannot be remedied or would cause more environmental damage to correct
- Natural physical features of a stream prevent attainment of water quality standards
- Hydrologic modifications prevent attainment of water quality standards
- Physical conditions related to the natural features of the water body, unrelated to water quality, prevent attainment of water quality standards

TABLE C3

Malaysian Effluent Discharge Standards, 2009 (Source: IWK)

	T [°C]	pH [-]	BOD [mg/L]	COD [mg/L]	SS [mg/L]	NH_3-N [mg/L]	NO_3-N [mg/L]	P [mg/L]	O&G [mg/L]
CATEGORY 1: NEW STPS (AFTER 2009), RIVERS									
STANDARD A*	40	6–9	20	120	50	10	20	—	5
STANDARD B**	40	5.5–9	50	200	100	20	50	—	10
CATEGORY 2: STPS FROM 1999 TO 2009									
STANDARD A	—	—	20	120	50	—	—	—	20
STANDARD B	—	—	50	200	100	—	—	—	20
CATEGORY 3: STPS DESIGNED PRIOR TO 1999									
COMMUNAL SEPTIC TANK	—	—	200	—	180	—	—	—	—
IMHOFF TANK	—	—	175	—	150	—	—	—	—
OXIDATION POND	—	—	120	360	150	—	—	—	—
AERATED LAGOON	—	—	100	300	120	—	—	—	—
MECHANISED STP (STD A)	—	—	60	180	100	—	—	—	20
MECHANISED STP (STD B)	—	—	80	240	120	—	—	—	20

* Upstream of drining water intake ** Downstream of drinking water intake

[2] https://www.epa.gov/wqs-tech/water-quality-standards-variance-building-tool

C FINDINGS

2 FINDINGS OF THE SANIMAS GOVERNANCE REVIEW

The detailed analyses for this governance review are lengthy and are therefore found in Annex C1.

2.1 STAKEHOLDER AND PROCEDURE MAPPING

Current institutional arrangements for SANIMAS service provision are assigned to MoPWH as the sole executing agency; and as such other ministries and LGs have no formal responsibilities or performance indicators. Upon completion of the project, all responsibilities for SANIMAS infrastructure are handed over to the KPPs (regardless of their limited capacity as voluntary community working groups) and thus all performance responsibility rests with the KPPs. The following outlines stakeholder involvement in each phase of the SANIMAS program.

FIGURE C2

SANIMAS Stakeholder Involvement

		PREPARATION	IMPLEMENTATION/SUPERVISION	OPERATION
	Donor Agency*	IsDB	IsDB	
NATIONAL GOVERNMENT	Ministry	MoF Bappenas MoPWH	MoPWH NPMC	Multi-government level stakeholders are mostly involved in preparation and implementation
NATIONAL GOVERNMENT	Regional		RPMC	
LOCAL GOVERNMENT	Province	PPIU POKJA AMPL	PPIU POKJA AMPL	
LOCAL GOVERNMENT	City/Regency	DPIU POKJA AMPL	DPIU POKJA AMPL TFL	
LOCAL GOVERNMENT	Sub-District		Head of Sub-District/Village TFL	
COMMUNITY GROUPS		BKM/LKM TFL	BKM/LKM KSM TFL	KPP Post-construction, all responsibilities handed over to community groups

Source: SANIMAS IsDB, Regular and DAK program and technical manuals[3] (See Annex C2 for more details)
*Donor agency involved in SANIMAS program funded by loan mechanism

National government's institutional arrangements for SANIMAS service provision

1. **Involvement in Planning.** Not all relevant ministries are mandated to be involved in SANIMAS, for instance:
   - MoPWH involved MoF and Bappenas in the preparation phase of SANIMAS, however MoPWH alone executes its implementation.
   - Unlike in PAMSIMAS, MoHA and MoH are not involved in SANIMAS project implementation.
2. **Use of KPIs.** Bappenas and the MoEF pointed out that there are no key government performance indicators for the post construction phase, for example:
   - Sumatera Selatan province stated that relevant agencies in the province are not involved in SANIMAS because the national government has not provided KPIs for the LGs.
3. **Support for Operations (National and Provincial).** Despite multi-level government involvement during preparation and implementation, as shown in Figure C2, their involvement is limited during the operation phase, demonstrated by:
   - MoPWH expects locally collected fees, and regency/city government to assist as required, but without a designated budget to cover O&M costs.
   - By SANIMAS project design, the KPPs alone handle system O&M, fee collection, regular effluent checking, desludging, increasing service quality, number of users, and continuous promotion to communities.

[3] MoPWH 2018, 2017, 2020

C FINDINGS

2 FINDINGS OF THE SANIMAS GOVERNANCE REVIEW

2.1 STAKEHOLDER AND PROCEDURE MAPPING *continued*

Provincial governments' capacity to support SANIMAS

1. **Staff Capacity.** Provincial governments have the staff to support capacity building through water and sanitation working groups (Pokja AMPL), but limited involvement in SANIMAS programs. For instance, the provincial agencies/ sanitation working groups in Sumatera Selatan and Sumatera Barat consider themselves capacity building resources for SANIMAS city/regency agencies/working groups, even though they have a limited mandate.
2. **Monitoring Mandate.** The provincial governments of Jawa Barat, Bangka Belitung and Kalimantan Barat stated that while they can provide budget to support monitoring activities, by mandate they are not involved in the monitoring and evaluation of SANIMAS. Examples include:
   - Only one province (Sumatera Barat) out of the five interviewed was involved in SANIMAS monitoring activities, during the initial phase of the project and at the end-of-year evaluation meetings
   - Unlike in PAMSIMAS, which conducted joint monitoring with national and provincial governments, most provinces were not invited to take part in SANIMAS monitoring
3. **Problem Solving Assistance.** Sumatera Selatan and Sumatera Barat provinces said they can offer solutions and recommendations to city governments:
   - The SANIMAS PPIU in Sumatera Barat can address complaints from city level and offer recommendations, but the final decisions are in the hands of the city governments
   - Sumatera Selatan Bappeda started cooperation with CSR programs for SANIMAS monitoring

SANIMAS evaluation discussions with Mr. Wawan, the head of the Division of Physical Planning and Development, Infrastructure, Bappeda in Palembang City

C FINDINGS

2 FINDINGS OF THE SANIMAS GOVERNANCE REVIEW *continued*

2.2 KEY INSTITUTIONAL AND POLICY CONSTRAINTS

The governance review of institutional and policy constraints developed a wealth of data, too much to include in this summary. The following summary identifies key aspects addressed in some SANIMAS investments but still requires additional resources to make the program more sustainable. They include community development in the preparation phase; integration of project targets and community requirements in the implementation phase; insufficient capacity building at all levels; an exit strategy that ensures SANIMAS facility sustainability; a clear financial policy for LG O&M budget support to KPPs after handover; and clear asset ownership. Box 1 has selected institutional, financial and regulatory constraints with specific examples from the governance review. The entire collection of constraints and examples are in Annex C1. After Box 1 there is an example of city/regency level lessons learned.

BOX 1

Institutional and Policy Constraints from the Governance Review

SELECTED CONSTRAINTS	GOVERNANCE REVIEW EXAMPLES
Limitations of community-based approach — connections and cultural variations	Banda Aceh, Bangka Barat households unwilling to connect because of O&M, fee and other issues; Bangka Selatan, Solok city found changing community behaviour in Sumatera harder than in Java, where shared communal responsibility is embedded
Capacity building challenges during implementation	Sumatera Selatan, Bengkulu Selatan have no capacity building for cities/regencies; Banda Aceh, Solok and Medan cities, there is no training for KPP after construction
LGs unable to provide post construction financial support	Bappenas expects LGs to provide KPPs adequate financial support, however LGs have limited capacity to provide O&M budget due to community ownership of SANIMAS assets, and some lack budget too; MoPWH wants O&M funded by the KPPs, with ad hoc LG support
MoHA reg 90/2019, law 23/2014 limits LG support	City/regency governments support limited with KPP asset ownership- unable to allocate a budget for network expansion and O&M
Former and current SSS technology unable to meet new effluent standard, PermenLHK No. 68/2016	MoEF reduced BOD standard from 100 mg/L to 30 mg/L (and other standards) over MoPWH objections; MoEF acknowledge that SANIMAS technology cannot meet effluent standards and want upgrades
Lack of monitoring, lab quality and database	MoEF or LG environmental agencies do not monitor SSS; many labs in cities/ regencies are not accredited; MoEF has a database but it is not populated

CITY/REGENCY LEVEL LESSONS LEARNED FROM SLEMAN[4]

- Sleman local environmental agency (DLH) are active in post construction activities such as effluent tests and organizing KPP meetings
- Effluent monitoring is funded through the city's annual budget (APBD) and is implemented by the DLH and supported by AKSANSI[5]
- The key message for community awareness raising was improvement of communal health, by encouraging communities to maintain SANIMAS facilities to prevent environmental pollution, improve communal cleanliness, and meet the effluent standards
- Creation of KPP networking — continuous community development and communication with the KPPs through events and WhatsApp groups

[4] Sleman Regency, Yogyakarta Special Administrative Region

[5] https://aksansi.org/

C FINDINGS

2 FINDINGS OF THE SANIMAS GOVERNANCE REVIEW *continued*

2.3 INNOVATIVE INSTITUTIONAL ARRANGEMENTS AND POLICIES

The national government understands the institutional constraints and is considering a collaborative platform of the relevant ministries (MoPWH, MoH, MoHA, MOEF) for implementation of SANIMAS, and integrating SANIMAS with city planning and other related sanitation programs including STBM for community development and LLTT for regular desludging. The governance review showed that the SANIMAS funding policy is gradually shifting from national government to LGs (APBD) that have high fiscal capacity. Currently, however, support for LGs with low fiscal capacity is available now from special allocation funds (DAK) or grants. Box 2 summarises these policy trends in service delivery and lessons learned through the governance review.

BOX 2

New SANIMAS Service Delivery Model and SABERMAS Example

AREA	MINISTERIAL INNOVATIONS, DIRECTIONS AND SUGGESTIONS
New mechanism for grants to LG for SANIMAS operations (Bappenas interview)	• Grants from national government reassigned to strategic programs — city-wide programs • Responsibility for funding of small infrastructure programs handed over to city/regency governments with high fiscal capacity; SANIMAS can be scaled up by city/regency governments • City/regency governments with low fiscal capacity will continue to receive financial support through the special allocation fund (DAK) or grants • No deadline set for phasing out national grants to LGs and fully implementing the new mechanism
Need for KPIs (MoHA interview)	• KPIs are needed for construction and post construction operations • Examples of KPIs are in the PAMSIMAS program with MoPWH, MoH and MoHA sharing roles, responsibilities and program funding (see website)[6]
SANIMAS integrated with other related programs (Bappenas and MoPWH interviews)	• SANIMAS integrated with desludging and IPLT programs • MoPWH requires city/regency governments to have a CSS as part of the readiness criteria to access national grants for SANIMAS programs • MoPWH plans to motivate city/regency governments by providing stimulant funds for SANIMAS replication; and give rewards to KPPs for maintaining SANIMAS facilities • Bappenas wants MoPWH to adopt the PPSP approach and encourages provinces to take responsibility for capacity building at city level
Performance incentives (MoF interview)	• MoF is drafting a new regulation related to rewards and punishments for programs funded by loans. Based on the commitment of LGs in project preparation, implementation and post construction phases. The aim is to improve the performance of the LGs
Continuous community development is crucial	• Continuous community development before and after the project is crucial to promote behavior change and ensure the sustainability (MoH); link to STBM — which focuses on infrastructure and behaviour change. • Written communal commitment with names and deadlines; identify community agents of change (natural leaders) and sanitarians[7] as focal points and for continuous promotion and monitoring
SABERMAS management	• Provincial government managed the planning, budget distribution contract management • Provincial government hired private contractors for SABERMAS construction

CITY/REGENCY LEVEL LESSONS LEARNED: SANIMAS REPLICATION IN BLITAR CITY

- SANIMAS infrastructure in line with CSS and other sanitation programs
- Increasing the city budget allocation for SANIMAS
- Facilitator competency was key to responsive community development during the implementation phase; facilitators trained by the national program were much more competent than those trained locally

[6] http://pamsimas.org/data-aplikasi/pelaporan-sim/#lapkpi

[7] A Sanitarian is a local public health official appointed by the MoH or local health agency, working at sub-district/village level

C FINDINGS

2 FINDINGS OF THE SANIMAS GOVERNANCE REVIEW *continued*

2.4 NEW BUSINESS AND FINANCIAL MODELS

Bappenas and MoF are developing a national government on-granting scheme for SANIMAS implementation that includes city/regency ownership, city/regency governments pre-finance project implementation and are then reimbursed by national government.

The on-granting mechanism was developed as a new financial model for SANIMAS to promote LG ownership. At the national level, Bappenas and MoF suggested funding SANIMAS with national and local government budgets and without loans. However, the budget does not accomplish the MoPWH's high target numbers (MoPWH, 2019). MoF notes that project funding may include more than one loan, such as under the Ministry of Agriculture's upland program with IsDB and IFAD. MoF also acknowledged that implementation of PPP business models is in the development phase, and there are few small wastewater plants in operation — Bandung was cited as a negative example.

At the city/regency level, Jambi, Medan, Solok, Bangka Barat and Bengkulu Selatan cities do not see any potential funding for O&M or additional house connections. Banda Aceh, Palembang and Singkawang cities are debating using village/sub-district funds (dana desa/dana kelurahan) for O&M and additional house connections. Palembang city cooperated with CSR programs to finance additional connections to SANIMAS.

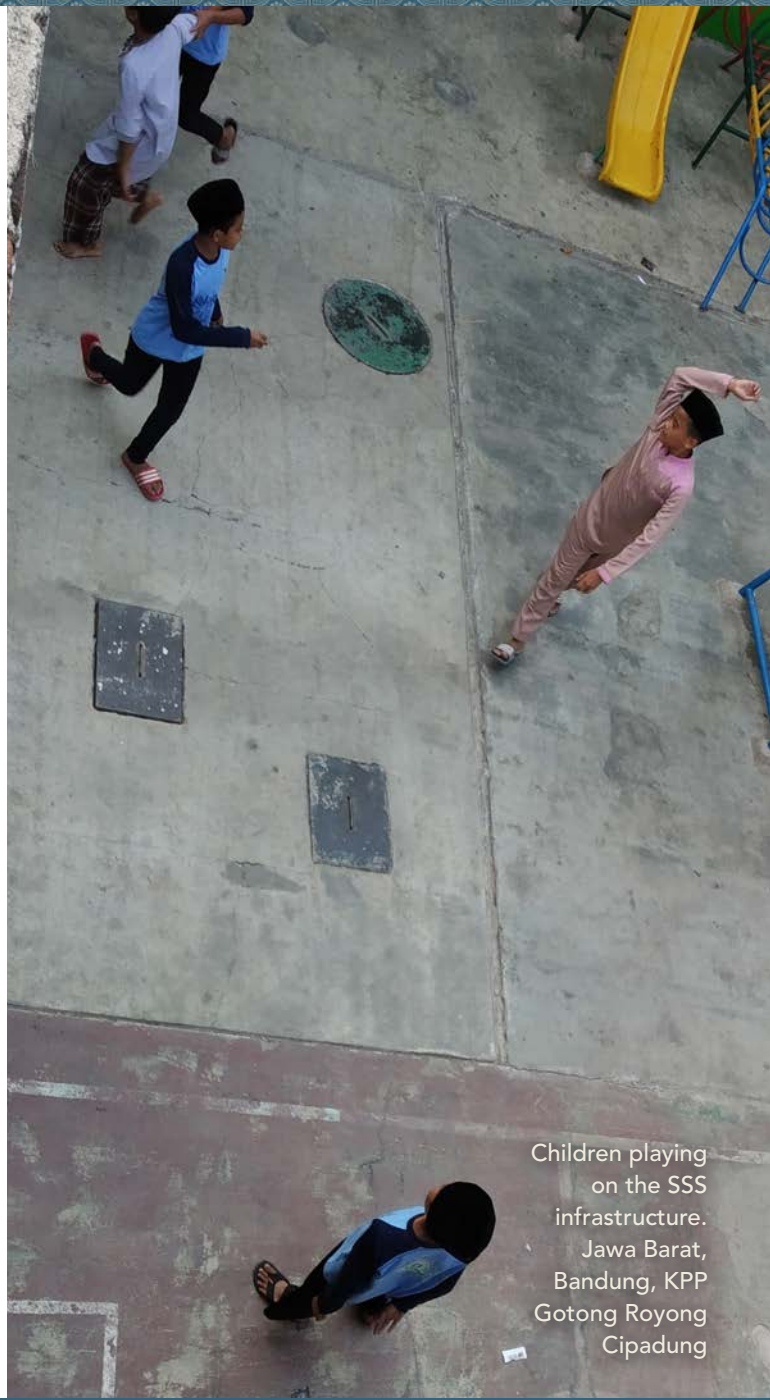
2.5 INTEGRATION OF SANIMAS INTO CITY PLANNING

SANIMAS requires city/regency governments to have a CSS to access national grants, but the requirement does not make LGs adopt integrated sanitation planning, even though they have relevant programs such as STBM and LLTT. MoH and Palembang city noted that SANIMAS can be linked to STBM programs. STBM starts with triggering communities to change their behaviour from open defection and to create sanitation demand, after which SANIMAS can be implemented to build sanitation facilities. MoPWH also suggests that SANIMAS should be integrated with desludging and IPLT programs, however places like Bengkulu Selatan city do not have an IPLT, and although Banda Aceh and Medan cities have regular desludging programs (LLTT), there is no coordination with SANIMAS programs.

Planning the locations. All the cities interviewed said that SANIMAS infrastructure was constructed in sanitation red zones[8] based on CSS, but surveys in IsDB locations showed that 71% of SANIMAS infrastructure was not in sanitation red or yellow zones (Table C13, page 67). Banda Aceh, Medan, Singkawang, Bangka Barat and Bengkulu cities reported that site selection for SANIMAS sites was based on project requirements, inlne with the CSS and mayoral decrees on programs for slum areas. SANIMAS Citarum Harum[9] faced challenges because of land availability, which meant that some SANIMAS facilities were not constructed in red zones as planned in the CSS.

[8] Sanitation high risk areas

[9] Citarum River Watershed Management program, 2018–2020 — 101 SANIMAS locations



Children playing on the SSS infrastructure. Jawa Barat, Bandung, KPP Gotong Royong Cipadung

C FINDINGS

2 FINDINGS OF THE SANIMAS GOVERNANCE REVIEW *continued*

2.6 VIEWS OF DEVELOPMENT PARTNERS AND OTHER STAKEHOLDERS

Development partners highlighted the main issues summarised in Box 3. In summary, the main issues cited with current SANIMAS programs by this group include:

- The community development process has suffered because of poor facilitator competency. One year of community development process with skilled facilitators is required for sustainable outcomes
- SANIMAS infrastructure is owned by the KPPs, which limits the ability of LGs to support O&M
- The lack of stakeholder engagement in project implementation and post construction phases to ensure the sustainability of SANIMAS infrastructure

BOX 3

Community Development and KPP Capacity Building Process in SANIMAS Programs

MAIN ISSUES	DEVELOPMENT PARTNERS' OBSERVATIONS
Capacity Building Requires More Funding	• IsDB reported that in the SANIMAS project design, capacity building was designed, implemented and funded by the executing agency (MoPWH). IsDB has offered the possibility of budget support in future loans • ADB said the creation of KPPs was generally treated as just a formality, and due to the lack of facilitator competency, capacity building was inadequate (ADB, 2017) • IUWASH started a capacity building program for existing KPPs of SANIMAS USRI in Gresik, Malang and Makassar cities; it encourages LGs to strengthen KPP capacity after SANIMAS project completion
Community Support and Development Issues	• DFAT noted that timing and frequency of community meetings were important factors to ensure that community behaviour changes occurred before sanitation facility construction started • UNICEF noted that many basic assumptions in community-based programs are not realistic, and that the community development process in SANIMAS programs has not addressed these issues • BORDA thought that the community preparation component in current SANIMAS programs has less than the 6 months minimum needed for supervision and quality management
Asset Ownership is Key to Service Delivery	• KIAT noted the SANIMAS financial mechanisms are efficient since the project can be completed within a year however, a major weakness is the asset ownership preventing LGs allocating O&M budget • Both IsDB and IUWASH indicated SANIMAS assets owned by the community translates to LGs having very little interest in maintaining the assets. IUWASH contrasted this with the SAIIG program (CWIS), in which the assets are owned by the LG, who allocates O&M budget
Stakeholder Collaboration	• DFAT cited the importance of cross ministerial involvement in SANIMAS and compared it with PAMSIMAS, which has a CPIU and performance indicators for related ministries (MoPWH, MoHA, MoH) • ADB and IUWASH noted that SANIMAS was supposed to be developed as a LG initiative with minimum service standards • AKSANSI supports the sustainability of SANIMAS by providing post-construction services, including monitoring, financial and institutional sustainability capacity building, and effluent sampling
PPP Examples	• PT. SUSTI[10] supplies prefabricated IPAL (SANFAB) for SANIMAS for LG sanitation programs • IATPI's PT. Biofilter Sanitasi Indonesia (BIOSAN) is certified but closed because of uncertified competitors • Several businesses in Klaten regency including Precast Djojobisono and UD Intan Manhole Ceper make manholes for SANIMAS and SAIIG programs

[10] PT. SUSTI is a private sector company that produces prefabricated sanitation systems under the SANFAB brand

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR

This chapter summarises the findings of the IsDB program delivery review. This is done by reporting performance indicator scores and those parameter responses considered most relevant for further discussion and analysis. For a comprehensive summary of findings please refer to Annex C3.

3.1.1 Overview of Average Performance Indicator Scores

Figure C3 presents the average PI scores of 236 investigated sites.

Site performance scores of 219 investigated sites are summarised in Figure C4. The site performance scores are calculated by averaging all available PI scores. If an indicator of system failure is observed at a site, its site performance score is 'poor'. For exact system scores please refer to Annex C4.

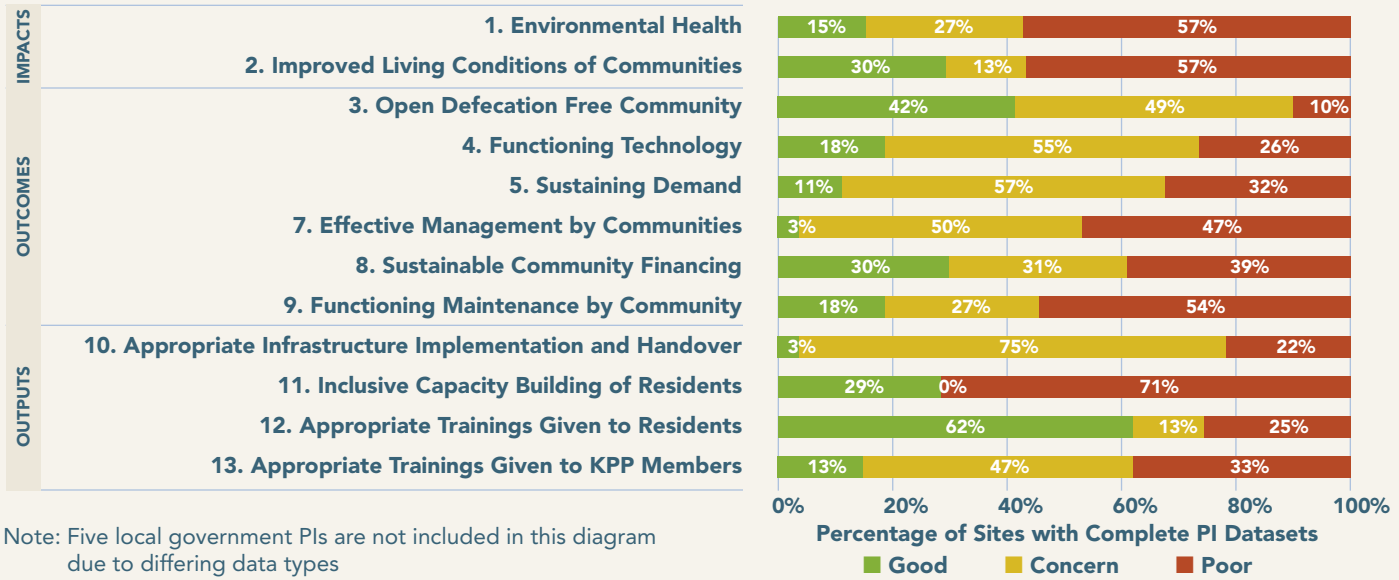
3.1.2 Indicators of System Failure

Indicators of system failure were found at a total of 111 sites (51% of 219 investigated sites):

- 16 sites (7% of 219 investigated sites) do not treat any wastewater as their construction has been left abandoned before completion
- At 106 sites (48% of 219 investigated sites), one or more signs of serious management challenges were observed:
  - At 80 sites (37% of total sample) KPPs have no income source to cover O&M costs
  - At 43 sites (20% of total sample) nobody is assigned to do regular O&M activities
  - At 9 sites (4% of total sample) there is no KPP and nobody has taken over the KPP's responsibilities
  - 7 sites (3% of total sample) show signs of major physical damage which affect operation or safety

FIGURE C3

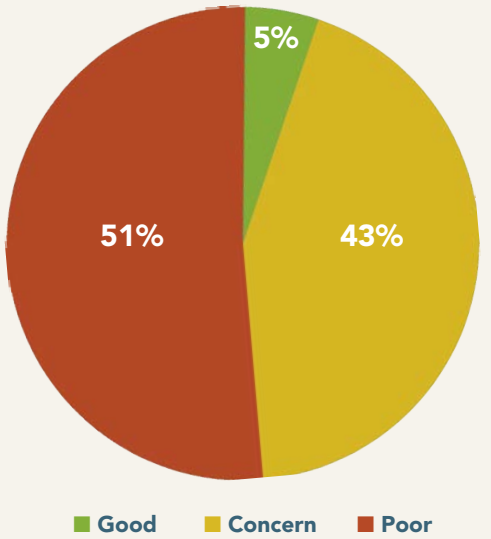
Summary of Average Performance Indicator Scores



Note: Five local government PIs are not included in this diagram due to differing data types

FIGURE C4

Site Performance Scores of 219 Investigated SANIMAS IsDB Sites



C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR *continued*

3.1.3 Performance Indicator 1

The Sanitation Service Maintains or Improves Environmental Health

Table C4 presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 1. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey, page 40).

The following points provide details on the parameters listed in Table C4; the data was gathered during KPP phone interviews:

- **a. IPLT existence:** Sludge from 33% of sites cannot be treated at an operational IPLT within a reasonable driving distance (<15 km).
- **b. Sludge disposal:** The sludge disposal at 33% of sites is unsafe and pollutes the environment.
- **c. Utilisation rate:** Many IPALs are not used to full capacity — e.g. 21% are used to less than half of their treatment capacity

Results from site visits:

- **Effluent concentrations and discharge standard compliance:** 65% of measured COD effluent concentrations did not comply with national discharge standards of 100 mg/l (MoEF, 2016).

3.1.4 Performance Indicator 2

The Sanitation Service Improves the Living Conditions of Communities

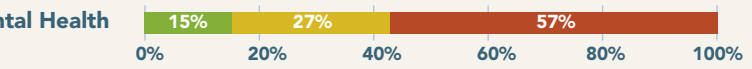
Table C5 presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 2. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

The following points provide details on the parameters listed in Table C5; the data was gathered during KPP phone interviews:

- **a. MCK — functional problems observed:** At 70% of investigated MCKs various functional problems were observed.

TABLE C4

Average Performance Indicator Scores and Summary of Parameter Scores (PI-1)



PARAMETER	GOOD	CONCERN	POOR
a. IPLT existence	46%	20%	33%
b. Sludge disposal	23%	44%	33%
c. Utilisation rate	62%	17%	21%

TABLE C5

Average Performance Indicator Scores and Summary of Parameter Scores (PI-2)

PARAMETER	GOOD	CONCERN	POOR
a. MCK — functional problems observed	20%	10%	70%
b. MCK access — elderly, people with disabilities	73%	9%	18%
c. Pathogen exposure for surrounding community through effluent	66%	22%	12%
d. Reaching low-income target population	67%	22%	10%
e. Pre-SANIMAS sanitation option	97%	0%	3%
f. MCK — safe and private access	87%	13%	0%

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR *continued*

b. MCK access — elderly, people with disabilities: Access is difficult or impossible in 19% of cases.

c. Pathogen exposure for surrounding community through effluent: In 12% of investigated cases anaerobic effluent exposes the surrounding community to significant pathogen loads.

d. Reaching low-income target population: At 10% of sites less than 25% of beneficiaries live in 'low income' households.

Results from beneficiary FGD and structured interviews:

- **Safe and private MCK access for women and children:** All interviewed communities with MCKs considered the MCKs to be safe and private for women and children.
- **MCK access — elderly, people with disabilities, minorities:** 75% of interviewed communities with MCKs reported several accessibility challenges.
- **Financial solution for low-income households:** All interviewed communities reported that financial solutions for the connection of low-income households were discussed and decided during community meetings.
- **Access of marginalised groups to IPAL:** All FGD participants agreed that members of marginalised groups within their communities can connect to the IPAL.

3.1.5 Performance Indicator 3

Open Defecation Free Community

Table C6 presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 3. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

The following point provides details on the parameters in Table C6:

a. Current open defecation practice: In 10% of SANIMAS communities open defecation is still practiced regularly.

Results from beneficiary FGD and structured interviews:

- **Current and previous sanitation practice:** Sanitation practices before the SANIMAS implementation were for the very most part unsafe. The few cases in which open defecation is currently still existing in SANIMAS communities are caused by missing freshwater household connections.

3.1.6 Performance Indicator 4

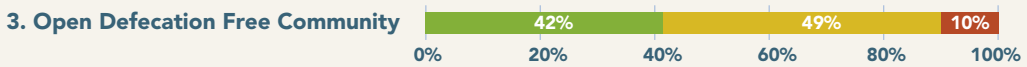
Functioning Technology: *Systems are operating as intended*

Table C7 presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 4. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

The following points provide details on the parameters listed in Table C7; the data was gathered during KPP phone interviews:

TABLE C6

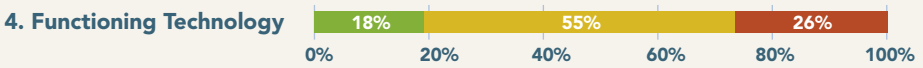
Average Performance Indicator Scores and Summary of Parameter Scores (PI-3)



PARAMETER	GOOD	CONCERN	POOR
a. Current open defecation practice	90%	1%	10%

TABLE C7

Average Performance Indicator Scores and Summary of Parameter Scores (PI-4)



PARAMETER	GOOD	CONCERN	POOR
a. Signs of blockages in the IPAL	56%	0%	44%
b. Technically acceptable utilisation rate	63%	0%	37%

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR *continued*

a. Signs of blockages in the IPAL: 44% of interviewed KPPs report signs of blockages (reactor blockages or other).

b. Technically acceptable utilisation rate: Information on household connections indicates that 37% of systems are under- or overloaded.

3.1.7 Performance Indicator 5

Sustaining Demand: System is accessible to all who need it, used to capacity and acceptable to all users

Table C8 presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 5. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

The following points provide details on the parameters listed in Table C8; the data was gathered during KPP phone interviews:

a. Reason for no IPAL connection: 75% of KPPs reported that households did not connect to the IPAL out of one or several reasons — details are listed in Table C9.

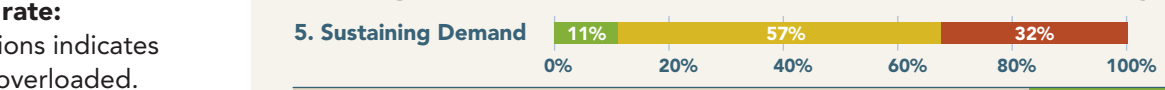
b. MCK utilisation rate: 40% of the investigated MCKs are under- and 20% over-utilised.

Results from beneficiary FGD and structured interviews:

- **Reasons for no IPAL connection or MCK use:** In 31% of interviewed communities, beneficiaries reported disconnections because of dissatisfaction or other personal reasons (such as house renovation).
- **Accessibility of MCKs:** 75% of interviewed communities with access to MCKs reported that the MCKs were open every day for at least 14 hours a day.

TABLE C8

Average Performance Indicator Scores and Summary of Parameter Scores (PI-5)



PARAMETER	GOOD	CONCERN	POOR
a. Reason for no IPAL connection	23%	1%	75%
b. MCK — functional problems observed	20%	10%	70%
c. MCK utilisation rate	50%	0%	50%
d. Technically acceptable utilisation rate	63%	0%	37%
e. MCK access — elderly, people with disabilities	73%	9%	18%
f. MCK — safe and private access	87%	13%	0%
g. Reason for no MCK usage	94%	6%	0%
h. MCK toilet to user ratio	100%	0%	0%

TABLE C9

Response count for the parameter: *'If applicable to this community: Why do people / HH not connect to the IPAL simple sewerage system?'*, certain KPPs gave more than one reason (text colour indicates response score: Good Concern Poor)

RESPONSE OPTION AND FREQUENCY			
Technical issues — hh outlet below sewer line	30%	No KPP budget to connect more households	7%
None / No issues	25%	Too expensive/cannot afford	5%
Technical issues — other — please specify	23%	Households have toilets connected to other treatment	4%
Not interested/ prefer previous sanitation option	17%	Technical issues — no access to hh outlet pipe	1%
Do not want to damage house to build toilet/ connection (for SSS)	14%	Do not have a toilet at home	1%
Do not connect — other reason	13%	Interviewee does not know	1%

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR *continued*

- **Beneficiary awareness of WASH benefits through SANIMAS:** 94% of interviewed beneficiaries felt they benefitted from the SANIMAS program and could state the specific reason why.
- **Beneficiary satisfaction:** 92% of beneficiaries joining the FGDs were either 'Satisfied' or 'Very satisfied' with the SANIMAS program.
- **Reasons for community members not connecting to the IPAL:** The most common reasons for households not connecting to the IPAL are technical limitations i.e. household effluent below piping system.

3.1.8 Performance Indicator 6

Community is Knowledgeable on the Advantages of Functioning Wastewater Treatment

This PI was investigated through onsite beneficiary interviews as part of the FGDs on social and gender related project aspects.

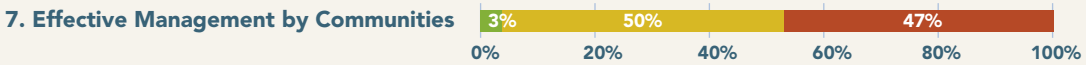
- **Community knowledge on advantages of wastewater treatment:** Only 23% of interviewed FGD participants were able to mention at least 3 out of 5 main advantages of connecting their household to a WWTP.
- **Community knowledge on advantages of MCK usage:** Only 8% of interviewed MCK users were able to mention at least 3 out of 5 main advantages for their household/family when practicing proper sanitation and using MCK.
- **Community knowledge on household O&M practices:** Only 24% of interviewed FGD participants were able to mention at least 4 out of 6 important household level O&M practices related to the SANIMAS infrastructure.
- **Motivational reason to join SANIMAS program:** The most commonly stated reasons for interviewed FGD participants to join SANIMAS are financial (free connection fee, no septic tank construction and emptying fee) and environmental cleanliness and health (cleaner and odourless drainage, no puddles, no water source contamination).

3.1.9 Performance Indicator 7

Effective Management by Community:
Active, motivated, accountable and inclusive management entity and operator with clear responsibilities

TABLE C10

Average Performance Indicator Scores and Summary of Parameter Scores (PI-7)



PARAMETER	GOOD	CONCERN	POOR
a. MoU between KPP and LG	1%	2%	97%
b. Complaint mechanism KPP - LG	15%	14%	70%
c. Gender inclusive KPP	38%	0%	62%
d. O&M documentation	14%	26%	60%
e. Financial administration	21%	22%	57%
f. Follow-up activities after commissioning by LG	50%	0%	50%
g. Trainings received by operator	32%	23%	45%
h. Trainings received by KPP	5%	50%	45%
i. Operator salary	27%	34%	39%
j. Complaint mechanism beneficiaries - KPP	56%	6%	38%
k. Legal registration of KPP	57%	5%	38%
l. KPP support for major maintenance needs	63%	0%	37%
m. Regular KPP meetings	23%	42%	35%
n. Operator existence	46%	34%	20%
o. KPP awareness of its responsibilities	3%	88%	9%
p. KPP existence	79%	13%	8%

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR *continued*

Table C10 (page 69) presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 7. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

The following points provide details on the parameters listed in Table C10 (page 69); the data was gathered during KPP phone interviews:

a. Memorandum of Understanding between KPP and LG: 97% of interviewed KPP have no MoU with local government for co-management of the system.

b. Complaint mechanism KPP-LG: In 70% of cases a complaint mechanism either does not exist or is not helpful when tried.

c. Gender-inclusive KPP: In 62% of cases the percentage of female members is below 33%.

d. O&M documentation: O&M administration logbooks do not exist in 60% of cases.

e. Financial administration: O&M administration logbooks do not exist in 57% of cases.

f. Follow-up activities after commissioning by LG: In 50% of cases no follow-up activities by LG are reported by KPP.

g. Trainings received by operator: In 68% of cases operators have received no or only insufficient O&M training.

h. Trainings received by KPP: In 50% of cases KPPs report to have received one or two types of trainings (O&M training was received in 54% cases, financial training in 19% cases and HHE in 7% cases). In 45% of cases KPPs have not received any kind of training although in almost all cases they had been appointed since the beginning of project.

i. Operator salary: 73% of operators receive no or inadequate payment.

j. Complaint mechanism beneficiaries — KPP: 56% of KPPs report that there is a complaint mechanism.

k. Legal registration of KPP: 38% of interviewed KPPs do not have any kind of legal registration.

l. KPP support for major maintenance needs: 37% of the KPPs report that they have no support for major maintenance activities or do not know.

m. Operator existence: At 46% of sites KPPs report that there is an operator. At 54% of systems there is none, but at 34% of sites one or more people without O&M responsibility take care of the facility.

n. KPP existence: KPPs exist at 79% of investigated sites.

Results from beneficiary FGD and structured interviews:

- **When asked who they thought were the legal owners of the infrastructure, KPP responses were:** KPP (58%), community (23%), local government (3%), private person — e.g. landowner (1%) and the installation is owned by nobody (1%). 4% of the KPP representatives did not know, and 9% answered 'other'. A total of 209 KPPs answered this question.
- **WASH promotion activities organised by KPP:** In 85% of cases KPPs organised WASH promotion activities at least once — and in 24% of the cases routinely.
- **Complaint mechanism from beneficiaries to KPP:** In 62% of cases, beneficiaries communicate their complaints to the head of KPP, via phone call, text message or home visit. In six FGD locations (14%) respondents reported that there was no complaint mechanism at all.
- **Inclusive KPP formation:** 53% of FGD participants reported there are no marginalised groups in their community. In 8% of investigated communities marginalised group members were not encouraged to join the KPP.
- **Reason for inexistence of KPP:** Limited probing into this aspect.

3.1.10 Performance Indicator 8

Sustainable Community Financing: *Sufficient ongoing income to cover ongoing costs and agreed mechanism to address any longer-term costs*

Table C11 (page 68) presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 8. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

The following points provide details on the parameters listed in Table C11 (page 68); the data was gathered during KPP phone interviews:

a. User fees for low income households: KPPs report at 64% sites that there is no agreed solution for the regular financial contribution (for O&M costs) of households with low income.

b. Regular expense coverage: At 52% of sites none of the regular expenses other than operator salaries (e.g. material, simple repairs, tools, equipment, for MCK: electricity, water) are covered by available income.

c. O&M budget definition: In 41% of cases no O&M budget was defined or the KPP does not know.

d. KPP income sources: In 40% of cases the KPPs have no income source at all.

e. Operator salary: 73% of operators receive no or inadequate payment.

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR *continued*

f. Solutions for irregular expenses: In 36% of cases no solution exists for irregular expenses in the future (replacing major parts, desludging, structural damage).

g. Payment of irregular expenses: In 23% of cases either expenses were not paid for at all or the KPP did not know.

Results from beneficiary FGD and structured interviews:

- **Reasons for reduced willingness to pay user fees:** User fees are collected at 19 investigated SANIMAS locations. At 47% there is a perceived reduction in the willingness of users to pay. The reasons are reported to be poor fee management (no regular collection or reminder, unavailable financial report) and difficult economic circumstances of households (low income, competing priorities during pandemic).
- **Inclusive user fee setting:** At 95% of FGD locations the fee was set by all users, including households with low income, and community representatives in a community meeting.
- **Agreed solution for contribution of households with little income:** Respondents reported that solutions exist for households having difficulties paying the contributions at 32% of FGD locations at which user fees are collected.

3.1.11 Performance Indicator 9

Functioning Maintenance by Community: Systems are maintained as intended

Table C12 presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 9. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

TABLE C11

Average Performance Indicator Scores and Summary of Parameter Scores (PI-8)

PARAMETER	GOOD	CONCERN	POOR
a. User fees for low income households	32%	4%	64%
b. Regular expense coverage	39%	9%	52%
c. O&M budget definition	59%	0%	41%
d. KPP income sources	60%	0%	40%
e. Operator salary	27%	34%	39%
f. Solutions for irregular expenses	64%	0%	36%
g. Payment of irregular expenses	55%	22%	23%
h. User fee payment	59%	30%	11%
i. User fee collection	84%	13%	4%

TABLE C12

Average Performance Indicator Scores and Summary of Parameter Scores (PI-9)

PARAMETER	GOOD	CONCERN	POOR
a. Desludging	26%	3%	71%
b. Functional problems with MCK	20%	10%	70%
c. Reparation of sewer network	49%	17%	34%
d. Maintenance of sewer network	77%	13%	10%

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR *continued*

The following points provide details on the parameters listed in Table C12; the data was gathered during KPP phone interviews:

a. Desludging: 71% of systems operating longer than 2 years have never been desludged.

b. Functional problems with MCK: Please refer to Section PI 2 above (Section 3.1.4).

c. Reparation of sewer network: In 34% of cases major issues with the sewer network were not fixed (e.g. broken pipes or manholes, leakages, other major damage).

d. Maintenance of sewer network: Maintenance issues with the sewer network were fixed in 77% of cases (e.g. clogging, blockages, bad smells or overflows).

Results from site visits:

- Onsite sewer network integrity testing indicated probably clogged or broken sewer lines in 22% of cases.
- During field investigations there has been a number of reports from communities in which considerable numbers of households preferred to disconnect themselves from the piping systems because of frequent pipe and sewer blockages — many resorted to connecting back to their 'old septic tanks'.

3.1.12 Performance Indicator LG-1

Effective Management by LG: *Active, motivated and accountable management structure with clear responsibilities*

City/regency governments currently lack the mandate and the management systems to effectively manage the SANIMAS program after infrastructure implementation.

According to the IsDB SANIMAS guidelines city/regency governments have no responsibilities concerning the post construction phase (MoPWH, 2018).

Existing LG data management for the IsDB SANIMAS program reflects that it was designed to track the project implementation progress but not for post construction evaluation and management. Furthermore, only data on locations and the number of constructed SANIMAS was reported to exist in all interviewed LG offices. All other types of SANIMAS project data, which would be needed for effective post implementation management and support, such as project documents and KPP contacts, are often not available in LG offices.

Isolated monitoring activities were conducted by some LGs.

3.1.13 Performance Indicator LG-2

Sustainable Financing by LG: *Annual budget sufficient to address agreed responsibilities including ongoing costs and agreed mechanism to address any longer-term costs*

Current program arrangements (all post-construction responsibilities handed over to KPP and SANIMAS assets owned by KPPs) do not foresee budget allocation for ongoing or longer-term O&M costs by local government. Certain follow-up costs however may be covered through local government budget allocation mechanisms based on demand from KPPs.

3.1.14 Performance Indicator LG-3

Functioning maintenance by LG: *Adequate O&M support given to KPP*

Because city/regency governments lack the mandate, the management systems and the budget to effectively manage the SANIMAS programs after infrastructure implementation, system maintenance through LG does not exist in most cases.

- All interviewed LG offices confirmed that there is no government activity related to SANIMAS after infrastructure implementation.
- All interviewed LG officials reported that, because there is no obligation for the city/regency government to support KPPs after infrastructure implementation, support to a KPP can only be given following an official demand from the community.
- The second major barrier for LG to take over more O&M responsibilities relates to asset ownership of SANIMAS installations. Because SANIMAS IPALs are owned by the community the LGs cannot allocate O&M budget. A possible solution is the asset handover to LG. However, regulations for this do not exist and any asset handover needs to be coordinated with the MoHA.
- The SANIMAS IsDB technical guidelines (MoPWH, 2018) state that city/regency governments should provide a complaint mechanism for beneficiaries, however 75% of the interviewed LGs do not have such a mechanism in place.

3.1.15 Performance Indicator LG-4

At least over 20,000 temporary jobs *created within the 8 provinces during the construction of the Community Sanitation Infrastructure*

A total of 43,191 temporary jobs (mostly 3-month construction work contracts) were created through the SANIMAS IsDB program (PT.Ciriajasa, 2020-MEC).

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR *continued*

3.1.16 Performance Indicator 10

Appropriate Infrastructure Implementation and Commissioning

Table C13 presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 10. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

The following points provide details on the parameters listed in Table C13; the data was gathered during KPP phone interviews:

a. Project document availability: In 89% of cases either one or no photos of the requested project documents (design drawings, RKM, budget planning) were transmitted by KPP.

b. Implementation within sanitation red zone: 71% of systems were not implemented in a sanitation red or yellow zone.

c. Construction with water-tightness test: 39% of IPALs were built without testing reactors for water-tightness.

d. Population density: 23% of systems were built in a low-density area (below and far below 150 cap/ha).

Results from beneficiary FGD and structured interviews:

- **Reactor setups of SANIMAS IsDB IPALs:** Information is available for 119 system designs of which all include settler and AF. 30% of system designs include ABRs.
- **Faulty reactor setups:** One treatment plant was found to be designed and built with an ABR after the AF.
- **Quality of design drawings:** Field teams reported repeatedly that design drawings of some sites were drawn by hand and of poor quality.
- **Reactor surface area per beneficiary:** Close to 95% of IPALs were built larger (and in certain cases much larger) than technical design documents suggest they should be built.
- **Top-slab thickness:** 18% of sites are built with dangerously thin top-slabs (< 15 cm).
- **Desludging of all reactors:** During the investigation it became apparent that many AFs cannot be desludged without removing the AF fixed-bed media.

3.1.17 Performance Indicator LG-5

Appropriate Training Given to LG Staff

50% of interviewed LGs did not receive any SANIMAS related training. 25% received training but reported that the training was insufficient in scope and content. 25% of interviewed LGs received training and found it was adequate.

TABLE C13

Average Performance Indicator Scores and Summary of Parameter Scores (PI-10)

10. Appropriate Infrastructure Implementation and Handover

PARAMETER	GOOD	CONCERN	POOR
a. Project document availability	2%	9%	89%
b. Implementation within sanitation red zone	29%	0%	71%
c. Construction with water-tightness test	61%	0%	39%
d. Population density	77%	0%	23%

SANIMAS evaluation discussions with local residents.
Sumatera Utara, Medan, KPP Sakriya

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR *continued*

3.1.18 Performance Indicator 11
Inclusive Capacity Building

Table C14 presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 11. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

The following point provides details on the parameters in Table C14:

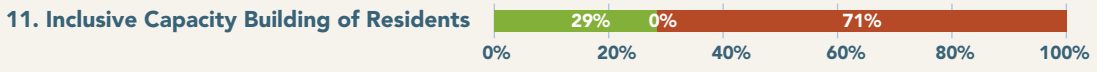
a. **Gender inclusive capacity building:** In 72% of cases women were not involved in training and project stages as defined by PTP (MoPWH, 2018)

Results from beneficiary FGD and structured interviews:

- **Gender inclusive project implementation and capacity building:** 95% FGD participants reported that women were involved in different project stages, however the level of participation in each stage and influence on decision making process varied greatly across locations. At 5% of investigated sites women were never involved in any project stage.

TABLE C14

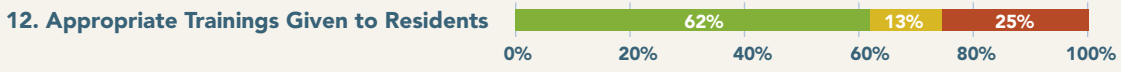
Average Performance Indicator Scores and Summary of Parameter Scores (PI-11)



PARAMETER	GOOD	CONCERN	POOR
a. Gender inclusive capacity building	28%	0%	72

TABLE C15

Average Performance Indicator Scores and Summary of Parameter Scores (PI-12)



PARAMETER	GOOD	CONCERN	POOR
a. Community HHE training	66%	0%	34%
b. Community O&M training	67%	0%	33%

3.1.19 Performance Indicator 12
Appropriate HHE Given to Residents

Table C15 presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 12. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

The following points provide details on the parameters listed in Table C15; the data was gathered during KPP phone interviews:

a. **Community HHE training:** In 34% of cases nobody provided HHE training to community members as part of the SANIMAS program.

b. **Community O&M training:** In 33% of cases nobody provided O&M training to community members as part of the SANIMAS program.

SANIMAS evaluation field staff training with the local community in Yogyakarta.

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.1 FINDINGS PER PERFORMANCE INDICATOR *continued*

3.1.20 Performance Indicator 13 *Appropriate OM Training Given to KSM/KPP*

Table C16 presents the average PI scores of sites with complete datasets as well as an overview of the parameter response scores given for PI 13. Certain PI scores are affected by 'Indicators of system failure' (see Section B 4.1. IsDB Program Delivery Survey).

The following points provide details on the parameters listed in Table C16; the data was gathered during KPP phone interviews:

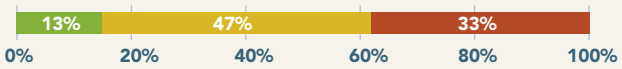
a. **Trainings received by operator:** In 68% of cases operators have not received adequate O&M training.

b. **Trainings received by KPP:** In 95% of cases KPPs have not received adequate training.

SSS technical check.
Sumatera Utara, Kabupaten Deli Serdang, KPP Seroja

TABLE C16

Average Performance Indicator Scores and Summary of Parameter Scores (PI-13)



PARAMETER	GOOD	CONCERN	POOR
a. Trainings received by operator	32%	23%	45%
b. Trainings received by KPP	5%	50%	45%

3.1.21 Additional Sanitation Related Information About the SANIMAS Beneficiaries

- **Main fresh water source(s):** 45% of interviewed KPPs report that municipal piped water was the main or one of the main fresh water sources used in the community. 36% reported that the main source was 'deep bore well with pump and sealed with concrete slab', 31% 'shallow (household) wells', 5% 'river water' and 5% rainwater.
- **Household connections to municipal water supply and disposal of solid waste though municipal waste collection:** 30% of connected households have connections to municipal water supply. 31% of connected households dispose of their solid waste though municipal waste collection.
- **What natural threats exist in the implementation area?** 67% of interviewed KPPs reported that there were no climate related threats in their area such as flooding, sea level rise, sea water intrusion to aquifers, landslides or others. 24% reported that there were threats of flooding, and 8% of sea-level rise.

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW *continued*

3.2 FINDINGS OF THE TREATMENT EFFICIENCY STUDY OF ISDB SANIMAS TECHNOLOGY

This chapter summarises the findings of the treatment performance study of IsDB SANIMAS technology. For a comprehensive summary of findings and calculations please refer to Annex C3.

3.2.1 Design Information

All three investigated IPALs are designed for an almost equal number of users and average daily feed flow. All consist of a settler followed by an Anaerobic Filter (AF) with varying numbers of chambers (10, 15 and 7 in Sakriya, Seroja and Lingtihat respectively). IPAL sizes vary significantly across systems. The comparison of design load parameter values with existing state-of-the-art design guidelines (see Annex C3) shows:

- The settler dimensions are in the range of large septic tanks. Settlers followed by further treatment steps are typically sized much smaller.
- The exact AF filter void space of the investigated AF reactors is unknown but resulting design HRTs are most probably below the range suggested by existing state-of-the-art design guidelines.
- Resulting flow velocities within the AF filter void space are much larger than suggested by existing state-of-the-art design guidelines.

3.2.2 System Loads

The detailed investigations on household connections conducted in all three communities showed that all households discharge all their wastewater (black- and all greywater) to the IPAL without pre-treatment through septic tanks. Sewer line integrity testing results indicate that there were no severe blockages or breakages. Figure C5 and Figure C6 present the design and actual system loads.

FIGURE C5
Design and Actual Number of Connected Households at the Three Investigated Sites

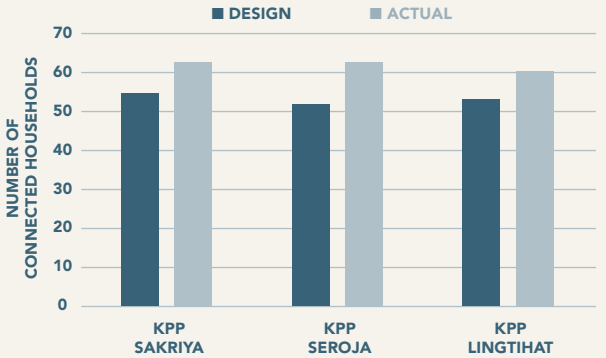
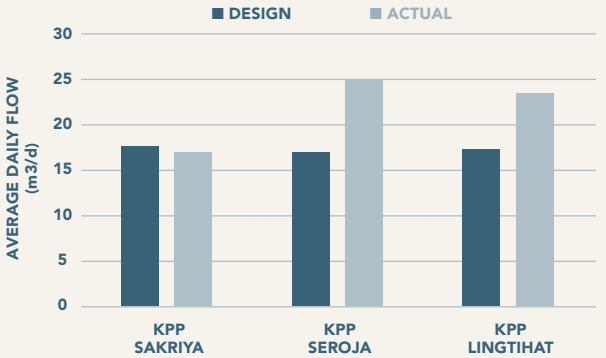


FIGURE C6
Design and Actual Average Daily Dry Weather Flow at the Three Investigated Sites



In-depth treatment efficiency study.
Sumatera Utara, Medan, KPP Sakriya

C FINDINGS

3 FINDINGS OF THE ISDB PROGRAM DELIVERY REVIEW

3.2 FINDINGS OF THE TREATMENT EFFICIENCY STUDY OF ISDB SANIMAS TECHNOLOGY *continued*

3.2.3 Treatment Performance

All measured wastewater pH values were between 6.6 and 7.1, which indicates stable anaerobic conditions.

Figure C7 and Figure C8 summarise the results of the daily effluent sampling for turbidity and COD concentrations, however there is evidence for a 2- to 3-fold dilution of settler effluents with rainwater as well as a significant dilution of AF/IPAL effluent. Typical settler effluent concentrations are 400 to 700 mg COD/l (Reynaud and Buckley, 2015; Laramee et al., 2018; Kerstens et al., 2012; Bugey et al., 2011). Therefore, reactor-type (settler and AF) specific treatment efficiencies and effluent concentrations when treating pure wastewater cannot be deduced from the available data. However, there is evidence that the AF significantly reduces turbidity and (with a lesser statistical significance) COD at all three sites.

None of the visited systems has ever been desludged. Measurements of the accumulated settler sludge volume however indicate rates that are about ten times lower than reported in existing design guidelines (Sasse, 1996). The reason could be sludge washout during storm events through the reactor manholes (as observed during field investigations at one site) or sludge washout to subsequent AF chambers.

FIGURE C7

Average Settler and AF/IPAL Effluent Turbidities at the Three Investigated Sites, Five Measurements Per Sampling Point, Error Bars Indicate Standard Deviation of Measurements

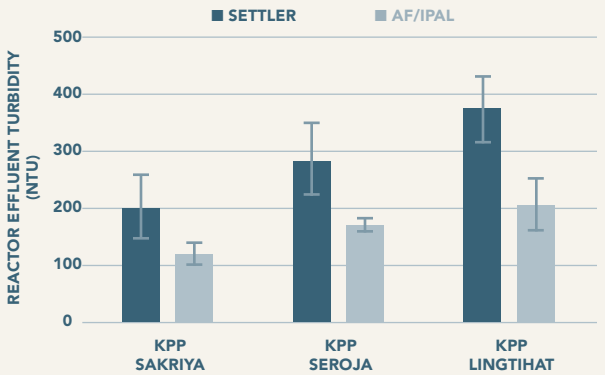
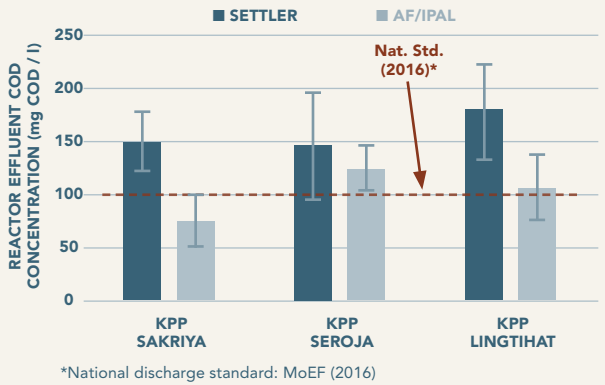


FIGURE C8

Average Settler and AF/IPAL Effluent COD Concentrations at the Three Investigated Sites, Five Measurements Per Sampling Point, Error Bars Indicate Standard Deviation of Measurements



*National discharge standard: MoEF (2016)

3.2.4 Observations Made by Field Team and Feedback from Residents

Overall, feedback about the SANIMAS program gathered from the residents during informal conversations was positive at all three sites. Members in all three communities mentioned a clearly perceived improvement in their living conditions through cleaner environment.

Also, in all three communities, members reported the intrusion of rainwater drainage into the sewer lines either through cracked manhole covers or through intentional household gutter connections. This was confirmed by observations of the field team: severe rainwater intrusion into IPALs was observed and measured in at least two of the three investigated systems.

In two communities, members mentioned that blockages in sewer lines and at the IPAL often lead to flooding and bad smells. At one site and during the field investigation, a heavy rain event led to complete flooding of the settler and first AF chambers, with rainwater flushing settler sludge and scum out of the settler manhole onto the IPAL top slab and into the street. Observations inside the AF reactor chambers indicated that water levels inside the last AF chambers had not risen, a clear indication that first AF chambers were blocked or at least hydraulically overloaded.

D ANALYSIS AND DISCUSSION

Community discussions for the SANIMAS evaluation.
Jakarta Utara, KPP At-Taubah

D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS

1.1 NATIONAL GOVERNMENT

Alignment with Indonesia's 2020–2024 National Medium-Term Development Plan (RPJMN)

Indonesia's national medium-term development plan (2020–2024 RPJMN) for sanitation focuses on improving access to sustainable and safely managed sanitation. The RPJMN goals are aligned with the national Sustainable Development Goals (SDGs), particularly to increase the number of households having access to improved sanitation and being open defecation free (Target 6.2.1) and reducing untreated wastewater (Target 6.3). As shown in Table D1, despite progress since 2011 in reducing open defecation (OD), in 2018 almost 10% of people in Indonesia still practiced OD, or the third highest level of OD in the world. Access to improved sanitation has increased by 1.4% per year from 2011 to 74.58% in 2018 (RPJMN 2020-2024: PP No.18/2020).

For the next medium-term plan (RPJMN 2020–2024), Indonesia has set new national targets, which are: **0%** of people practicing OD and **90%** access to improved sanitation, including **15%** safely managed sanitation services (Table D1).

To achieve these targets over the next five years, the Government of Indonesia will need to provide additional access to improved sanitation for more than 42 million[1] people with the total budget plan of IDR 140.9 trillion or USD 10.06 billion.[2] The total budget required will be raised from multiple capital sources: national budget (APBN), special allocation fund (DAK), local government budgets (APBD), community funds and the private sector (RPJMN 2020–2024: PP No.18/2020).

Access to improved and safely managed sanitation is a key part of the national development priorities and is indicated by multi-level government programs executed by multiple ministries and agencies, including the MoPWH, MoH, MoHA, LG, and the private sector (SOEs and private companies).

TABLE D1

National Medium-Term Development Plan (RPJMN) Targets

PARAMETER	SANITATION ACCESS IN 2011	SANITATION ACCESS IN 2018	2020-2024 RPJMN TARGET
Open Defecation Practice	19.39%	9.36%	0%
Access to Improved Sanitation	58.44%	74.58% (including 7.42% of safely managed sanitation)	90% (including 15% of safely managed sanitation)

National Medium-Term Development Plan 2020–2024 (PP No.18/2020)

In terms of SANIMAS program design, IUWASH explained that the design was good, with a built-in mechanism to share roles with all relevant ministries. However, in practice the mechanism was not used and participation of related ministries in the SANIMAS programs (SANIMAS Regular, DAK, IsDB, USRI) was not mandatory. The MoF and Bappenas were involved in the project preparation phase, while the other ministries such as the MoH, MoHA, and MoEF reported that there was no active collaboration with the MoPWH on any SANIMAS programs, whether in the planning, implementation or post-project phases. Responsibility for achieving all the SANIMAS IsDB program performance indicators lies with the MoPWH as the sole executing agency. This is confirmed by DFAT, which pointed out the absence of SANIMAS program performance indicators for the other ministries, contrasting it with the PAMSIMAS program, which involves multiple ministries.

Bappenas noted that there has been an increase in local government awareness of their responsibility for minimum service standards (SPM) provision, particularly in the last 5–10 years. Therefore, the design of a community-based sanitation program, which is a part of a national strategy and prioritises the achievement of the SDGs, should enhance joint commitment and be integrated and coordinated with related stakeholders. Setting program performance indicators for each relevant ministry/agency in accordance with their function and authority is crucial to provide more realistic performance indicators and assign responsibilities to related stakeholders at all levels.

In addition, the output and outcome indicators in the SANIMAS IsDB program plan shows only the responsibilities of the MoPWH. Intermediate indicators showing the responsibilities of other parties are not included or measured. Equally, when the indicators were adapted for LGs, only indicators for the appointed technical agency were included; and unfortunately, they are not clearly understood by the LGs.

[1] Based on 2020 population data: 274 million population (www.worldometers.info) / 90%–74.6% = 15.4%; 15.4% * 274 million = 42 million

[2] USD 1 = IDR 14,500 (average exchange rate in 2020)

D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS

1.1 NATIONAL GOVERNMENT *continued*

Local Government Capacity Building

Sanitation investment priority programs are facilitated by the national government. This includes more than 1.4 million HCs via SANIMAS/SSS programs,[3] which is the largest RPJMN national target for increasing sanitation access, as shown in Table D2.

In the context of the management of SANIMAS program implementation, the decentralization and local government autonomy policies outlined in Law 23/2014 are the main instruments governing the implementation of national programs. Under this law, primary and secondary wastewater pipe network systems and household connections are the responsibility of city/regency governments. Hence, the capacity of city/regency governments needs to be increased to enable them to implement national priority programs such as SANIMAS.

The capacity building mechanism takes the form of collaboration between national and LGs, focusing on institutional capacity building for the provision of minimum service standards. The policy provides opportunities for LGs to develop their own regions and deliver better services to their residents. However, the implementation of the law presents its own challenges because it requires LGs to be more responsive and targeted in their regional development, including in the provision of minimum service standards.

To achieve the minimum service standards, each ministry and local government must achieve their respective minimum service standard performance indicators. A summary of indicators and the institutions responsible are presented in Table D3.

[3] SSS: Residential/Skala Permukiman

TABLE D2

RPJMN 2020–2024 Sanitation Access Provision Targets by Sanitation System

SANITATION SYSTEM	2020–2024 RPJMN TARGET	UNIT
Off-site systems — citywide scale (SPALD-T)	311,760	HC
Off-site systems — residential scale (SPALD-T/SSS/SANIMAS)	1,439,610	HC
On-site system — IPLT/FSM	505	Units

Source: National Medium-Term Development Plan 2020–2024 (PP No.18/2020)

TABLE D3

Summary of Sanitation Service Standards Indicators and Institutions Responsible

MINISTRY/AGENCY	TYPE OF BASIC SERVICE	INDICATOR
MoEF and local environmental agencies (DLH)	Water pollution prevention	Percentage compliance with administrative and technical requirements to prevent water pollution for all activities and/or business units
MoPWH and local technical agencies (Dinas PU/Perkimta	Environmental health for settlements (sanitation and solid waste management; domestic wastewater)	Availability of adequate on-site wastewater system Availability of off-site wastewater system (communal/regional/city-wide)
MoH and local health agencies (Dinkes)	Improved sanitation	Percentage of the poorest households using private or shared sanitation facility to defecate, with gooseneck system and contained in a septic tank

D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS

1.1 NATIONAL GOVERNMENT *continued*

Identification of stakeholders that need to be involved in the SANIMAS programs, both in national and LG levels, is another part of increasing the capacity of LGs to foster integration and cooperation between the various parties. The MoF noted that all identified ministries and agencies that have significant involvement in SANIMAS programs should establish CPIU or PPIU/ DPIU to ensure the effectiveness of the program.

Review of Current SANIMAS Settings

The MoF emphasised the need for thorough identification of aspects relevant to program benefits and sustainability from the start. Program design must begin with the setting of readiness criteria that ensures LG commitment to the program, community development and include a program exit strategy. Bappenas, MoF and MoPWH noted that preliminary commitments are often not implemented, causing a number of problems with program implementation, including community preparation, changes in orientation, and local government leaders and staff changes.

At the end of the SANIMAS program implementation, an exit strategy is essential. Having a clear exit strategy clarifies who has responsibility post construction. This optimises program benefits and sustainability by defining management for infrastructure operations and maintenance, additional connections, repairs and environmental monitoring.

Benchmarking SANIMAS to the PAMSIMAS program, shown in Table D4, DFAT notes that early coordination of project management, networking with other related ministries and with LG agencies were important factors from the start of PAMSIMAS. The five mandatory PAMSIMAS components are translated into key performance indicators which are assigned to each related ministry.

TABLE D4

Benchmarking of SANIMAS to PAMSIMAS

continued on next page

BENCHMARK PARAMETERS	PAMSIMAS	SANIMAS (ISDB, REGULAR, DAK)
Scope of Work (Program Components)	5 mandatory components: 1. Community empowerment and institutional capacity building for LG and village 2. Improve hygiene behaviour and sanitation services 3. Provision of water supply and sanitation service 4. Incentive grant (HID) 5. Technical assistance and program implementation management	Focus on communal infrastructure with a degree of community-based approach: 1. Promoting inclusion of low-income households 2. Consultancy services 3. Promoting community participation 4. Improving community self-reliance 5. Community capacity building (CB)
Program Guidance	13 program and technical guidelines: 1. Selection of locations at village level 2. Develop community action plan (CAP) 3. Implementation of CAP 4. Environmental and social safeguard 5. Procurement of goods and services at community level 6. Distribution of direct grants (BLM) 7. Management of WSS and CB for sustainability 8. Financial management 9. Development, implementation and monitoring of LG action plan for water and sanitation 10. Procurement of goods and services funded by loan 11. Institutional CB for sustaining community WSS 12. Monitoring, evaluation and reports 13. Grants to regency and community	The most detailed example is from SANIMAS IsDB: 1. Main book: technical guideline 2. Procurement of goods and services 3. Management of grants at community level 4. Construction of infrastructure 5. O&M 6. Gender mainstreaming 7. Implementation of audit for gender mainstreaming No detailed program guidelines to address: – Selection of locations – Community action planning and implementation – Environmental and social safeguards – Managing WSS for sustainability – Financial management for sustainability (program, LG and community) – M&E
	Catalogue of informed choices for water supply and sanitation systems	None
	Standard Operating Procedures	None
Principles	1. Demand responsive 2. Participatory approach 3. Gender equity 4. Poor inclusive 5. Access to all community level 6. Child protection 7. Sustainability 8. Transparency and accountability 9. Based on values	1. Demand responsive 2. Selection of location by community 3. Technological options 4. Community participatory approach 5. Gender equity 6. Sustainability 7. Multi funding 8. Accountability

D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS

1.1 NATIONAL GOVERNMENT *continued*

TABLE D4 *continued*

Benchmarking of SANIMAS to PAMSIMAS

BENCHMARK PARAMETERS	PAMSIMAS	SANIMAS (ISDB, REGULAR, DAK)
Financial Components	Financial component based on 5 mandatory program components: 1. Community empowerment and institutional capacity building of LG and village 2. Improve hygiene behaviour and sanitation service 3. Provision of water supply and sanitation service 4. Incentive grant (HID) 5. Technical assistance and program implementation management	Components based on IsDB appraisal: 1. Block financing for community sanitation infrastructure (open) 2. Institutional CB (carried out and paid for by national government) 3. Consultancy services 4. Project management units 5. Financial audit 6. Start-up workshop, familiarisation visit
Roles and Performance Indicators	MoPWH-Cipta Karya: • Additional sustainable access of improved water supply system for 22.1 million people • Additional sustainable access of improved sanitation system for 14.9 million people	No program performance indicators for SANIMAS Regular or DAK, only for SANIMAS IsDB MoPWH — Cipta Karya: Address health issues resulting from OD and poor sanitation by providing SANIMAS in 13 provinces, across 1,800 locations, using a demand responsive approach
	MoHA-Bangda: Component 1	None
	MoHA-Bina Pemdes: Component 1	None
	MoVT-PPMD: Component 1 & 3	None
	MoH-Kesehatan Masyarakat: Component 2	None
	MPWH-Cipta Karya: Components 3, 4, 5	None
Consultants (Facilitators)	NMC (National Management Consultant)	National Program Management Consultant (NPMC)
	Regional Oversight Management Services (ROMS)	Regional Management Consultant (RPMC)
	Regency Facilitator Team (Faskab)	STFL City Facilitator (TAMK)
	Community Facilitator Team (TFM)	Community Facilitator (TFL)
	Sustainability Facilitators	None
	None	Monitoring and Evaluation Consultants (MEC)
Financial Sources	Loan — World Bank	Loan — IsDB
	Grant — DFAT	No Grant Support
	GoI Budgets: National (APBN), LG (APBD), Village (APBDes) and Community Contributions	GoI Budget Allocations: National (APBN and DAK), LG (APBD) and Community Contributions

See Annex D1 for more details

Sources: PAMSIMAS program and technical guidelines; SANIMAS IsDB, Regular and DAK technical guidelines[4]

1.2 CO-MANAGEMENT AND ACCOUNTABILITY

1.2.1 Local Government

Collaboration Among City/Regency Government Agencies

City/regency government involvement is essential to achieve the national RPJMN targets however, the SANIMAS program design limits any local agency collaboration and related local performance indicators (KPIs). Only MoPWH and MoPWH related technical agencies such as Dinas PU or Perkimta have KPIs.

The responsibility for achieving 100% ODF lies with the local health agencies, and achieving this target necessitates collaboration with SANIMAS. This agency has sanitarians in each sub-district/village who act as community facilitators and promote behaviour change associated with open defecation in all phases of the program. In SANIMAS programs, however, this is the work of the field facilitators, who are on short term contracts and usually not part of the community. This means there is no continuity post construction and the field facilitator's contract is terminated.

The responsibility for ensuring that domestic wastewater discharge standards are met lies with the DLH, who's focus is improving river water quality. However, the primary SANIMAS program target is the number of IPALs and house connections, and their construction is not communicated to other agencies, nor are they required to submit environmental documents. Hence, the DLH receives no information about the IPAL, which they are tasked with monitoring.

[4] MoPWH 2018, 2017, 2020

D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS

1.2 CO-MANAGEMENT AND ACCOUNTABILITY *continued*

A collaboration of local agencies has been implemented in Jawa Barat province for SABERMAS,[5] a SANIMAS replication program with several improved aspects funded by the province. SABERMAS implementation involved Bappeda, Dinas PU, Dinkes, and DLH. Community triggering activities (promotion and community empowerment) were carried out by Dinkes, while DLH monitored the initial and post-construction phases. Financial support from the province to cities/regencies takes the form of financial grants, pursuant to Law 23/2014 and Permendagri 13/2018, and cities/regencies involved were required to provide land for the infrastructure. However, SABERMAS did not involve communities in the implementation phase and instead engaged private sector contractors for construction. The contractors used community labour and were responsible for O&M during the construction guarantee period. Once the guarantee period finished, the city/regency government took over responsibility. Thus there were no KPPs established at SABERMAS locations and no sense of ownership at the community level.

The role of POKJA AMPL or PPAS[6] is typically limited to participation in joint monitoring and evaluation. Some cities/regencies involve POKJA in discussions and coordination meetings on sanitation programs, however POKJA are not actively involved in SANIMAS activities either during the implementation period or post construction.

[5] 1260 locations were planned but only 635 were completed in three years, reportedly mostly due to the land contribution requirement

[6] Water and Sanitation Working Group: A collaboration platform for all relevant ministries/agencies

Co-Management and Asset Ownership

Programs with a community-based approach have significant asset management tasks, especially when it is linked to co-management and accountability. SANIMAS programs face similar challenges in ensuring the ownership of SANIMAS assets, financing operation and maintenance, and optimising the IPAL capacity to ensure sustainability. The challenges of asset ownership begin with land procurement in the pre-construction phase and continue through into the post-construction phase. The interview results show that 75% of cities/regencies stated that SANIMAS facilities are community owned, primarily because the facilities are on land provided by the community. In addition, program grants are distributed directly to community groups (BKM/KSM), while the sole responsibility for SANIMAS asset management lies with the KPP.

There are also challenges with financing SANIMAS asset O&M. Based on the project design, financing of O&M is the responsibility of the community and should be covered by the collection of community fees, agreed upon by the beneficiaries before the handing over of the asset to the KPP. However, a MoPWH report (MoPWH, 2019), summarised in Table D5, shows that only around 12% of KPPs collect fees regularly that are sufficient to cover O&M costs; 43% collect fees but they are not sufficient to cover O&M costs; and 45% do not collect fees regularly. Further, the interviews show that there is no city/regency budget support for O&M.

However, many cities/regencies have shown interest in supporting SANIMAS. The interviews confirmed that 88% of cities/regencies said that allocating budget for major repairs to SANIMAS assets is a possibility, but they would need to understand the details of the regulations and adhere to the local budget mechanisms. Cities/regencies expressed an interest in using village/sub-district funds (Dana Desa/Kelurahan) or transferring the assets to the city/regency. A total of 63% of cities/regencies noted that transferring ownership of SANIMAS assets to the LG was a possibility but clear regulations were essential.

Only 50% of cities/regencies said that allocating funds for optimising IPAL capacity and increasing HCs was a possibility, while the remaining 50% stated that this was impossible. The SANIMAS IsDB technical guidelines outline the in-kind contribution required from the beneficiaries of additional house connections and that the 5% of the budget for implementation of the program would come from the city/regency. However, there is no such mandatory contribution from the city/regency for the post-construction phase. The majority (63%) of cities/

TABLE D5

Capacity of KPP for Fee Collection

INDICATORS	PERCENTAGE (%)
Collecting monthly fee and sufficient for O&M	12%
Collecting monthly fee, but not sufficient for O&M	43%
No collection of monthly fee	45%

Source: Overview of KPP Functionality 2014–2018 (MoPWH, 2019b)

D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS

1.2 CO-MANAGEMENT AND ACCOUNTABILITY *continued*

regencies interviewed said that there is no budget allocation for additional house connections in the post construction phase. The remaining cities/regencies provided budget if requested by the KPP, or in line with city/regency strategic planning targets. The responsibility for additional HC implementation is handed over to the asset owner or initiated by KPPs.

The interview results show that 50% of cities/regencies have never conducted monitoring and evaluation activities, while the other half did, but not on a regular basis. Cities/regencies that have carried out monitoring and evaluation did so during the program implementation phase for completed projects. They noted the inadequate capacity of KPPs to operate and maintain piped systems, control boxes and grease traps. Some cities/regencies relied on the field facilitators (TFLs) to carry out monitoring and evaluation during program implementation, but this support was not possible in the post construction phase because TFL contracts are terminated at the end of the construction phase.

Integration of SANIMAS with City Planning

Implementation of minimum service standards falls short. The interview results show that the planning of the related agencies is not integrated, and there is misalignment between the CSS and city planning, spatial planning and the implementation of SANIMAS programs.

In the interviews, all cities/regencies said that SANIMAS facilities were built in sanitation red zones,[7] but surveys of the IsDB locations found that 71% of systems were not implemented in a sanitation red or yellow zones. IUWASH also emphasised the need for the national government to ensure that city/regency sanitation master plans, including the mapping of sanitation infrastructure locations, were prepared in order to facilitate the implementation of SANIMAS programs.

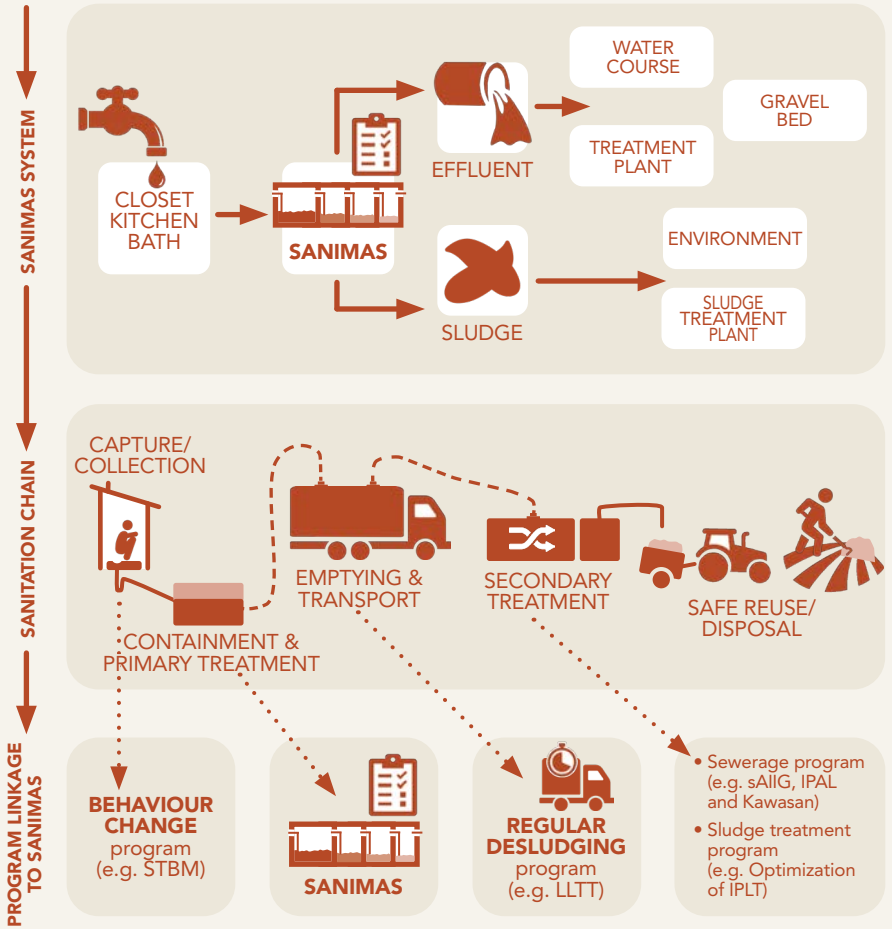
The 2020–2024 RPJMN report (RPJMN 2020-2024: PP No.18/2020) noted that 489 cities/regencies, across 33 provinces, have CSSs, but nine provinces need acceleration to significantly improve their sanitation access. Currently integration of SANIMAS and other related sanitation programs in CSSs is not effective. Cities/regencies said that they have STBM programs for changing community behaviour towards sanitation and for regular LLTT desludging services, however they are generally not aligned with SANIMAS programs or locations. Bappenas, MoH and city/regency governments are aware that they need to link all related programs to SANIMAS programs as shown in Figure D1. This includes integrating SANIMAS into a complete sanitation chain at the city/regency level and connecting SANIMAS to regular/city-wide off-site systems (sAIIG program).

[7] Sanitation high risk areas, based on local (city/regency) criteria. (e.g. flooding area, density)

FIGURE D1

Integration of SANIMAS with Related Sanitation Programs and the Sanitation Chain at City/Regency Level

SANITATION CHAIN OF SANIMAS / PROGRAMS POTENTIALLY LINKED TO SANIMAS



D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS

1.2 CO-MANAGEMENT AND ACCOUNTABILITY *continued*

1.2.2 Communities and KPP

Community Development

The main purpose of a community-based program is to ensure that interventions enable its beneficiaries to be more independent, realise their own potential, and solve their own problems. UNICEF noted the importance of using the right methods to develop the mechanism for community capacity building. In the implementation, there is a need to map out the tasks that can be carried out by the community and then become their responsibility; and tasks that remain part of local government responsibilities.

The IsDB survey found that 94% of interviewed beneficiaries felt they benefitted from the SANIMAS program. However only 23% of FGD participants interviewed were able to mention at least 3 out of 5 main advantages of connecting their households to SANIMAS facilities. In addition, only 24% of interviewed FGD participants were able to mention at least 4 out of 6 important household level O&M practices related to SANIMAS infrastructure. This indicates that community awareness of SANIMAS operations is low and requires more continuous investment.

In SANIMAS program implementation, the national government has field facilitators (TFLs) who are recruited by, and report to the provincial level project implementation units (Satker MoPWH), to support and build community capacity to actively participate in each phase of the program. However, the recruitment of SANIMAS TFLs at the provincial level (SANIMAS IsDB) and city/regency level (SANIMAS DAK) must follow local government budget availability and cycles. Several of the provinces interviewed explained that the community development process stops when the TFLs are demobilised. This situation is a key challenge faced by community-based programs tied to government budget availability and cycles.

Creation of Community Groups and Capacity Building

The creation of community groups (KSM/KPP/BKM/LKM) and their capacity building are a fundamental part of ensuring the sustainability of a community-based program. The IsDB SANIMAS program utilises existing community groups that are notary certified, at the sub-district/village level (BKM/LKM), as the point of fund distribution. However, members of the KPP, which are expected to be the foundation of program sustainability are appointed at community meetings (SANIMAS IsDB technical guidelines, 2019), at which there is insufficient participation and limited deliberation. The IsDB survey results show that KPPs exist at 79% of investigated sites. However, 97% of interviewed KPPs have no MoU with local government for co-management of the infrastructure. In addition, 38% of the KPPs do not have any kind of legal registration and 95% of KPPs have not received adequate training. Further, in 8% of investigated communities, marginalised group members were not encouraged to join KPP.

The aspects of participation and contribution, cohesiveness, collaboration, and inclusiveness (as explained by DFAT) are not fulfilled in all SANIMAS programs. As a result, the capacity of the KPPs is generally very weak, and they do not function as expected. In addition, the cities/regencies said that the capacity building activities for the KPP were handed over entirely to the TFL during the project implementation period. Only 25% of cities/regencies implemented capacity building for communities and none of the cities/regencies has an agreement or MoU with KPP to support the O&M of the SANIMAS infrastructure.

The main purpose of a community-based program is to ensure that interventions enable its beneficiaries to be more independent, realise their own potential, and solve their own problems.

IUWASH facilitates KPPs in Gresik, Makassar to have well-maintained financial management for sustainable SANIMAS O&M and encourages city governments to give more attention to KPPs. IUWASH assists Gresik city government to cooperate with CSR programs to finance additional HCs to existing SANIMAS facilities. Meanwhile, SNV facilitates Tasikmalaya regency to empower the KPPs through supporting the creation of an AKSANSI[8] branch.

[8] Association for community groups created under SANIMAS programs: https://aksansi.org/

D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS *continued*

1.3 REGULATORY ARRANGEMENTS

Under the provisions of Law 23/2014, the SANIMAS program is devolved from national to local government, and therefore program funding comes from the national government (APBN). The disbursement of funds directly to community bank accounts (KSM/BKM/LKM) is based on MoF regulation PMK 173/2016. Because SANIMAS is designed as direct community assistance the community is expected to be responsible for the SANIMAS infrastructure.

The MoF noted that the on-granting scheme (PMK No.224/PMK.07/2017) is an option to increase the financial capacity of city/regency governments, but in practice the scheme requires a strong commitment from cities/regencies. Therefore, the readiness criteria and the selection of local governments for pre-financing need to take into account the fiscal capacity of each city/regency. The MoF has introduced a punishment and reward system to be implemented for different types of programs using the on-granting scheme in order to encourage city/regency governments to perform well.

DFAT shared an example of an on-granting mechanism from PAMSIMAS initiating a collaborative funding platform called 'Village Incentive Grant' (*Hibah Insentif Desa*/HID) with a 4:1 program financing agreement. This means that the national government provides an investment grant for four villages and the regency provides a grant for one village from its local budget. In the context of SANIMAS IsDB program requirements, the interviews found a commitment from local governments to provide implementation support funds. For example, the provincial level can contribute 1% of the total grant and cities/regencies can contribute 5%. However, no agency provided any budget for post construction support, such as O&M to ensure the sustainability of the sanitation facilities.

Regulatory support from the national government that defines the scope of local government authority and flexibility for program financing needs attention. This type of regulatory support will ensure the availability of sufficient funds for O&M. ADB confirmed that the main issue is with O&M, particularly when a community is unable to deal with damage to infrastructure and the cost of repairs.

The idea of asset transfer from communities to local governments was brought up in interviews, but it is necessary to ensure clear regulation covering such mechanisms. Regulation is needed to ensure the asset transfer process does not harm any parties involved, especially when the sanitation facilities are built on private land owned by a community. IUWASH concluded that community-based programs are needed, but a government presence is needed because there are many problems that communities cannot solve by themselves, such as major infrastructure repairs.

Regulation is needed to ensure the asset transfer process does not harm any parties involved.

SANIMAS evaluation FGD with Kabupaten OKI officials.

D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS *continued*

1.4 PRIVATE SECTOR

The survey suggests that system performance and sustainability are key issues. Tapping the private sector may provide cost, innovation, management and ultimately sustainability benefits. This section reviews the current involvement of the private sector in SANIMAS and small-scale sanitation systems (SSS); current private sector resources; and a summary of what the private sector could do to increase the sustainability of systems and how.

Current SANIMAS System and Private Sector Involvement
SANIMAS is a community-based model and all SANIMAS projects have similar service delivery methods at each phase of the service delivery. Table D6 shows each phase of the SANIMAS sanitation service delivery that generally applies to all communities and installations, regardless of the source of capital. The table delineates the activities for each stage, many of which could be supported by the private sector. Please note that here SPALD-T refers to the SANIMAS program change in 2016 that included a new AF/IPAL design, referred to in the text and the SPALD-T AF/IPAL design. SPALD-S refers to on-site sanitation options, such as septic tanks.

IPLT Example. As summarised in Table D6, there is limited private sector involvement in any phase of the current SANIMAS program. Desludging service, which is not part of the SANIMAS program, does have private sector actors that collect, transport and dispose of sludge from the SSS units; but usually they exist only when there is no service provided by city/regency government (PDPAL). Some PDPALs own and operate IPLTs (sludge treatment facilities); usually run as a state owned enterprises (SOEs). Generally, the PDPAL's desludging service is not full cost recovery and correspondingly the desludging fees are much lower than private sector desludging fees.

TABLE D6
SANIMAS Private Sector (PS) Participation (2004 to 2020)

PHASE	MANAGEMENT	PRIVATE SECTOR (PS) USE
PLANNING	• National Government — plan, financing • Local Government • Community	• Consulting companies for loan TAs • Limited; hired TFLs • TFLs assisted (trained by MoPWH)
DESIGNS	• ABR/AF; +BG — BORDA (NGO) • ABR+AF — MoPWH • SPALD-T AF/IPAL • Network — MoPWH • MCK — SN103-2399-2002	• Competitive PS small WWTP • None — SPALD-T AF/IPAL • None • PS Basins — have national standards and certifications
CONSTRUCTION	• Grant from MoPW to LG to with oversight by MoPWH audited by BPKP (National government internal auditor)	• Some private contractors for construction (SABERMAS); TFL (Field facilitator) assisted KSM (community for construction) • KSM constructed the unit • Inspection by TFL and BKM (a community group at Village level), no certification
O&M	• KPP	• None
MONITORING	• KPP	• None
SLUDGE COLLECTION TREATMENT	• Government-run IPLT — by UPTD/PDPAL • KPP manages timing • Vacuum truck — pumping and transport	• Many PS vacuum trucks; survey shows some SANIMAS sites have IPLT access, usually if over 15km
FEE COLLECTION	• KPP	• None

D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS

1.4 PRIVATE SECTOR *continued*

Lessons from the SANIMAS Studies About the Private Sector. Several common themes were identified across the reviews and evaluations of SANIMAS programs. Many of the evaluations specifically identified service delivery areas that could improve by engaging the private sector. Table D7 lists examples of the private sector delivering sanitation services from Indonesia and from other Asian countries.

FIGURE D2
Example PreFab Septic Tank/IPAL

TABLE D7
Private Sector (PS) Takeaways

FINDINGS AREA	SPECIFIC EXAMPLE	RELEVANT PS TAKEAWAY
INDONESIA EXAMPLES		
World Bank	Suggest the use of private sector for construction, commissioning and operation	• Commissioning would ensure operations by using performance contract • O&M and effluent quality tied to contract
ADB[9]	The design of facilities should not necessarily involve communities but be left to experts (i.e., qualified consultants)	• PS offers innovation, cost competition and variety to meet effluent standards
DAK Regular	Prefab individual septic tanks; some IPAL	• Indonesia has a well-developed market, demand, suppliers and certifications
IPLT	PS vacuum trucks service much of the market	• Demand drives PS
INTERNATIONAL CASE STUDIES		
India	O&M fails due to lack of qualified personnel, limited supervision, weak documentation and poor record of repairs	• PS performance contracting allows some level of oversight and performance
Malaysia	Use utility model with PS suppliers	• Utility manages data, resources and financing — contracting out some services
Japan	Standardisation brought reliability and sustainability from PS suppliers	• Supervision, inspection and monitoring are all expensive for the government and this example shows that by certifications and standards, there is more reliability

[9] ADB, 2017 — PCR

D ANALYSIS AND DISCUSSION

1 GOVERNANCE ARRANGEMENTS

1.4 PRIVATE SECTOR *continued*

What the Private Sector Could Do

The survey shows that there are several aspects that could use strengthening such as construction and O&M. Table D7 (page 85) lists examples of how the private sector met demand in this sector. Table D8 highlights several areas in which the private sector offers potential strengthening of the construction and O&M service delivery.

The survey shows that there are several aspects that could use strengthening such as construction and O&M.

TABLE D8

Potential Private Sector Use for SSS Advantages and Examples

PRIVATE SECTOR USE	ADVANTAGES AND METHODS
Design	By allowing the market to respond to performance requirements (effluent standards) gain innovation and cost competition
Production	Prefab has higher costs but more guaranteed service; having multiple suppliers gives innovations; robust certification helps reliability and sustainability
Construction, Hand-Over	Performance contracts with longer term handover (>1 year); performance contracts have effluent standards; list of certified consultants, engineers and constructors pre-approved
O&M	Long term O&M contracts, such as DBO or BOT, on a regional basis may offer cost savings and reliability; maybe use sensors and indicators to gauge performance
Climate Adaptation	Consider contracting point system that encourages adaptation
Climate Mitigation	Consider contracting point system for energy and water savings

SANIMAS evaluation FGD with Kabupaten Singkawang officials.

D ANALYSIS AND DISCUSSION

2 TECHNOLOGY

The review and findings show that technology plays an important role in system performance and sustainability. The technologies used in all the SANIMAS programs and specifically sampled representative technologies constructed since 2015 under the IsDB SANIMAS program were reviewed. This technology discussion looks at the findings from the other SANIMAS programs and more specifically the current SPALD-T AF/IPAL (Figure D3) likely to be used in the next phase; the factors that affect technology performance; appropriate technology options for the current SANIMAS program design; and considerations when planning a decentralised network. Operations and maintenance (O&M) and financing, discussed in the next section, are extremely important to system sustainability and are influenced by the technology selection.

Onsite surveys indicate that over 50% of the SANIMAS systems show some level of long- and short-term unsustainability. Although this section looks at the reasons for technology under performance and methods to improve sustainability, there are systems that work very well. The common threads of better performance generally include good governance, O&M and financing. Installing over 10,000 units using a community-based model is remarkable but also difficult. The pace posed risks for construction and the handover as shown by a previous evaluation (ISF, 2017) indicating that as the units per year grew, treatment performance dropped correspondingly (Figure D4). The same evaluation estimated that many of the units were oversized and thus when reporting usage, the units appeared underutilised. Indeed, the site surveys showed more than 50% are underutilised; and 21% are below 50% utilisation.

FIGURE D3

Example of SPALD-T AF/IPAL Design (MoPWH)

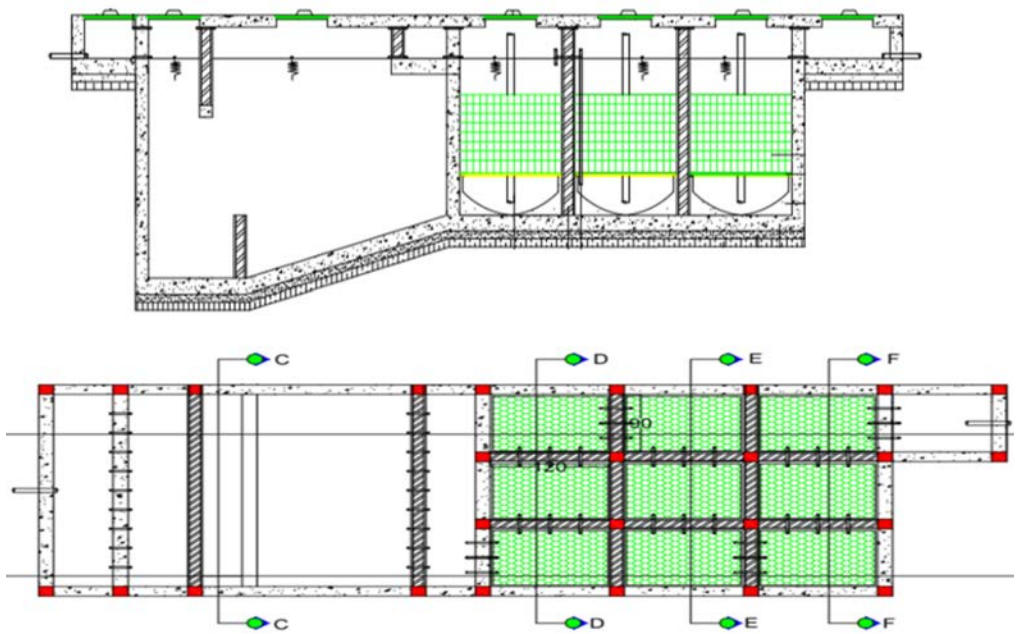
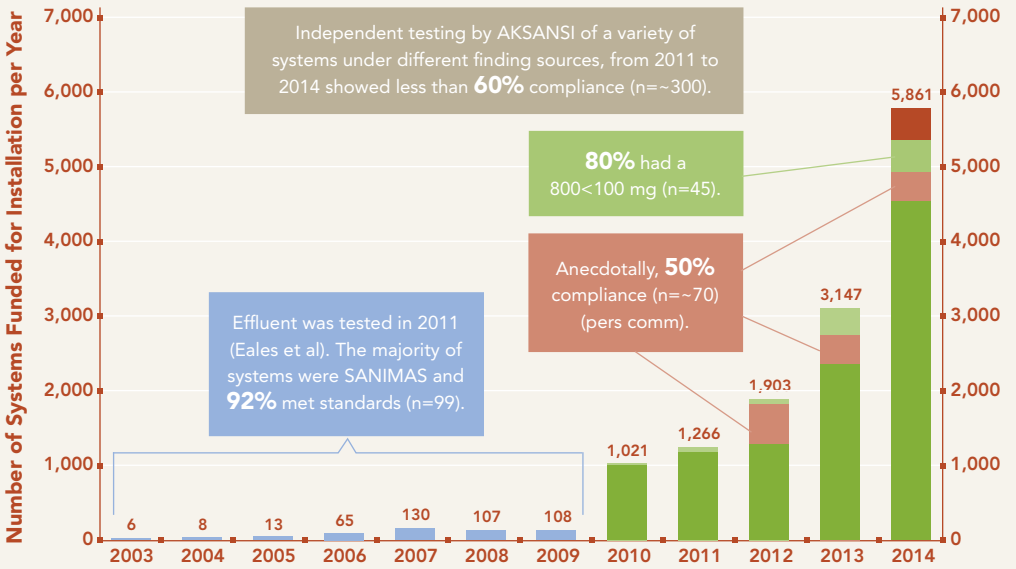


FIGURE D4 (ISF 2017)

Available Data Suggests Declining Technical Performance is Linked to Rapid Scale Up and Weaker Capacity Building



D ANALYSIS AND DISCUSSION

2 TECHNOLOGY *continued*

2.1 TECHNOLOGY PERFORMANCE SUMMARY

Figure D5 shows the development of the SANIMAS technologies since inception in 2003. ABRs and MCK Biogas were the original basis and they evolved to mandatory AF to each ABR; standalone MCKs and then to the SPALD-T AF/IPAL design in 2016 (Annex D2 contains a list of monitored MCK and MCK Biogas sites).

All of the SANIMAS technologies were reviewed however, and some of those those built between 2014 and 2019 under the IsDB program were inspected and sampled. The design target was from 50 to 300 single residences or households (HHs), however, the most common size for IsDB financed sites is 50 to 100, with 52 HHs the average for the IsDB financed sites. Table D9 highlights the combined comments from the review and survey findings regarding each SANIMAS technology.

TABLE D9

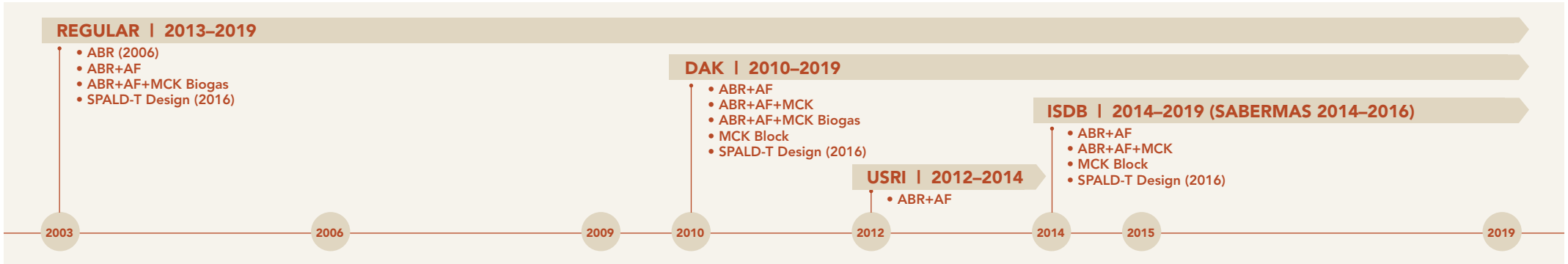
SANIMAS Installed Technologies and Technology Performance Comments

IPAL AND/OR TOILET UNIT	SELECTED RESULTS FROM SANIMAS PROGRAMS
MCK single (PTP[10] 2 toilets) and Block (many toilets)	In all programs but lower numbers — DAK still installing MCKs. Most failures: 1. no longer needed (have in-house toilets); 2. not maintained; 3. not sex segregated
MCK Biogas (+ABR)	Primarily installed before 2012, dropped because of operational difficulties and lack of biogas use
S+ABR	Initially all SANIMAS were ABR. Generally (from review) the ABRs have the best performance but still do not meet the new discharge standards (2016)
ABR+Biogas	These are limited to the early models and although a good idea, they complicated the operation and were stopped
S+ABR + AF	This was the standard unit of most SANIMAS sites until 2016; SLBM program established AF to follow ABR. Met discharge standards prior to 2016; 30% of IsDB total units have this configuration.
(SPALD-T AF/IPAL design)	All SANIMAS units after 2016 are SPALD-T AF/IPAL; MoPWH design

[10] *Petunjuk Teknis Pelaksanaan* (Technical Guidelines)

FIGURE D5

Timeline of SANIMAS Technologies



D ANALYSIS AND DISCUSSION

2 TECHNOLOGY

2.1 TECHNOLOGY PERFORMANCE SUMMARY *continued*

SPALD-T Performance

The SPALD-T IPAL design is detailed in the IsDB SANIMAS technical guidelines (MoPWH, 2018) and consists of a settler (HRT 12h) followed by nine to twelve AF chambers (HRT 12h). The findings show that the reactors sizes vary widely from the design guidelines (Table D10), and specifically:

- The settler dimensions are extremely large and in the range of large septic tanks. Settlers followed by further treatment steps are typically sized much smaller
- AFs influent should be pre-treated wastewater; in the SPALD-T design, the AF pre-treatment consists only of an oversized settler (just settling some solids)
- The AF filter void space is unknown, but from the site visits, the resulting design HRTs are likely below the existing guidelines
- Resulting flow velocities within the AF filter void space are much larger than suggested by existing guidelines

Although this short review and a few site visits is not a complete technical performance evaluation of the SPALD-T design, Table D11 summarises typical ranges for effluent concentrations measured at reactors operating in tropical climates and sized following state-of-the-art design guidelines. ABRs always operate after a settler; and AFs always operate after a settler and ABR. This acknowledges that effluent concentrations depend on variables such as temperature, loading rates, feed concentration, peak flows, stormwater infiltration, and the amount of fats and grease (Annex D4 contains accepted design standards for settlers and AFs).

TABLE D10

PTP[11] SPALD-T Design Parameters

	HRT SETTLER* hours	PRE-TREATMENT BEFORE AF	HRT AF** hours	HRT AF OF FILTER VOID SPACE*** hours	FLOW VELOCITY IN AF MEDIA*** hours
Design value suggested by PTP	12	Settler	12	None	5–9
Design value of implemented systems	35–65	Settler	20–40	6–10	5–9
State-of-the-art design guidelines	4–8	Settler & ABR	None	10–24	<1.5

* calculated with complete settler volume not taking into account volume reduction through sludge accumulation
** calculated without considering volume reduction through AF media (plastic bottles)
*** assuming 50% void space and Peak Flow Factor of 4 (see Annex D3)

TABLE D11

Typical Effluent Concentration Ranges of Similar DEWATS[12]

	BIOGAS SETTLER*	SETTLER	ABR	AF
COD (mg/L)	300–1,000	400–700	200–350	80–150
BOD_5 (mg/L)	150–500	200–350	100–175	25–75
NH_4-N (mg/L)	50–80	50–80	50–80	50–80
PO_4-P (mg/L)	5–20	5–20	5–20	5–20
pH	6 –7.5	6–7.5	6–7.5	6–7.5
Coliform (CFU/100mL)	10^7–10^9	n.a.	10^6	10^6

* Higher effluent concentrations compared to conventional settler, as biogas settlers are typically used for treatment of higher strength wastewater
n.a. = not available

[11] *Petunjuk Teknis Pelaksanaan* (Technical Guidelines)

[12] Ranges based on Foxon, 2009; Reynaud and Buckley, 2015; Laramee et al., 2018; Kerstens et al., 2012; Bugey et al., 2011

D ANALYSIS AND DISCUSSION

2 TECHNOLOGY

2.1 TECHNOLOGY PERFORMANCE SUMMARY *continued*

Stormwater Intrusion

The site visits also showed that rainwater intrusion in sewer lines and in the SPALD-T treatment reactors occurs often, as documented in many decentralised wastewater treatment systems in Indonesia (Reynaud, 2015) and India (TNS India, 2019). Heavy rain within 24 hours of the site sampling at the nearly 50 sites caused over 30% of sampled plant effluents to be diluted, probably due to rainwater infiltration. In-depth investigations over five consecutive days also showed rainwater infiltration and dilution. The settler sludge volume indicated rates that are about ten times lower than reported in existing design guidelines, likely due to stormwater entering manholes. Another issue that may contribute to infiltration, and a safety concern, is the top slab thickness. The site surveys showed a large variance in the top slab thickness (see Figure D6 that shows the thickness from the sites visited). The main reason for the variance is that the PTP design does not specify top slab thickness.

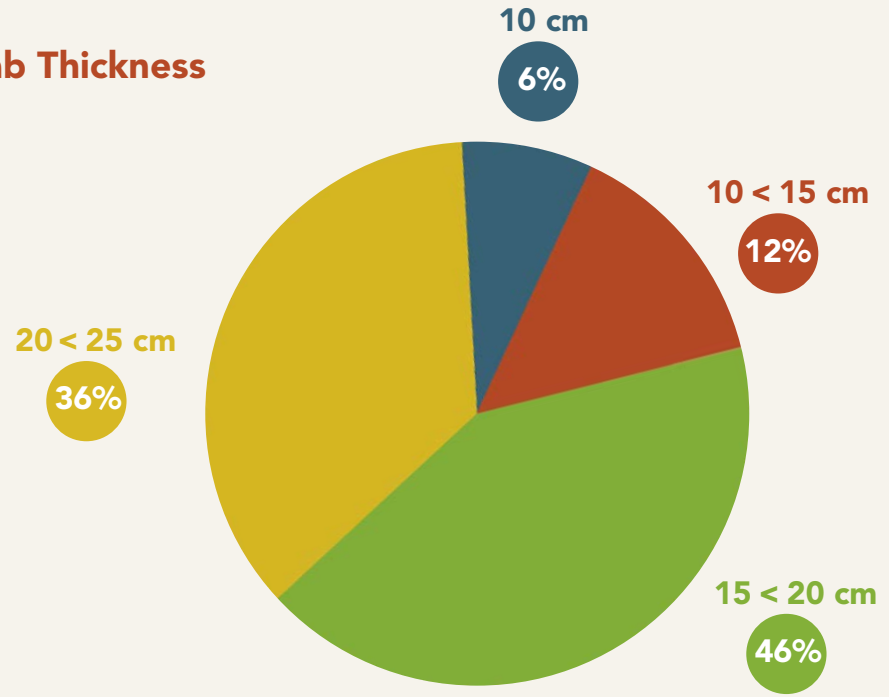
Technology Design Options

The findings show that there are many reasons for system underperformance or failure. This section looks only at the technology performance; however, ancillary factors that affect technology design, cost and sustainability are cited. The main finding showed that 26% of the IPALs were showing system failure and another 55% showed potential for eventual failure; 44% of the IPALs had signs of blockages; and that 37% of the IPALs were under or overloaded. Table D12 (page 91) presents the findings in more detail and shows technology design and upgrade options.

Another issue that may contribute to infiltration, and a safety concern, is the top slab thickness.

FIGURE D6

IsDB Top Slab Thickness



D ANALYSIS AND DISCUSSION

2 TECHNOLOGY

2.1 TECHNOLOGY PERFORMANCE SUMMARY *continued*

TABLE D12

Selected Key Issues Affecting IPAL Technology Performance (from IsDB Findings)

TECHNOLOGY	KEY ISSUE(S) TO RESOLVE	ARE THERE TECHNOLOGY (T) OR SYSTEM DESIGN (D) OPTIONS?
NETWORK	• 37% of treatment systems under or over-loaded • Non-connection; some choice, some technical (i.e. elevation) • Pipe quality and size are appropriate; connections failing low flows — affects ABR biology; odor in network • Black water/high solids and clogs, solid waste, no grey water • SPALD-T design of control tank every 12m is good, just not practised uniformly • Poor construction causing infiltration to sewer lines • Over 70 existing units in flat area and high-water table, for 0.5% slope for gravity flow • Flood area needs more resiliency, climate proofing	• **D** — Connection lower than design; consider mandatory connections (already free to connect); investigate Indonesia specific PEs and factors influencing these (very little evidence available) • **D** — Construction issue; consider flex pipe, standardised connectors (cost more) • **D** — Stop grey water, disconnection and using old septic tank • **D** — Need inspection and post construction certification; prefab control tank • **D** — Need to stop HHs connecting gutters to sewer • **D** — Develop design adaptations that limit flow velocities inside reactors • **D** — Requires more oversight during construction • **D** — Requires investigations into adequate sewer design solutions • **T** — Consider more pump/lift stations, possibly with solar power (so far, bad experience with pumps)
HOUSEHOLD GREASE TRAPS	• Too much grease network/units; HH grease traps not cleaned	• **T** — Consider supplying easy to clean grease traps
ABR + AF	• Unable to meet new discharge standards • Infrequent (none) desludging causes solids to build up • Meets pre-2016 effluent regs but not current	• **T** — To meet standard requires aeration and disinfection technologies to AB • **T** — Control effluent flow (i.e. leaping weir) and when too high, bypass • **D** — Mandatory desludging • **D** — AF design needs to include a desludging shaft • **T** — Desludging difficult when IPTL>30km; consider local drying beds and small (hand) transport tank/ vehicles; or LG has contract with yearly schedule
AS	• Very few of these units installed; high maintenance has operator issues	• **D** — Need to design in to meet new standards • **T** — Many technology options explored further in next discussion
SPALD-T IPAL Design (From review, 56 site visits and in-depth sampling at 3 sites)	• Settler + AF has routine clogging issues • Reactor volume varies widely • Settlers too large — size of septic tank instead of IPAL • AF void space causes lower performance than design HRT; flood velocities in AF higher than guidelines • Desludging AF requires removing AF fixed-bed media • Unable to meet 2016 discharge standard • Construction is not uniform — some top slabs were 3–20 cm • Drawings unavailable • Poor construction causing infiltration, causing failure, in over 50% of units; often from covers not watertight (39% not watertight tested) • Climate — 67% no threats; 24% flooding; 8% sea level rise	• **D** — AF chambers too small; media type caused head loss • **D** — PTP 3 design calculations — 50, 75, 100 HHs — consider more sizing options, or larger basins and placed in series; prefab is better but more expensive, (discussion follows about PS providing product) • **D** — AF void space needs adjusting to meet HRT design • **D** — Drawings need to be institutionalised, transparent and available • **D** — Need desludging point/port/area in AF • **T** — 2016 Regulations: change some basins to sludge digesters and flow equalization, need to install a blower in digester; consider inserts • **T** — ABR before AF (improve MVLSS, reduce AF loading), smaller settler • **T** — Increase AF media volume — balance surface area and void space • **T** — Reduce number and increase size of AF basins to reduce velocity • **T** — Weather proofing; in flood and seaside areas using climate proofing

D ANALYSIS AND DISCUSSION

2 TECHNOLOGY

2.1 TECHNOLOGY PERFORMANCE SUMMARY *continued*

Conclusion

On the surface it appears that the technology is unsatisfactory; however, after reviewing both the ABR+AF and the SPALD-T IPAL configurations, some of the system failures originate from ancillary (sizing, construction, O&M) issues and not a result of the technology choice. The most prevalent issue with ABR + AF IPALs is desludging and not being able to meet the 2016 regulations without expensive modifications. The SPALD-T IPAL design (MoPWH, 2018) differs significantly from existing state-of-the-art designs. Another issue is the sizing since both the SSS and the MCK are underutilised. The ISF study, (ISF, 2016a) for BAPPENAS also flagged the reactor size and underutilisation (Figure D8). The SSS IPALs and networks were likely sized correctly but just lack the number of expected HH connections. The MCK (toilets) underutilization in part is due to HHs installing toilets, and maintenance issues in some locations. The original design was likely a temporary solution. Table D13 (page 93) summarises the SPALD-T IPAL design, since that is the current design used for SANIMAS.

FIGURE D7

ABR+AF—DEWATS (BORDA, 2020)

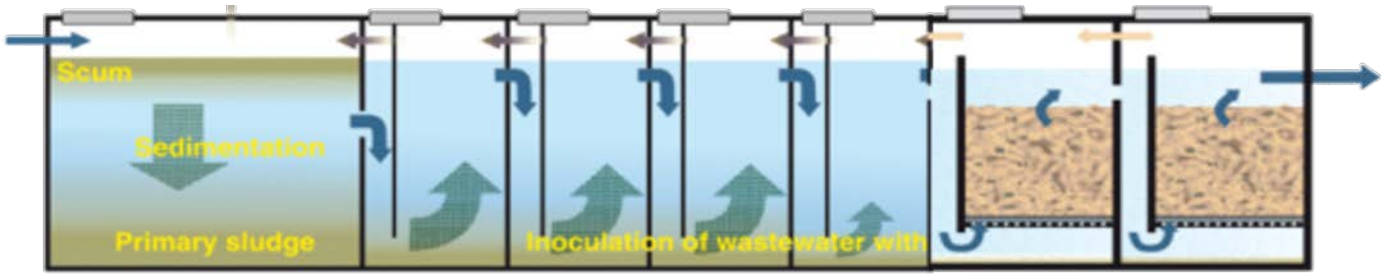
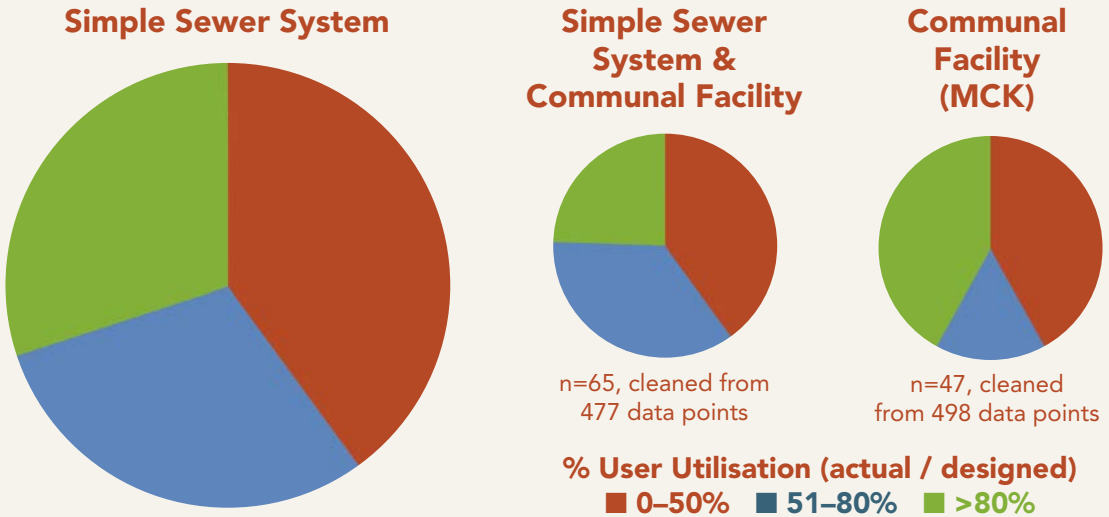


FIGURE D8

SSS and MCK Underutilised Percentages (ISF 2016a)



Source: USDAP NAWASIS

D ANALYSIS AND DISCUSSION

2 TECHNOLOGY

2.1 TECHNOLOGY PERFORMANCE SUMMARY *continued*

Toilets

Public toilet blocks were identified early on in SANIMAS (2004) as a method for increasing access to sanitation and reducing open defection, the primary goal of the program. These were a good investment given the open defecation and access to sanitation data. The MCKs include toilet blocks and combination with IPAL and MCK. Initially some were designed to collect biogas (with the exception of some with the IPAL combination) and the gas was to be collected and used by the community. Table D14 shows the various configurations and types of toilets. Generally, the toilet technology and biogas worked. However, many are now unsustainable or not in use.

The site surveys show that the MCK scored quite well with safe access (87% good) and community sanitation option (97% good). However, like the previous SANIMAS programs, there were functional problems with the MCK, with 70% poor and 10% concern. Thus, 80% of the MCKs may not be sustainable. Again, this does not mean the MCK effort was a failure but more a temporary answer to open defecation. Overwhelming evidence (WSP, 2012) shows that once HHs have water supply, they shortly thereafter acquire a toilet, either in or just outside the dwelling. Over 80% of the survey respondents had piped water (and over 98% have access to the national (PLN) electricity grid). The findings showed that many were simply not used due to a variety factors as highlighted in Table D15 (page 94).

TABLE D13

SPALD-T AF/IPAL Design Concerns

ISSUE OBSERVED	PROCESS-THEORETICAL EXPLANATION	EVIDENCE PROVIDED IN THIS STUDY
Storm water intrusion	Affects treatment through dilution effect and solid washout	Multiple cases observed by research team and reported by users
Large settler	No treatment beyond certain retention time — wasted reactor volume	Measurement of reactor dimension
Direct treatment of settler effluent through AF	Danger of blockage in AF	Blockages and backflow observed by research team and reported by users
Small, single AF chamber area	Danger of blockage in AF	Blockages and backflow observed by research team and reported by users
	Dilution effect and high flow velocities within reactor lead to biomass washout and reduced treatment	Concentration measurements are inconclusive because of dilution through rainwater
Short overall HRT within AF growth media	Reduced contact time of wastewater with anaerobic micro-organisms and therefore reduced treatment	Concentration measurements are inconclusive because of dilution through rainwater
Unknown AF growth media characteristics	Difficulty to correctly dimension AF	Missing definition of specific surface area and void space in design procedure

TABLE D14

MCK Configurations and Installations

(<2016, source AKSANSI survey only)

UNITS	TOTAL	BIOGAS
IPAL Komunal/SSS	819	19
IPAL MCK/CSC	1230	415
IPAL Mix	291	76
Prefab Komunal/SSS	452	12
Prefab MCK/CSC	791	305
Prefab Hybrid	135	10

D ANALYSIS AND DISCUSSION

2 TECHNOLOGY

2.1 TECHNOLOGY PERFORMANCE SUMMARY *continued*

In conclusion, the toilets were an excellent idea for reducing open defecation but are not needed now in most of the communities. The biogas was also an excellent idea for resource recovery, climate mitigation and an energy source for remote communities. Given the performance, lack of biogas demand and the added cost, biogas is not a preferred option for many of the communities. There remains a need for public toilets, however specific criteria for the best applications are needed.

TABLE D15

Selected Key Issues Affecting MCK Technology Performance (from IsDB Findings)

TECHNOLOGY	KEY ISSUE(S) TO RESOLVE	ARE THERE TECHNOLOGY (T) OR SYSTEM DESIGN (D) OPTIONS?
MCK* MCK Biogas	MCKs not maintained well Demographics change and no longer needed (34%) Disabled access poor (19%) Biogas not used, added investment has very low return	**D** — Design at IPAL and standalone ok but need operator O&M **D** — Toilet still a good reduction in BOD and OD method, put in high use areas **D** — Include accessible pathways and accessible toilets, based on MoPWH accessibility regulations[13] **T** — Consider packaged toilets or plants for high use areas that can be moved once connections established; for remote mines, ports and transient groups **T** — Biogas a good idea but needs demand

* Only the toilet systems were reviewed, not the communal areas, baths and playgrounds

[13] No. 14/PRT/M/2017, building accessibility requirements

There remains a need for public toilets, however specific criteria for the best applications are needed.

SSS infrastructure. Sumatera Selatan, Kabupaten OKI, KPP Rajawali

D ANALYSIS AND DISCUSSION

2 TECHNOLOGY *continued*

2.2 APPROPRIATE TECHNOLOGY OPTIONS

SANIMAS planning in Indonesia focuses on a SSS approach for most urban areas, with only densely populated urban centres having centralised plants planned or already built (e.g. in Solo where the PDAM manages the WWTP and IPLT). An enhanced septic design with an ABR plus AF was selected early on due to advantages that include lower initial capital outlay and lower O&M. The technology selection fits with the SANIMAS decentralised approach and remains the focus of the following analysis.

There are numerous analyses regarding selecting and optimising SSS technologies and systems. Annex D4 contains an analysis of technology options, their pros and cons, and life cycle costs; and some of these studies are referenced in the following discussion. However, the main focus of this discussion is how to get the existing SANIMAS technologies and systems to perform better.

Factors that Affect Technology Performance

The factors that affect technology performance and that were used in the findings are highlighted above. In addition to the reactor treatment of influent wastewater, other underlying factors identified in the findings include construction, placement, network, regular O&M, desludging, cost, connections, resiliency and sustainability. This discussion focuses on sustainable technology options based on a review of reactor performance and the technologies employed. Many of the SANIMAS reviews and evaluations provide data about performance but lack sufficient detail to assist in the technology analysis.

Technology options and selection are defined by several factors that differ by country, city and

TABLE D16

Technology Design Implications on SPALD-T IPAL Design (to meet 2016 effluent standards)

SPALD-T Technology to Indonesia 2020–2025	TECHNOLOGY DESIGN IMPLICATIONS (Annex D4 contains menu of innovative technologies)	PROS/CONS (See Annex D4 for full analysis of each technology)
Effluent Quality New discharge standards (2016); Concentrations of BOD, N, P, TSS important for treatment selection and sludge options — SPALD-T design using only HRT	New Units (costing below, description in Annex D6) All have higher O&M (see below) SPALD-T upgrade — redesign chambers and sizes; add digester; and final clarifier MMBR or Fixed Film (IFAS) configuration; with anoxic zone for N removal + hopper clarifier MMBR or IFAS packaged plants SBR MBR HSSF, FWS, VF Wetlands Upgrades to existing SPALD-T Convert basin to aerobic digester, open basin, clarifier Packaged IFAS Insert — see FAST (Figure D9 page 93) Upgrades to ABR+AF Aeration Need to add end basin or convert to one to aerobic digestion with blower Final clarifier Disinfection — needed by all the above units to meet coliform standards Chlorination Ozone Heat — screw or solar Sand filtration	Upgrading the SPALD-T is relatively easy but added O&M with blower[14] IFAS and MMBR similar to SPALD-T — some low energy Packaged plants more expensive but have less risk SBR — simple, low cost, scalable, requires operator MBR — high CAPEX and OPEX Constructed wetlands/ponds — best method but no land Blower and basin enlargement add cost More CAPEX, same OPEX, less risk Easier to upgrade than SPALD-T Probably solid settling issue; clarifier needed Adds chemical to surface water/dosing has risk Ozone very difficult Heat adds energy and basin Need space and proper sizing
CAPEX SPALD-T sizing 50, 75 100 HHs OPEX Certifications Standards	Need proper sizing with expansion capable; packaged plants; private sector contracting; commissioning included Standardised technology, private sector operator, prefab units, effluent sensors (flow + DO) Good; needs to be better applied; may need new ones; use ISO[15] 30500	Variable sizes add design cost but lower CAPEX and OPEX; package plants add CAPEX but lower OPEX Higher initial cost but life cycle cost lower Not much additional effort for certifications; additional effort for application

[14] 87% of the IsDB sites surveyed have electricity

[15] RISO 22094:2017, ISO 30500:2018 and ISO/NP 23457:2018

D ANALYSIS AND DISCUSSION

2 TECHNOLOGY

2.2 APPROPRIATE TECHNOLOGY OPTIONS *continued*

community. The main criteria for selection of sustainable, SSS collection, conveyance and treatment technologies in Indonesia include:

- Meets regulatory discharge requirements
- Is cost-effective — both CAPEX (including land) and OPEX
- O&M is minimal
- Sustainable with proven shelf life
- Resilient floods, drought (often climate adaptation)
- Has customer satisfaction (sometimes climate mitigation goals in using pumping)

The survey found that there are several areas in which the IPAL performed well and some areas where the technology design may under perform. The aim was to recognise what works; what technology modifications might be considered to upgrade existing units to meet effluent standards; and what the technology options are going forward. Table D12 (page 91) highlighted technology performance and design shortfalls identified in the survey. The suggested system and technology design options in the table were for those systems that either showed system failure or were not sustainable. Table D16 (page 95) shows additional technology considerations for further use of the SPALD-T IPAL design.

Upgrading Existing IPALs

Table D16 lists the summary of the installed SANIMAS technologies (see Figure 9), what may be needed to get them to meet the new discharge standards (2016), and what technologies to consider for upgrading existing units to the pre-2016 effluent standards. The 2016 effluent standards (Annex D5 — P.68/MENLHK-

TABLE D17

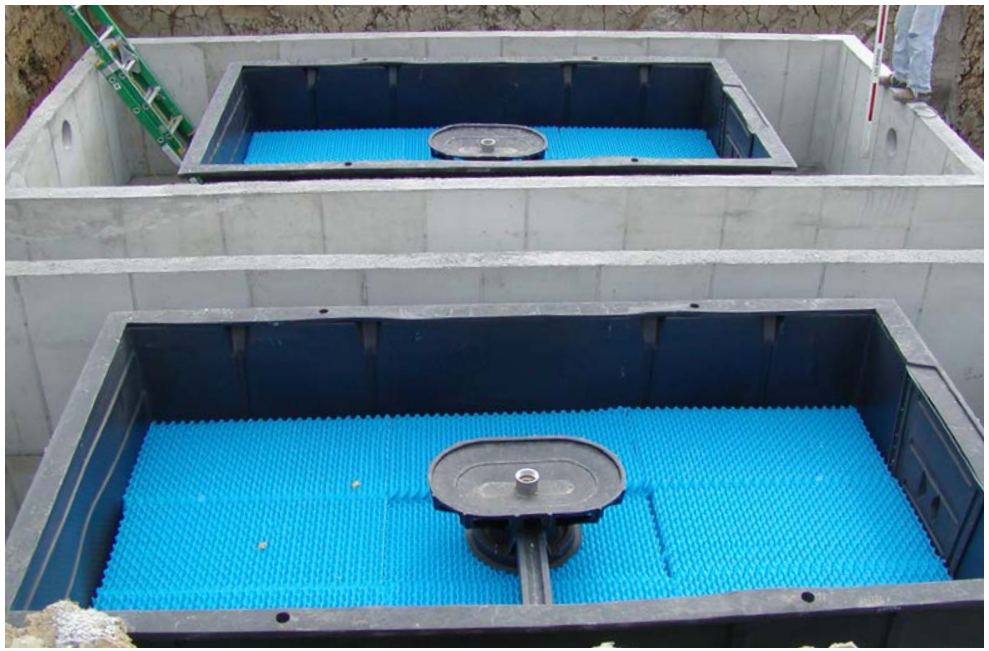
Cost to Meet 2016 Discharge Standards for Example IPAL and Network

ITEM (for 50 HH = 20 m3/d wastewater)	CAPEX (USD)	10-YEAR OPEX (USD)	TOTAL 10-YEAR COST (USD)
IPAL (ABR AF) and Network (pre-2016 standards)	30,000	5,210	35,210
IPAL (ABR AF) and Network (2016 standards) Cost Breakdown	35,900	97,200	127,200

FIGURE D9

Potential Aeration Technology Add-On to Meet 2016 Effluent Standards

(Biomicrobics FAST, 2020)



D ANALYSIS AND DISCUSSION

2 TECHNOLOGY

2.2 APPROPRIATE TECHNOLOGY OPTIONS *continued*

SETJEN/2016) require further reduction in organics, inorganics and coliform. Using the BOD (organic waste) and COD guidelines as an example, the new standards require a reduction in the IPAL effluent from 100 mg/l BOD to 30 mg/l BOD and 200 mg/l COD to 50 mg/l COD (note in the international review section, that many countries allow 100 mg/l COD). Using and average influent of 400–450 BOD mg/l, the pre-2016 organic waste reduction is 90% and 95% in the 2016 regulations. Thus, the cost for an extra 5% organic waste reduction is double or more of the original cost. This does not take into account the life-cycle costs for long-term management and replacement parts, which for the latter are much higher. Thus, the cost to meet the 2016 standard is likely to be 300% over ten years higher than the cost of the units installed (see Table D17, page 96). The estimates for this particular example (see Annex D6) also show that the cost of fixing a non-performing system and providing O&M is 10% of the cost of constructing a new, same-size system. In other words, for 10% of the cost, the same COD reduction target can be achieved.

Innovative Technologies to Consider

The next phase of SANIMAS may want to consider innovative technology options. Table D18 shows several new technologies and approaches that offer sustainable options with lower, long-term costs, but often higher CAPEX. Annex D4 contains more information about these technology options.

FIGURE D10
Omni Processor, to treat faecal sludge and solid waste (CRCC, 2020)

TABLE D18

Innovative Technologies to Consider

AREA	TECHNOLOGY	WHY CONSIDER
Sludge Pumping and Transport	• Mobile dewatering • Ingestors • Hand pumps	• High CAPEX, but transport 85% less volume, put the supernatant in IPAL • Helps digest solid waste and solids • Low-cost way to desludge
Local Sludge Treatment with Solid Waste	• Process to steam, electricity, potable water (Omni Processor) • Process in bioreactor landfill • Co-composting	• High CAPEX but produces energy and potable water from sludge and solid waste (findings show 46% use bottled water) • Treat faecal sludge and solid waste using 85% less land than standard landfill • Can use locally, high quality fertiliser, needs bulking agent
Solid Free Sewer	• Interceptor Settling Tanks • Small bore sewer (>50mm) • Grey water separation	• Small bore allows gradient in flat areas • IPAL treatment needs less • Small bore clog easier, solids sensitive • For the size application, cost is high
Climate Mitigation and Adaptation	• Lower CO_2 footprint materials • Low energy aeration* • Solar pumps and blowers • Solar septic • Smaller footprint — save land • Water/Wastewater reuse • Sludge reuse	• Low CO_2 cement, piping • Mechanical oxygen capture • Low hp but can work for IPAL • Higher efficiencies but adds some cost • MMBR, IFAS, MBR all smaller • If meeting new standards, could use re-water for non-potable uses • Composting with solid waste effective

* Wastewater treatment average energy consumption is 0.5 kWh/m3 influent

D ANALYSIS AND DISCUSSION

2 TECHNOLOGY

2.2 APPROPRIATE TECHNOLOGY OPTIONS *continued*

Innovative Toilet Technologies

As mentioned, there remains a need for public toilets, however specific criteria for the best applications are needed. Existing toilets were not well maintained and had additional treatment and biogas requirements. Table D19 shows several technologies with unique advantages. Some are zero waste, so they can be placed in sensitive areas, flood zones, high water tables, and locations near a treatment system. Most are movable, so once piped water and toilets arrive, they can be re-positioned. Some offer recycling of water with remote operation and can be used in drought prone areas or those with poor water quality. Other applications include high use areas in ports, mines, construction areas and natural disaster sites. All the examples require additional CAPEX, however the cost is competitive given the long-term use, mobility and zero waste.

IPLTs

Treatment of faecal sludge at the IPLT is not part of the SANIMAS program but is integral to the overall system performance. The survey findings show that there are many IPLTs (>60 on Java), many designed under the IUWASH Project. They generally have 1–2 vacuum trucks financed during the construction of the IPLT; and the remainder, which exceeds those owned by the LGs, are operated by the private sector. Generally, the IPLTs are located in areas to receive SPALD-S (individual septic tank) sludge and not IPAL sludge. Many SPALD-T sites do not have a convenient IPLT close by or a private sector operator willing to make the trip and then dispose of the sludge properly.

TABLE D19

Innovative Toilet Technologies

TOILET TECHNOLOGY	FEATURES & ADVANTAGE
ZYCLONE CUBE 130 USERS/DAY 0.10 USD/USER/DAY 	• Toilet system: 1–4 toilets • Pour flush (1.5 liters) up to 130 users/day, flushing (3.0 liters) up to 70 users/day; uses media and chemicals • No energy, recover 200 l/d water, and 10kg fertiliser per month • Ability to retrofit in existing systems • Good for camp, natural sites, temporary festival event, refugee camp, medical
RECYCLING TOILET (CLEAR) 6,000 USERS/DAY 0.003 USD/USER/DAY 	• Toilet system: 4 toilets • Water is treated and recycled, no need for connections • Modular design facilitates easy transport, installation and commissioning • Can be equipped with a solar panel for use at remote sites • Back end wastewater plant also available to hook up to existing toilets or SSS
ECOSAN 800 USERS/DAY 0.02 USD/USER/DAY 	• Toilet system: 1–10 toilets (5 estimated) • Design can be fully containerised, or with separate digestion tank • Patented electrochemical cells process mixed wastewater • Recycle process effluent as toilet flush water, good in water scarce areas • Compatible with any type of flush toilets (squat pan, western, urinals)

D ANALYSIS AND DISCUSSION

2 TECHNOLOGY *continued*

2.3 DECENTRALISED NETWORK PLANNING — MAXIMISING TECHNOLOGY AND COST

This short discussion looks at the technology and cost for deciding between individual septic tanks, SSS (decentralised) or centralised networks. Annex D7 has a complete discussion and analysis of technology options and decision-making for SSS networks. As mentioned, the SANIMAS IPAL technology and network has clear benefits compared to centralised networks that include:

- ✓ Easier to install in existing areas
- ✓ Easier to finance
- ✓ Simpler to operate
- ✓ Less consequences when things go wrong
- ✓ Can be connected up as financial and institutional capacity improves

From the survey findings and specifically the interviews, the trend in Indonesia is for rapid expansion of the decentralised approach rather than large centralised networks. SANIMAS currently has a list of technology options for the community that includes among other items, a constructed or prefab IPAL; and individual septic tanks or a connected SSS with an IPAL. Some communities selected the individual septic tanks (many were installed under the DAK program). From the survey, this seems to be a growth area, especially on Java and Sumatra. Individual septic tanks have advantages since asset ownership, O&M and desludging are all the responsibility of the individual. As mentioned in the private sector review, there is a complete certification program for constructed and prefab septic tanks, and numerous, competitive suppliers. Generally septic tanks are designed to meet the pre-2016 effluent standards. However, most are installed without a drain field so they are unlikely to have 100% compliance with the pre-2016 standards; and it is very unlikely that they meet the 2016 standards. For these reasons, a connected system offers better wastewater treatment. Table D20 shows an approximate cost comparison for individual septic tanks and SSS. These estimates vary based on geography, network design, type of IPAL, effluent standards, O&M costs and replacement costs. For this example, the current IsDB IPAL and network were constructed on free land and individual septic tanks were prefab with no land costs. So for 100 HHs, the 10-year total cost is less for an SSS. An increase in the number of HH would likely further reduce the per capita cost of the SSS.

The SANIMAS IPAL technology and network has clear benefits compared to centralised networks.

TABLE D20

Cost Comparison of Septic Tank and IPAL with Network (pre-2016 standards)

SYSTEM SIZE	COST SEPTIC TANKS (USD) (USD) CAPEX & OPEX (10 YEARS)*	COST SSS—IPAL NETWORK (USD) CAPEX & OPEX (10 YEARS)#
100 Households	$80,625	$50,250

* CAPEX includes prefab tank and installation; OPEX is desludging every 4 years

\# CAPEX from SANIMAS average; OPEX is O&M, spare parts, desludging every 2 years

D ANALYSIS AND DISCUSSION

3 SERVICE DELIVERY SYSTEMS

This section looks at the survey findings on the current SANIMAS service delivery systems and discusses various options to upgrade the service and allow a higher level of sustainability.

SANIMAS Service Delivery System and Options

The service delivery model starts with governance. Previous sections outlined the current SANIMAS, community-based, service delivery system, which is basically a grant to the community for selecting, building and developing capacity (through technical assistance) for their own wastewater, toilet and/or communal (MCK) system. Thereafter the community manages and finances operation of the system. Figure D11 shows what the service delivery needs to include, the governance options (adapted from ISF, 2016a) and the service delivery options.

Sanitation in Indonesia is: (i) a basic service, to be provided by local government; (ii) mandatory in each region; and (iii) co-managed by national and local government. The service delivery options are highlighted in Table D21. The table shows a variety of options, each with its own unique benefits. Clearly the private sector offers innovation, cost savings and sustainability, but only if engaged with succinct parameters, certifications, contracts and managed accordingly. Each service delivery method also requires agreements between the parties. Also, each community in Indonesia faces a different set of circumstances, including institutional arrangements, geography, culture, climate or density. Certain service delivery models may suit some regions better than others.

FIGURE D11

Menu of Service Delivery and Governance Options

SERVICE DELIVERY	FUNCTIONING TECHNOLOGY	EFFECTIVE & SUSTAINABLE O&M	SUSTAINABLE FINANCING	SUSTAINABLE DEMAND
Governance	Community-Led	Co-Management	National Government	Local Government
Service Delivery Options	Community-CBO (current system)	Co-Management LG/COB • Government • Private Sector	Utility Model • Government	Utility Model • Private Sector

TABLE D21

Service Delivery Options to Consider

SERVICE DELIVERY MODEL	ADVANTAGES	DISADVANTAGES	BEST APPLICATION
Community Driven (i) Current (ii) PS Contracting	(i) Allows local control and financing of assets; local jobs; local participation (ii) Still local control but using a pre-approved constructors and operator; could mandate local labour	(i) Higher risk for unsustainability — technology, network, O&M (ii) Higher initial cost; have to manage	(i) Engaged community with demand for self-operation (ii) Lower community interest in managing
Co-Management — LG-CBO Co-Manage (i) Government (ii) PS Contracting	(i) LG provides all technical expertise, funds for upgrades/spare parts, and desludging (ii) PS lowers performance risk; allows for innovation and enhances sustainability	(i) Requires LG funding and LG capacity building (ii) Initially higher cost and LG and/or CBO have to manage contracts	(i) Engaged community with demand for self-operation (ii) Lower community interest in managing
Government Utility Model (PDAM)	Government (LG) controls performance, financing, fee collection; benchmark performance	Need large government infrastructure to deliver service; fee collection	Large and mid-size, dense city
PS Utility Model Government has PS Contracts	PS performance contract lowers risk; asset may be off Govt books; benchmark performance	More expensive; need detailed contracts and supervision	Large and mid-size, dense cities

D ANALYSIS AND DISCUSSION

3 SERVICE DELIVERY SYSTEMS *continued*

PS Service Delivery — Contracting

Globally and in South East Asia there are many examples of private sector service delivery in the sanitation sector, including in Malaysia and the Philippines. Sustainable PS programs usually have a well thought out PS management and contracting system. Indonesia already has a certification program for many goods and some services. One system employed in many countries for the procurement of consultants, engineers and constructors in a sector-specific activity such as design, construction and operations of SSSs is an environmental service providers (ESPs) model that pre-approves or certifies consultants, contractors and operators. This type of system helps LGs and communities, no matter which service delivery model they use, to find qualified resources. Engaging the resources for a single service, operations contract or a design/build/operate (DBO) contract, requires specific contract language that, at a minimum, needs to address the items highlighted in Table D22.

Community Centres

Some of the SANIMAS investments included community centres, usually around an IPAL and MCK. The centres, if the community lacked such a centre, helped bring the community together as some had playgrounds, picnic and meeting areas; and they helped enhance knowledge about SANIMAS. Since the centres were not part of the outcomes, we did not assign performance indicators or rate their performance.

TABLE D22

SSS Private Sector Contracting

PS SSS CONTRACTS — MINIMUM REQUIREMENTS FOR PERFORMANCE BASED CONTRACT
SSS Technologies Approved — applicability, design criteria and installation
Construction — detailed construction requirements, testing, certification and hand-over
O&M — (i) requirements for operations, maintenance, replacement parts, contingency; (ii) performance based on indicators — for instance meeting effluent standards (iii) need to define reporting requirements
Service Quality — define acceptable minimum level of service within a well-defined timeframe that includes standards and performance targets
Licensed Service Providers — certification program
Reporting to the LG — detail reporting requirements and well-defined timeframe(s)
Reporting to the Regulator — detailed reporting needed by the regulator

Utilizing SSS infrastructure for community purposes.
Jawa Barat, Bandung, KPP Sadewa

D ANALYSIS AND DISCUSSION

3 SERVICE DELIVERY SYSTEMS *continued*

3.1 SUSTAINABLE OPERATION AND MAINTENANCE

As mentioned, several times in this report, over 50% of the sites surveyed show strong signs of unsustainability. Table D23 shows some of the O&M issues identified and methods to address them.

O&M Financing

The survey found that community financing works well at 30% of the sites. In addition, regular expenses, operator salaries and payment for irregular expenses were issues at over 40% of the sites. Table D24 presents the O&M financing issues and potential remedies.

O&M Tariff

A recent ADB centralised and SSS wastewater loan, PNPM Mandiri, estimated the proposed wastewater fees needed to cover O&M were about 0.15% of HH income. A rigorous assessment of full O&M cost, including desludging, estimates that the total for a 100 HH network is only Rp 17,000 per month per HH. The complete analysis is in Annex 7. If the LG desludges the units every 2 years then the cost is Rp 8,000 per HH per month, or US $0.8 per household per month. The case is made for LG managing desludging since it is not happening now and evidence shows that otherwise sludge is not likely to be disposed of properly. The O&M estimate includes a paid operator, replacement parts and rental equipment needed for network clean-out.

TABLE D23

O&M Issues and Potential Remedies

O&M ISSUES (FROM SURVEY)	POTENTIAL REMEDIES
37% no income to cover O&M*	88% of cities/regencies have budget but need LG needs MOU and asset ownership; hand-over may need longer O&M 'gap' financing until the fees can catch up
54% have no O&M operator	Operator not full-time job — consider linking multiple locations; LG support needed; PS
44% show blockages	Many lack expertise for piping system, control box, and grease trap — need LG or PS technical support; PS contracting
37% under or over-loaded	Design and planning issue that affects O&M, needs technology fix from additional budget — best candidate is LG
34% of network damage not fixed	LG needs to provide budget support; generally, fixing assets is less expensive than build new ones
60% have no O&M logs; most lack any monitoring data	LGs and KPPs training; need better, robust national data base (PU, LG); MoE needs to provide guidance on monitoring; consider simple sensors
71% have not been desludged	LG likely needs to pay for desludging using a routine schedule (i.e. IPLT)
63% lack budget for HH connect	LG needs to provide budget support; HH need to be financed with CAPEX instead of OPEX
70% MCKs have functional issues	Different from network/IPAL O&M but needs operator

* (MoPWH, 2019b) found 45% do not collect fees

TABLE D24

O&M Financing Issues and Options

O&M FINANCING ISSUES	REMEDY OPTIONS
O&M budget not supported: • Regular expenses not identified funds source not identified • User fees from poor HHs difficult ○ no agreement with users ○ willingness to pay low • Irregular expenses difficult to cover • Desludging rare • Operator pay/training	Better estimates of O&M — costs and effort detailed and understood by the KPP Handover — longer term, suggest 1 year; or with PS contracting a multi-year contract Connections — should not be in OPEX; finance before and after network construction, maybe with some incentive for early hookups Fees — O&M fees are not excessive but should be support for poor HHs; spare parts, desludging, disasters, network fixes, upgrades need LG involvement Operator Engagement — operators need pay, training and reporting capability (to LG); PS management can provide

D ANALYSIS AND DISCUSSION

3 SERVICE DELIVERY SYSTEMS

3.1 SUSTAINABLE OPERATION AND MAINTENANCE *continued*

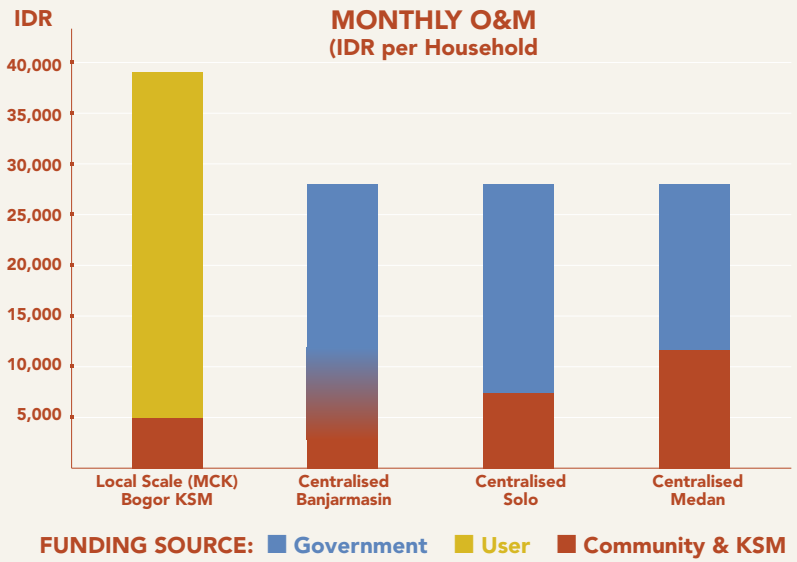
Conclusion

Although there are issues with O&M performance, some of the systems work very well. The O&M lessons learned from the review and our survey include: (i) some communities manage better than others; (ii) LG support is crucial to many communities to shore up O&M; (iii) rapid build-up focused on CAPEX and not on OPEX (O&M); and (iv) some of the O&M issues are beyond local problem solving, for instance repairs and recurring desludging. One program design issue is the heavy reliance on the community for O&M, whereas in other larger communities with centralised service, the O&M requirements and cost per HH are far lower (see Figure D12, ISF, 2016a). Following the examples from the graph, especially considering these are low-income demographics, LG support is justified. Table D23 (page 102) highlights some of the O&M issues and potential remedies; and dovetails with the previous discussion of service delivery models. For each model to be sustainable, it must address O&M, and involvement from LG and the PS are likely to improve O&M performance.

FIGURE D12

O&M Costs are Similar Across Scales, But Poorer Communities are Expected to Fill the Revenue-Cost Gap

(ISF 2016a)



Community toilet block (MCK), managed by the community. Sumatera Selatan, Kabupaten OKI, KPP Karya Bersama

D ANALYSIS AND DISCUSSION

3 SERVICE DELIVERY SYSTEMS *continued*

3.2 PROGRAM FINANCING

This section looks at the overall program financing and includes a discussion of SANIMAS financing; what financing was expected from the LG and KPP; financing for governance and capacity building; and conclusions about what needs to be financed, with examples.

The previous discussion shows areas where SANIMAS delivery performed well, such as a rapid build out for poor communities and 92% customer satisfaction; and also several areas where attention and financing are needed to attain system sustainability. SANIMAS performance likely suffers from rapid growth, and some areas such as capacity building and better management at all levels just take time. Ultimately, it is the quality of the service delivery that determines demand and sustainability; so, this section focuses on program financing options for better service delivery. The ultimate performance gauge is customer satisfaction; however, the survey's high customer satisfaction result likely says more about the provision of the service without understanding the unsustainability of the service. Among items to consider for better service delivery through program financing are equitable project cost distribution between the government and the community; financing the best solution for each community, noting their differences; how LG finances its role; and investing in sustainability, even at those already constructed. Table D25 shows some of the salient issues discussed in this section and the role of program financing.

Financing the Hard and Soft Components

The SANIMAS program had several sources of financing. Some were donor driven (World Bank, ADB, USAID, IsDB, DFAT); others were financed by national government

TABLE D25

Review of IsDB Findings and Role of Program Financing

AREA	ROLE OF FINANCING	IsDB FINDING
Equitable Cost Distribution	• National — balance financing, poor HH service, COD reduction • LG — balance service with competing ecosystem services • Community — balance income, service and willingness to pay • Legal — legal framework needs to support investment	• Poor communities generously provided networks, treatment plans, toilets (96% customer satisfaction likely from this) • LGs supported repairs (76%) • Connections included in grant — but thereafter by the community • Community ask to contribute more)&M cost support than centralised • Many units not in red zones
Equitable Management	• National — ensure national policies, certifications, standards • LG — provide management support • Community — each is unique and requires varying levels of management support	• National supported design, block grants to communities, training TFLs, certification programs, education • LGs management support varied — no counterpart budget identified in the loan • Community received block assistance regardless of needs; no follow-on assistance
Sustainable Technology	• Design — financing can promote certified designs • Construction — supervision, inspection, connections • O&M — consider with CAPEX	• ABR/AF and SPALD-T designs were reviewed and standardised design needs upgrade to meet 2014 and 2016 standards • Loan financed construction, some very good, some not to standard design • O&M was by the community and poor in over 50% of the sites
Institutional	• Governance, legal, support • LG support • Private sector • Awareness programs	• Land was donated by community — title and location appropriateness often not clear • LG role and institutional arrangements not clear • Limited use of private sector — consultants, TFLs, and community constructors • Several awareness programs and community meetings were financed and crucial to community acceptance
Capacity	• Education — programs • Staff training	• TFLs received training, communities received some education

D ANALYSIS AND DISCUSSION

3 SERVICE DELIVERY SYSTEMS

3.2 PROGRAM FINANCING *continued*

(Regular, DAK) and some by provincial government (SABERMAS). Nonetheless the SANIMAS service delivery was similar across all programs, as documented earlier in this report. Each program provided a set of block financing for each community for construction; provided TFLs to assist with the construction; and provided some public awareness through meetings, training, KPs and events. All of the areas in the SANIMAS program financing were important, reflected real needs, and are common components of similar IFI sanitation projects in the region. Table D26 shows each area and the amounts financed by ADB and IsDB loans. The amount of technical assistance (soft components for project management, supervision and consulting services) financed by the ADB loan was 14.5%, and for the IsDB loan, 10.5%. The national government contributions for soft components, such as the TFLs, were similar. This amount of loan technical assistance is in within the norm for South East Asian utility projects.

Why is Program Financing for SANIMAS Different?

Considering SANIMAS is community driven program delivered to poorer areas where there is very little experience or technical expertise, there is a higher need for investment in supervising, training and educating the community. The current program also requires significant resources from the community (see Figure D13, ISF, 2016a). If the option of LG co-management is pursued, then LGs will likely need a technical unit that also requires capacity building. SANIMAS is a national investment that needs sector support, including national guidelines, direction and transparent data base. The service delivery is a new system, which always requires additional resources and fixes. This is true for both soft and hard components, where systems may fail for technical or lack of maintenance reasons and they need to be fixed. Making sure the service works and is sustainable should be the primary goal.

Risk Mitigation and Covenants

Financing such a large program with grants has many risks. The IsDB and ADB loans identified similar risks. Loan preparation is an opportunity to tie financing to behaviour and to ameliorate risks, sometimes using loan covenants. The IsDB SANIMAS loan covenants focused on land ownership, procurement and financial disbursement. The ADB SANIMAS loan identified several risks and used loan covenants that are worth discussing. Table D27 (page 106) gives a brief summary and provides some additional conclusions to consider for new SANIMAS investments. The risk and mitigation measures identified the key issues, however did not supply adequate O&M assistance.

TABLE D26

Comparison of ADB and IsDB Sanitation Projects (million USD)

ITEM	ADB LOAN PROJECT				IsDB PROJECT		
Capital Source	**ADB**	**N Gov**	**LG**	**KPP**	**IsDB**	**Gov**	**LG/KPP**
Block financing for Community Sanitation (ADB included drainage)	89			8.0	85		ND
Capacity Building (training, workshops, KPs)	5.1					0.16	ND
Consultancy Services	7.9				8.89		
Project Management Unit		1	0.3			5.29	ND
Community Facilitators		10.3				10.8	ND

FIGURE D13 **Cash contributions in construction phase of local scale systems are required by GoI from community. Scale of contribution varies, but can be significant and prohibitive.** (ISF 2016a)

Cash	Cash Range (median)	Who Pays?
Legal documents for land security[1]	IDR 1.5M–5M	Community
Acquiring land[3]	IDR 30M–150M	Community or donor (mosque, individual)
CBO notarisation[3]	IDR 0.6M	Community
Pipework, treatment system	IDR 3M–16M (9M)[1,4]	Community
HH connection	IDR 0.3M–3M/hh (1M/hh)	Often users, sometimes program

Sources: [1] AKSANSI members; [2] BEST; [3] Bogor CBO workshop and agencies; [4] For SLBM Regular, 4% community contribution

D ANALYSIS AND DISCUSSION

3 SERVICE DELIVERY SYSTEMS

3.2 PROGRAM FINANCING *continued*

TABLE D27

Program Financing: Risks Mitigation, Loan Covenants and Lessons Learned

ADB SELECT LOAN RISKS (ADB RRP, 2014)	**MITIGATION MEASURES**
Lack of adequate operation and maintenance (O&M) can reduce the benefits from investments and jeopardise sustainability	Community facilitators and consultants advise community members on the importance of O&M; O&M concepts mandatory part of the investment plans, approved by the district project implementation unit.
Lack of understanding of the importance of sanitation	Attached capacity development technical assistance helps to consolidate and improve existing awareness strategies and scale up and roll out awareness campaigns, and training programs at all levels in the project cities.
Poor technical design and poor implementation of civil works	Community facilitators and consultants carefully selected and trained to support the communities; monitoring system established to provide additional supervision by government experts from the respective district and municipality

SELECT ADB COVENANTS (condensed)	**COMMENTS AND POTENTIAL ADDITIONS**
Ensure that the project facilities are operated, maintained and repaired in accordance with sound applicable technical, financial, business, development, O&M practices	O&M is a key issue and this covenant needs to be more explicit; perhaps tied to a % meeting of O&M targets or PS performance
Implemented in accordance with the detailed arrangements set forth in the PAM	The PAM was according to the loan
Facilitators to (a) assist communities to carry out poverty mapping, identify problems and needs; (b) evaluate community implementation capacity; (c) develop efficient planning and decision-making processes; (d) establish and manage CIOs; (e) formulate development plans and specific investment plans to be financed by block grants; (f) prepare technical designs and implement Works; and (g) formulate and implement O&M plans to ensure sustainability	Need to decide if going forward (i) if staying with community driven, facilitators likely need to stay on site longer and/or work for the LG; or (ii) if going with PS model, facilitators would not be needed and this cost borne by the PS; LG still needs to inspect; if using PS, would need an additional covenant regarding PS contracting
Project executing agency to conduct specific sanitation-trainings for the community facilitators, and use a system to provide continuous guidance and advice to community facilitators through NGOs and district administrations under coordination of MPW with the concerned agencies	Same comment as above; possibly use LG for project execution using similar model or PS model, or both
Fulfill the following selection criteria: (a) the neighbourhood located in cities with an approved City Sanitation Strategy; (b) the community members agreed to design and implement sanitation facilities; (c) the CIO for the neighbourhood established and accountability and governance; and (d) the community members indicate their willingness	If using the same model, this requires strengthening and possibly by the LG since the communities may not have the capacity to develop and implement; PS could be engaged
Assist community members to (a) identify issues and needs related to health, hygiene and sanitation; (b) formulate inclusive and sustainable sanitation plans with specific investment plans to be financed by block grants; (c) prepare technical designs; (d) implement sub-project; and (e) formulate and implement O&M plans to ensure sustainability of completed sanitation facilities	

SELECT LESSONS LEARNED (ADB PCR, 2019)	**COMMENTS AND POTENTIAL ADDITIONS**
Facilities constructed under the project are owned by the communities — local governments have little continuing responsibility for these assets	Land and asset ownership require clarification. LG should consider buying or leasing, and selecting ideal location
Insufficient community facilitation, which limited the awareness of community members regarding the importance of good hygiene, and limited community resources to fund property connections — more time is required to build such awareness and collect resources	Need to encourage HH connections
People are initially reluctant to invest in sanitation facilities but tend to build home connections once they see sanitation systems in operation	Provide incentives to hook up at construction; pay subsidy for connection

E RECOMMENDATIONS

Opening the control chamber before the SSS.
Sumatera Utara, Medan, KPP Babura Sehat

E RECOMMENDATIONS

Almost twenty years ago, the SANIMAS concept offered the Government of Indonesia a sanitation service option that had not been used anywhere at scale before. It enabled sanitation services to be delivered to people who lacked them in poor urban communities, and by the end of 2019, a total of 21,832 SANIMAS decentralised SSS had been built, serving an estimated 6 million people.

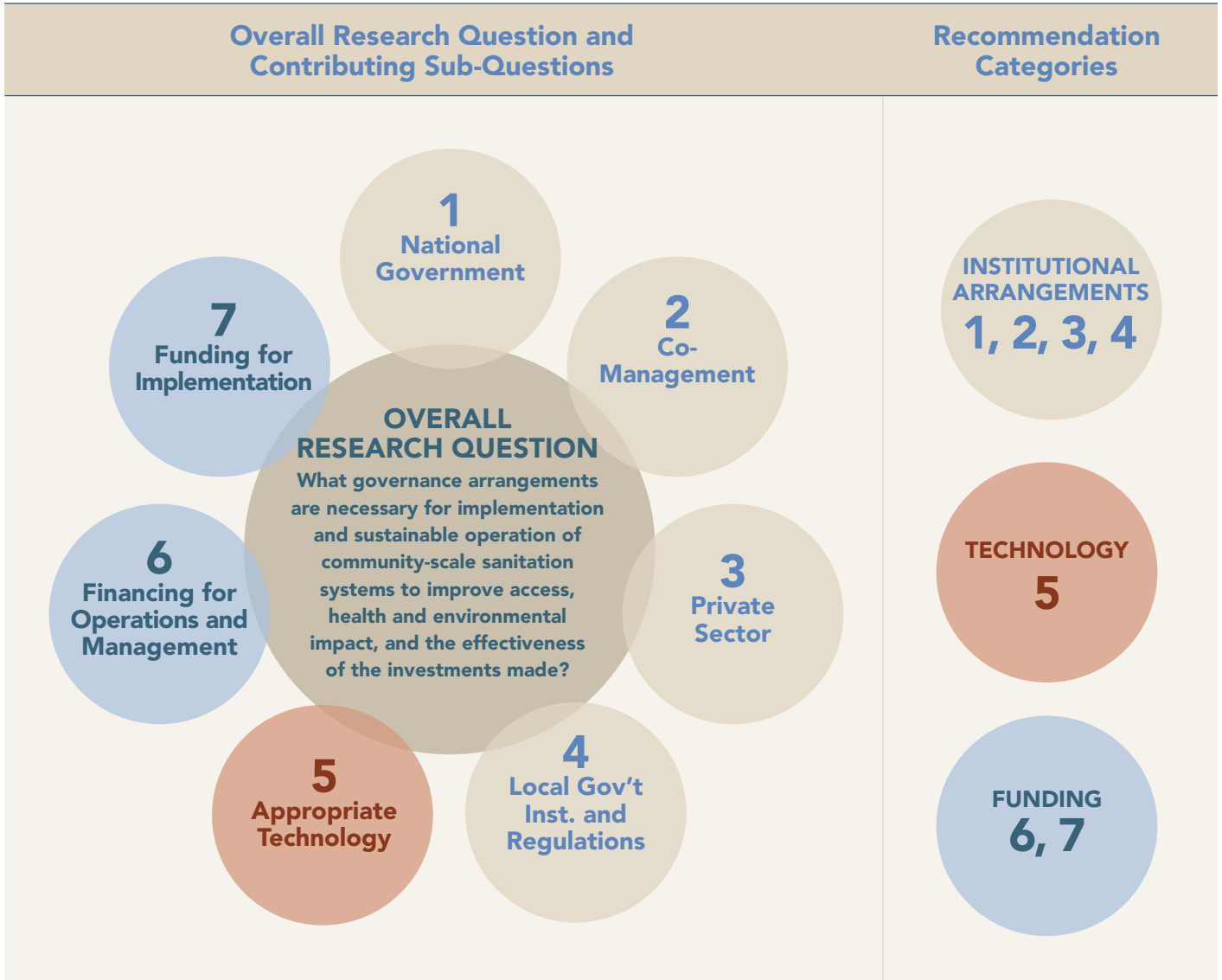
The vast majority, about 21,000 of SSS were built in the last ten years, or an average of 2,300 each year until 2019. Due to the rapid growth and pace of construction, challenges have emerged with service delivery and with sustainability post construction. But fortunately, there are practical and cost-effective solutions available to address these issues.

The 2020–2024 RPJMN target of potentially 5750 new SANIMAS/SSS units per year (based on 50 HH per location) represents a very significant investment and a considerable increase in implementations. This scaling up will require new approaches to be taken for planning, implementation and monitoring, to ensure future operation and maintenance leading to improved inclusion and sustainability.

Based on the findings and discussion in this report, and feedback from a high-level virtual roundtable meeting (see Annex E1), recommendations for future SANIMAS investments have been made. They focus on how to revitalise the SANIMAS program and achieve a more sustainable service delivery, while significantly up-scaling implementations and safely managed sanitation access. The recommendations are arranged based on grouping the seven sub-research questions into three main categories; (i) institutional arrangements; (ii) technology; and (iii) funding, as shown in Table E1.

TABLE E1

Recommendation Categories



E RECOMMENDATIONS

Each recommendation listed in Table E2 has an action title and description, and identifies the main responsible stakeholder(s). The description is purposely brief, but more details on each recommendation can be found in Annex E2, most of these recommendations are used in the proposed design and monitoring framework (DMF), which can be found in Annex E3.


Sumatera Utara, Binjai, KPP Lingtihat

TABLE E2
Recommendations for Future SANIMAS Programs

CAT.	NO.	ACTION	RECOMMENDATIONS	RESPONSIBLE
INSTITUTIONAL ARRANGEMENTS	1	RESOLVE	**Resolve Asset Ownership with Cities/Regencies and Communities** Request MoHA to formalise a regulatory framework for city/regency governments to take over ownership of SANIMAS SSS assets and provide guidance (Surat Edaran) on budgeting maintenance of SANIMAS utilising APBD. The assets should be made part of the city/regency fixed assets inventory. This will clarify that the city/regency is responsible for the assets, and allow them to allocate city/regency budget for O&M.	MoHA
	2	VARY	**Variance for the 2016 Discharge Standards** Request MoEF to provide a variance for SANIMAS SSS to be required to meet the pre-2016 domestic wastewater discharge standards. Many countries (see Section C 1.2) allow for variances based on viable economics, small size of system/ number of users, quality of the receiving water and other social or environmental reasons. The cost for the SANIMAS program to meet the 2016 discharge standards, whether upgrading existing SSS, or installing new ones will cost between 200%–400% more in CAPEX and OPEX (see Annex E2) than the current SSS. A variance of the domestic discharge standards offers a way to balance high costs, serving more people and protecting public health and the environment.	MoEF
	3	SET	**Set SANIMAS National to Local Key Performance Indicators (KPIs)** Bappenas and MoPWH are recommended to set SANIMAS KPIs with MoPWH, MoHA, MoH, MoEF from the national to provincial and city/regency levels. Setting verifiable indicators, which will be used nationally by all stakeholders, will contribute to more sustainable outcomes. Also, the KPIs should: • Monitor ongoing sustainable sanitation services, not only construction of systems. • Establish and apply a common SANIMAS database / monitoring platform between all the stakeholders, MoPWH, MoHA, MoH, MoEF and provincial/city/regency levels of government • Include gender inclusiveness aspects • Integrate the SANIMAS database / monitoring platform with other urban water, sanitation and solid waste programs • KPIs must link to city/regency initiatives and strategies to provide sanitation services to their citizens • Consider linking KPIs to a Local Government Performance Indicator SMART score card system (see example Annex E4) • Form project implementation units at the central, provincial and district levels. • Be used in all SANIMAS design and monitoring frameworks for large scale investment projects e.g. new IsDB project	Bappenas and MoPWH

E RECOMMENDATIONS

TABLE E2 *continued*

Recommendations for Future SANIMAS Programs

CAT.	NO.	ACTION	RECOMMENDATIONS	RESPONSIBLE
INSTITUTIONAL ARRANGEMENTS	4	ESTABLISH	**Establish or Strengthen a Sanitation Management Unit in All Cities and Regencies** With support from MoHA, cities and regencies to establish or strengthen a UPTD, PDAM, PDPAL or related technical entity to manage sanitation services. The existence of a technical entity in the city or regency should be a 'readiness criteria' and prerequisite for further SANIMAS investments, renovations or upgrades. With city or regency ownership of the SANIMAS assets, the technical entity will be responsible for the sustainable management of the assets in cooperation with communities/KPP. Other key aspects include: • Mandatory 'Cooperation Agreements' (Perjanjian Kerjasama) between the city/regency government/technical entity and all KPPs to co-manage O&M, both technical and financial (see examples in Annex E5) • The technical entity will be responsible for SANIMAS KPI's, visiting communities and complaint management e.g. support Hotline for the KPPs • The technical entity can engage the private sector to provide O&M services using performance-based contracts to carry out some aspects of management	MoHA and City/Regency
	5	SET UP	**Set Up a National SANIMAS Database and Conduct an Inventory of All Existing SANIMAS Systems** Bappenas and MoPWH to establish and maintain a single comprehensive consolidated SANIMAS database for all existing and future SANIMAS based on SANIMAS KPIs. Conduct a detailed inventory of all SANIMAS to populate the database. The database is to be used for inventory control, to monitor performance, to guide future investments and to provide evaluation, planning and management data to improve service sustainability. Other key aspects include: • Database can be adapted from the IsDB service delivery survey • Accessible by city/regency, provincial authorities, national ministries and any operators as necessary, and compatible with their access to computer systems and internet services • Can be used to identify new connections; assess repairs and upgrades needed • Should be integrated with IPLT data; linked to SPM and SDG and other sector programs • Consider integrating a Local Government Performance Indicator SMART score card system (see example Annex E4)	Bappenas and MoPWH
	6	DEVELOP	**Develop and Revise SANIMAS Program and Technical Manuals** In line with national SANIMAS KPIs program and technical manuals provide clear guidance and structure for all participants and levels of government. Reframe SANIMAS through the manuals based on stronger co-management and the KPIs to integrate these key points: • Define the scope of program and KPIs for national (all relevant CPIU), LG (all relevant agencies) • Define the scope of co-management for KPP and City/Regency; Cooperation Agreements (see examples Annex E5) • Include gender inclusiveness aspects • Mandate one legal community-based entity to implement SANIMAS and be responsible for ongoing O&M • Strengthen readiness criteria for city/regency to access SANIMAS grants (see Annex E6 'On granting' example) • Prioritise soft components and capacity building (6 to 12 months community preparation); standardised capacity development tools (O&M checklists and model contracts) • Standardise methods to establish and collect O&M budget (see Annex E7) • Provide standard technical designs — peer reviewed and verified; Strengthen construction supervision; Limit community involvement on technical decisions • Provide guidance on service delivery cooperation with other entities such as the private sector, NGOs and Associations • Include TFL job description, scope of work • Include pro-poor mechanism/cross subsidy when calculating the tariff to cover O&M costs • Criteria on selecting suitable locations (prioritise sanitation red zones, density, etc.)	Bappenas and MoPWH

E RECOMMENDATIONS

TABLE E2 *continued*

Recommendations for Future SANIMAS Programs

CAT.	NO.	ACTION	RECOMMENDATIONS	RESPONSIBLE
INSTITUTIONAL ARRANGEMENTS	7	INTEGRATE	**Integrate SANIMAS into CSS and Maximise Use of Infrastructure Investment** SAMINAS systems should become an integral part of the CSS; and include increasing house connections, repairing and rehabilitating non-performing assets. SANIMAS systems are one component of the whole city sanitation system and need to be planned, built and monitored within the overall City Sanitation Strategy. Integrating SANIMAS into CSS can maximise cost effectiveness and the protection of public health. This will include maximising cost effectiveness by increasing HC from existing SSS (utilise idle capacity), avoiding duplication and coordinating, where possible new SANIMAS investments in high density areas with planned sewerage investments.	Bappenas and MoPWH
	8	DEVELOP	**Develop a Communications Strategy for LG and Communities** Bappenas and MoPWH to develop an effective SANIMAS communication strategy. A communication strategy is essential to increase awareness and build supportive attitudes for sustainable SANIMAS services at the provincial, city/regency and community levels. Gaining the support and commitment for sustainable SANIMAS services from the province/city/regency is essential. The province/city/regency must work directly with the community to foster community-based initiatives to improve sanitation services and infrastructure. The communication strategy should include: • Formative social research to understand contextual SANIMAS behavioural barriers (LG and KPP), triggers and trusted media channels • Strategy to inform and engage province and city/regency levels of government on SANIMAS ongoing O&M roles and responsibilities • Strategy to inform and engage different SANIMAS stakeholders on their SANIMAS roles (Community/KPP/NGO) • Public awareness and behaviour change strategy (SANIMAS gender / health / environmental/economic issues and benefits) • Multiple media channels: social media / radio / digital poster or comics / videos / mobile apps • Training courses and materials for LG, Community, KPP, NGOs and media	Bappenas and MoPWH
	9	STRENGTHEN	**Strengthen Quality of Capacity Building so that LGs Can Improve Their Management of SANIMAS** Strengthen LGs to take an active role operating (planning, operation and monitoring) as a utility service provider (UPTD, PDAM, PDPAL or related technical entities), with support for basic day-to-day O&M from the community, in line with co-management 'Cooperation Agreements'. This requires 'change management' support on an on-going basis and cannot be achieved by only a series of workshops. On-going tailored TA, with substantial specialist back stopping will be needed. The approach should no longer be 'community based', but Local Government managed and 'community supported'. LGs require better quality support, training and capacity building in the following areas: • To develop and implement the 'Cooperation Agreements' between the city/regency and the KPPs (see examples Annex E5) • Modes of service delivery cooperation with other entities such as the private sector, NGOs and Associations • Private sector contracting and implementing model performance-based contracts • Contracting and procurement for major repairs, spare parts, additional connections and de-sludging • The use of the KPIs, survey tools, data entry to the national database, and site monitoring • Undertaking O&M technical advice capacity development and training • Establishing a KPP Helpline • How to develop and establish longer contracts for TFLs • To establish a PPIU, active involvement on the capacity building to city / regency (IsDB DMF)	MoHA, MoPWH and LGs

E RECOMMENDATIONS

TABLE E2 *continued*

Recommendations for Future SANIMAS Programs

CAT.	NO.	ACTION	RECOMMENDATIONS	RESPONSIBLE
INST'L	10	ESTABLISH	**Establish Co-Management Arrangements for Operation and Maintenance** KPP with City/Regency co-management 'Cooperation Agreements' are made mandatory (see examples Annex E5); systems and mechanisms for sustainable operation and maintenance are established. Consider service delivery cooperation with the private sector, NGOs and Associations Performance-based contracting with the private sector should be tested and model contracts and clauses should be standardised and made available to all cities and regencies.[2]	MoPWH, MoHA and City/Regency
TECHNOLOGY	11	CONFIRM	**Confirm Design(s) and Design Parameters** Establish improved simple small-scale sewerage and treatment designs and standards — peer reviewed and verified; include upgrading designs for sewerage to limit stormwater intrusion; and upgrade design of the SPALD-T AF/IPAL to make O&M easier and more cost effective. Strengthen construction supervision procedures. Limit community involvement on technical decisions.	MoPWH
	12	PILOT	**Pilot New or Innovative Technologies and Methods** Pilot a limited number of innovations in treatment and conveyance technologies; focus on sustainable options that can reduce O&M costs, promote sustainability and lower the carbon footprint. Technologies include: pre-fab IPAL, sensors, aeration technologies, solar pumps, gravel/sand drains, planted beds, connecting networks, accessible or universally designed toilets, zero waste/re-usable toilets.	Bappenas and MoPWH
	13	REHABILITATE	**Increase Households Served, Public Health and Environmental Outcomes by Upgrading Existing Dysfunctional or Poorly Performing SANIMAS and Strengthening LG/KPP O&M Capacity** As a part of new programs alongside new systems, assess the hard and soft requirements to rehabilitate systems which are not functioning as designed. For example: • Increase house connections where the sewerage system and treatment has spare capacity. This will be the quickest and most cost-effective increase to national access to sanitation services, by utilizing existing idle treatment capacity. • Establish cooperation agreements and build LG/KPP capacity • Improve quality of treatment by rehabilitating treatment to work more efficiently, backwashing filters, desludging, etc. • Relay sewerage within adequate slopes or low points to make O&M easier.	MoPWH and LGs

[2] As above, while this is recommended for the whole SANIMAS program, it is specifically proposed to be a component in the new IsDB investments

E RECOMMENDATIONS

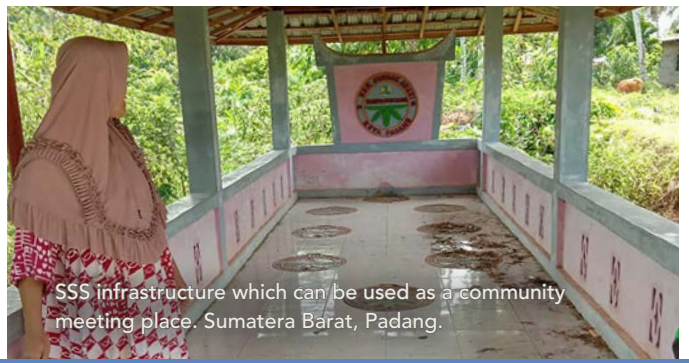
TABLE E2 *continued*

Recommendations for Future SANIMAS Programs

CAT.	NO.	ACTION	RECOMMENDATIONS	RESPONSIBLE
FUNDING	14	ESTABLISH	**Model for CAPEX and OPEX Financing** Establish a financing model, and contracts, that considers both CAPEX and OPEX; and finance according to maximising the BOD reduction and lowers CO_2 emissions. Key recommendations include: • Pay for full time, trained O&M staff • Calculate the 10-year OPEX cost in decision making • LG should pay for major repairs and scheduled desludging • Pilot private sector DBO, performance-based contracts • Maximise BOD reduction by adding more connections and repairing existing assets • Lower the carbon footprint by avoiding aeration To understand estimated SANIMAS OPEX costs see Annex E7	Bappenas, MoPWH and LGs
	15	SET UP	**Program Financing** Formulate a comprehensive sanitation investment plan to acquire and mobilise financial resources. Set up a more sustainable program financing scheme that includes measurable outcomes and outputs and is focussed on management, monitoring and OPEX costs. **Soft components should include:** • Build a consolidated database based on agreed national KPIs (ref 3, 5 above) • Develop a survey platform to collect initial data on all system performance and conduct yearly or biannual (5 above) • Build LG capacity, develop private sector O&M contracts; increase technology certification and conduct media campaigns (ref 9, 10 above) • Consider On-granting scheme for LG budget (see Annex E6) **Hard components include:** • Update the designs for all future installations (11 above) • Upgrade existing SSS to add connections, repair networks and upgrade reactors (13 above) • Pilot innovative technologies including zero waste and/or movable toilets	Bappenas and MoPWH

Community discussions for the SANIMAS evaluation. Sumatera Barat, KPP Marapak Saiyo

SSS infrastructure embedded in the community. Sumatera Utara, Medan, KPP Babura Sehat



SSS infrastructure which can be used as a community meeting place. Sumatera Barat, Padang.

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