Effective governance for the successful long-term operation of community scale air limbah systems

Mid-term Observations Report

May 2015

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While all due care and attention has been taken to ensure the accuracy of the material published, UTS/ISF and the authors disclaim liability for any loss that may arise from any person acting in reliance upon the contents of this document.
This document is a synthesis of **observations and recommendations** distilled from the first phase of our research. The **validity and representation** of these observations and recommendations has been tested with key stakeholders in the sector, including six Ministries across the Government of Indonesia, major donors, programs, and NGOs. In order to further consolidate our findings and inform future sector policy and research, we are keen to continue to **gather input and feedback from a broader audience** on what resonates and what is missing from our study so far. If you have comments, criticisms, or suggestions, please contact us (see the last slide for details).
Introduction
## Project Details

<table>
<thead>
<tr>
<th><strong>Duration</strong></th>
<th>May 2013 – March 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding</strong></td>
<td>Australian Aid Development Research Awards Scheme</td>
</tr>
<tr>
<td></td>
<td>Contributors: UTS, ISF, BORDA</td>
</tr>
<tr>
<td><strong>GoI Partners</strong></td>
<td>BAPPENAS (Partnership Agreement)</td>
</tr>
<tr>
<td><strong>Methodology</strong></td>
<td>Transdisciplinary Participatory Action Research</td>
</tr>
<tr>
<td><strong>Collaborators</strong></td>
<td>Local Partner: AKSANSI</td>
</tr>
<tr>
<td></td>
<td>International Partners: BORDA Germany, ODI</td>
</tr>
<tr>
<td></td>
<td>Expert Advisors: Kathy Eales, Jeff Moeller, Chris Buckley</td>
</tr>
</tbody>
</table>
Our focus is on governance. We have identified four complementary aspects for community-scale sewerage services.

<table>
<thead>
<tr>
<th>Functioning technology:</th>
<th>Sustainable financing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensuring the physical system delivers the service</td>
<td>Sufficient ongoing revenue to cover all short and long-term operational cost elements</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effective management:</th>
<th>Sustaining demand:</th>
</tr>
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<tbody>
<tr>
<td>Accountable and equitable administration and decision making system</td>
<td>Maintaining effective community demand for the service over time</td>
</tr>
</tbody>
</table>
Together with our partners, we have identified four areas of inquiry.

**Performance monitoring:**
What is the volume and quality of available data on community-based sanitation performance?

**Legal arrangements:**
What are the legal and informal arrangements for ownership?

**Scale and distribution of costs:**
For a range of sanitation service delivery models, what are the scale and distributions of cost?

**Management partnerships:**
What are the range of structures and institutional arrangements that could deliver the responsibilities for managing community-scale systems?
Our research uses a life-cycle and system-wide view.

Sanitation service requires arrangements for full service chain to maintain a safe barrier between human excreta, other humans and their water sources. A life cycle and system-wide view is essential to ensure investments deliver outcomes.
The fundamental outcome of sewage management is to separate people from excreta, and protect the environment.

Increasingly, it also seeks to capture the value of the nutrients.
Project methodology
Our **mixed method approach** includes qualitative and quantitative data collection, analysis and synthesis. This involves:

- **Semi-structured interviews** and **focus group discussions** with diverse groups including:
  - communities and village leaders,
  - local NGOs,
  - national and local government staff and leaders,
  - representatives from the main funding programs of community scale air limbah systems (GoI and donor), and
  - the Jakarta-based national Project Advisory Group
- **Evaluative inquiries** of the principal databases (AKSANSI and NAWASIS) and other datasets,
- **Observations** during study site visits, and
- **Document review**.
Our understanding of the situation
The risk of effluent contaminating drinking water in Indonesia appears to be high.
The risk of effluent contaminating drinking water in Indonesia appears to be high.

The predominant form of sanitation is water-based.

(WSP, 2012)
The risk of effluent contaminating drinking water in Indonesia appears to be high.

Over 50% of urban and peri-urban Indonesians take household water from groundwater. (WHO, 2012)

PDAMs can also take water from rivers that may be contaminated.
The risk of effluent contaminating drinking water in Indonesia appears to be high.

80% of septic tanks fail.

(GOI, WSP)
The risk of effluent contaminating drinking water in Indonesia appears to be high.

Only 3% are connected to sewerage.

(WSP, 2012)
The risk of effluent contaminating drinking water in Indonesia appears to be high.

So we need to focus on separation.
Indonesia’s target for 100% sanitation coverage by 2019 is ambitious and so is the target for community scale systems (7.5%).

7.5% of population = 20M Assuming there are 4 people per household and 50 households per system then target for community scale systems in 2019 could be 100,000.

To have 100,000 effective community scale systems by 2019, we need to learn from installed systems so that new systems achieve separation and enable reuse.
Observations from community scale systems
Summary of observations

• **Program design** is central but varies – it influences whether monitoring happens, it seems to influence performance, and in some cases, a program’s financial arrangements may accidentally prevent good health and environmental outcomes.

• Only a small proportion of systems are **monitored**, and that is usually a **single post-construction functional check**. The technical treatment performance is monitored for a very small proportion of systems.

• The fundamental purpose of sanitation is to separate people and their excreta. We are not yet monitoring separation through **human health indicators** (e.g. groundwater quality where it is principal drinking water source) or **environmental health indicators**.

• Post construction surveys suggest that on average, **systems have 50% spare capacity** – the number of people served could be doubled, without installing any new IPALs.

• Most KSMs have trouble with a similar subset of tasks.
Installing systems doesn’t always deliver separation outcomes.

[ In this systems diagram the arrows are to be read as “causes” or “contributes to” ]
Installing systems doesn’t always deliver separation outcomes.

Not all hh may connect

Contamination / Pathogen removal limited

[ In this systems diagram the arrows are to be read as “causes” or “contributes to” ]
Installing systems doesn’t always deliver separation outcomes.

- Not all households may connect.
- Systems may not have enough effluent to function properly.
- Effluent may not meet standards and be released to drinking water source.
- Contamination/Pathogen removal limited.

[In this systems diagram the arrows are to be read as “causes” or “contributes to”]
Installing systems doesn’t always deliver separation outcomes.

- Not all households may connect
- Septic tank may not be properly disconnected after connecting to IPAL
- Systems may not have enough effluent to function properly
- Effluent may not meet standards and be released to drinking water source
- Contamination/Pathogen removal limited

[In this systems diagram the arrows are to be read as “causes” or “contributes to”]
Installing systems doesn’t always deliver separation outcomes.

- Poor construction or O&M
- Pipes may leak
- Systems may not have enough effluent to function properly
- Effluent may not meet standards and be released to drinking water source
- Contamination / Pathogen removal limited

[In this systems diagram the arrows are to be read as “causes” or “contributes to”]
Installing systems doesn’t always deliver separation outcomes.

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- Pipes may leak
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[In this systems diagram the arrows are to be read as “causes” or “contributes to”]
Growth of funding for air limbah systems is exponential.

By 2014 there were over 13,000 systems funded for installation, mostly by SANIMAS DAK SLBM. Available data indicates that the DAK funds the majority of systems for installation (77%), while USRI and the SANIMAS Regular fund similar amounts (10% and 8%, respectively). Anecdotal evidence indicates that the Ministry of Health may also be funding SSS systems.
Of the 13,600 systems funded for installation, about 20% are intended to have a single post construction survey.

Almost no systems are monitored longitudinally and it appears that nearly 80% of systems have no monitoring data about the technical, financial, or management performance.

(Source: PU, ADB, AKSANSI)
The need to monitor effluent is recognised, but is challenging in practice, because of e.g., lack of funds, uncertainty about responsibility, access to labs and the quality of the lab testing.
The available data indicates that system performance could be influenced by program design.

Effluent was tested in 2011 (Eales et al). The majority of systems were SANIMAS and 92% met standards (n=99).

Anecdotally, 50% compliance, (n~70) (pers comm).

80% had a BOD <100 mg (n=45).

The systems under the original SANIMAS program had very good performance.
Longitudinal monitoring appears to not be undertaken.

<table>
<thead>
<tr>
<th>Infrastructure life (years):</th>
<th>Post-construct audit</th>
<th>Planned longitudinal monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 yr</td>
<td>5 yrs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 yrs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 yr</td>
</tr>
<tr>
<td>Systems funded by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAK SLBM</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>APBN PU</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>ADB USRI</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Systems monitored by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AKSANSI</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Systems report in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAWASIS</td>
<td>✓</td>
<td></td>
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</tbody>
</table>

Some programs require a post-construction assessment. Usually the assessment is conducted within one year after construction, when systems are likely to perform well. The assessment does not monitor separation. Planning for on-going monitoring over the asset lifecycle appears not to be implemented, and we were unable to ascertain if on-going separation is achieved.
Monitoring human health and water quality impacts can demonstrate separation, and does not seem to occur.

<table>
<thead>
<tr>
<th>Components of post construction check:</th>
<th>Governance aspects</th>
<th>Required impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Financial sustainability</td>
<td>Functioning technology</td>
</tr>
<tr>
<td>Systems funded by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAK SLBM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(77% of systems)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>APBN PU</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>(11% of systems)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADB USRI</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>(10% of systems)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systems monitored by:</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AKSANSI</td>
<td>✓</td>
<td>✓</td>
</tr>
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<td>Systems reported in:</td>
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<td></td>
</tr>
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<td>✓</td>
<td></td>
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</table>

AKSANSI’s monitoring appears to be the most comprehensive. It is unconfirmed if any post-construction checks or on-going monitoring is undertaken for the DAK funding.
Post construction surveys suggest a very wide range of actual use of air limbah systems.

Available data suggests that actual use of air limbah systems is about half of system design, suggesting a large opportunity to increase use of existing systems to, a maximum, double existing coverage.
Most KSMs could benefit from support.

<table>
<thead>
<tr>
<th>Manageable tasks for the KSM</th>
<th>Challenging tasks for the KSM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Successful operation</strong></td>
<td>Monitoring of effluent</td>
</tr>
<tr>
<td>✓ Flushing the system</td>
<td>Repairs facilities (MCK)</td>
</tr>
<tr>
<td>✓ Checking pipes for cracks</td>
<td>Conducting biogas maintenance</td>
</tr>
<tr>
<td>✓ Planning and tracking O+M tasks</td>
<td>Deodorising the methane</td>
</tr>
<tr>
<td>✓ Fixing blockages</td>
<td>Unused facilities (MCK &amp; unconnected SSS)</td>
</tr>
<tr>
<td><strong>Sustainable financing</strong></td>
<td>De-scumming monthly</td>
</tr>
<tr>
<td>✓ Keeping records of group assets</td>
<td>De-sludging every 2-4 years</td>
</tr>
<tr>
<td><strong>Sustaining demand</strong></td>
<td>Managing the treasury book &amp; bank account</td>
</tr>
<tr>
<td>✓ Conducting health campaign</td>
<td>Preparing financial accountability report</td>
</tr>
<tr>
<td>✓ Reminding users of their responsibilities &amp; providing support</td>
<td>Collecting user fees</td>
</tr>
<tr>
<td>✓ Conducting monthly users meetings</td>
<td>Forecasting recurrent costs</td>
</tr>
<tr>
<td>✓ Cleaning the MCK</td>
<td>Planning &amp; budgeting for major expenses, uncertainty, emergencies</td>
</tr>
<tr>
<td><strong>Effective management</strong></td>
<td>Sourcing supplementary income streams</td>
</tr>
<tr>
<td>✓ Paying KSM</td>
<td>Educating about the benefits of the system</td>
</tr>
<tr>
<td>✓ Keeping complaint recording mechanism</td>
<td>Paying operator</td>
</tr>
<tr>
<td>✓ Hosting regular management meetings</td>
<td>Ensuring operator legitimacy in community</td>
</tr>
</tbody>
</table>

(Source: AKSANSI)
Program design may inadvertently prevent health outcomes.

[In this systems diagram the arrows are to be read as “causes” or “contributes to”]
Program design may inadvertently prevent health outcomes.

In this systems diagram the arrows are to be read as "causes" or "contributes to".
Program design may inadvertently prevent health outcomes.

- Sites chosen on basis of land available
- Program design excludes pumps
- HHs that are below the IPAL cannot connect
- Program design does not pay for hh connection
- Poor hh cannot connect
- Incomplete coverage of hhs
- Air limbah is not processed in the IPAL
- Drinking water & environment contamination

[In this systems diagram the arrows are to be read as “causes” or “contributes to”]
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Program design excludes pumps

Program design does not pay for hh connection

Poor hhs cannot connect

Less system capacity is utilised

System does not function properly

[ In this systems diagram the arrows are to be read as “causes” or “contributes to” ]
Program design may inadvertently prevent health outcomes.

Program design has one CBO for installation and one for post-construction

2nd CBO is not trained

System does not function properly

Drinking water & environment contamination

[ In this systems diagram the arrows are to be read as “causes” or “contributes to” ]
Program design may inadvertently prevent health outcomes.

- Program design does not include enough socialisation
- Less demand
- Challenges in collecting fees
- Inability to raise fees
- Insufficient maintenance funds
- CBO may lack authority in fee setting and collection
- System does not function properly
- Drinking water & environment contamination

[In this systems diagram the arrows are to be read as “causes” or “contributes to”]
Program design may inadvertently prevent health outcomes.

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Program design may inadvertently prevent health outcomes.

In this systems diagram the arrows are to be read as “causes” or “contributes to”.

- Drinking water & environment contamination
- Lack of drinking water or health monitoring
- Poor performance unnoticed

Program design may inadvertently prevent health outcomes.
Program design may inadvertently prevent health outcomes.

- Sites chosen on basis of land available
- Program design excludes pumps
- Program design does not pay for hh connection
- Program design has one CBO for installation and one for post-construction
- Program design does not include enough socialisation
- HHs that are below the IPAL cannot connect
- Poor hhs cannot connect
- Budget limits length of mains pipe
- Incomplete coverage of hhs
- Less system capacity is utilised
- 2nd CBO is not trained
- System does not function properly
- Challenges in collecting fees
- Inability to raise fees
- Insufficient maintenance funds
- CBO may lack authority in fee setting and collection
- Air limbah is not processed in the IPAL
- Drinking water & environment contamination
- Lack of pathogen or health monitoring
- Poor performance unnoticed
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- Program design does not include enough socialisation
- Sites chosen on basis of land available

[ In this systems diagram the arrows are to be read as “causes” or “contributes to” ]
Proposed recommendations
**Functioning technology**

- **A.** Target and monitor what matters

**Sustainable financing**

- **B.** Make the most of existing investments

**Effective management**

- **C.** Next generation program design

**Sustaining demand**
Functioning technology

A. Target and monitor what matters

Effective management
A. Target and monitor what matters

Current target

100% population with toilet

Effluent captured?

Expanded target

100% of population’s effluent is successfully captured and processed

What matters will shift in the next generation of air limbah management, for example, to treatment and towards resource recovery.
A. Target and monitor what matters

1. All systems get a post-construction audit

2. Monitoring reflects the local situation, e.g:
   - Where groundwater is principal source of drinking water, monitor groundwater annually
   - Where PDAM provides water, then monitor receiving water quality

<table>
<thead>
<tr>
<th>Example monitoring plan</th>
<th>Post-construct audit</th>
<th>Water and environment monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 yr</td>
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<tr>
<td>Systems funded by:</td>
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<td></td>
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<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
How can we create the conditions for monitoring what matters?

For example:

How could program managers influence long-term appropriate performance monitoring?

Who could undertake longitudinal performance monitoring and evaluation?

How could programs link with existing monitoring (AKSANSI, NAWASIS, Ministry of Health, Ministry of Environment)?

Who could undertake a cross-programmatic evaluation of the existing systems?
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>B. Make the most of existing investments</strong></td>
<td></td>
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</tbody>
</table>
Effectiveness of existing systems can be significantly improved through simple interventions.

Existing data shows that investing in existing systems could significantly increase coverage.
These **simple interventions** could be funded a variety of ways.

- Necessary incremental amount needed to optimise the existing investment
- Initial 425,000,000 IDR invested to construct the decentralised system

What is the value of the optimisation gap and who could pay?

- Government
- Donor programs
- Increased user fees
- CSR
C. Next generation program design

- Functioning technology
- Sustainable financing
- Effective management
- Sustaining demand
Initial ideas for improving donor and GoI programs:

• find ways to pay for/connect all households to help ensure design capacity (and therefore system operation) is used and no groups are marginalised or excluded

• formalise tariff setting to improve user approval of fees

• formalise fee collection to improve user payment rates

• maximise KSM capacity to deliver e.g., include powerful local champions to improve standing in community during construction and operation, ensure good handovers when members change

• responsible management partnerships with local government to ensure all operational responsibilities for the system are successfully undertaken
Project Team Details

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