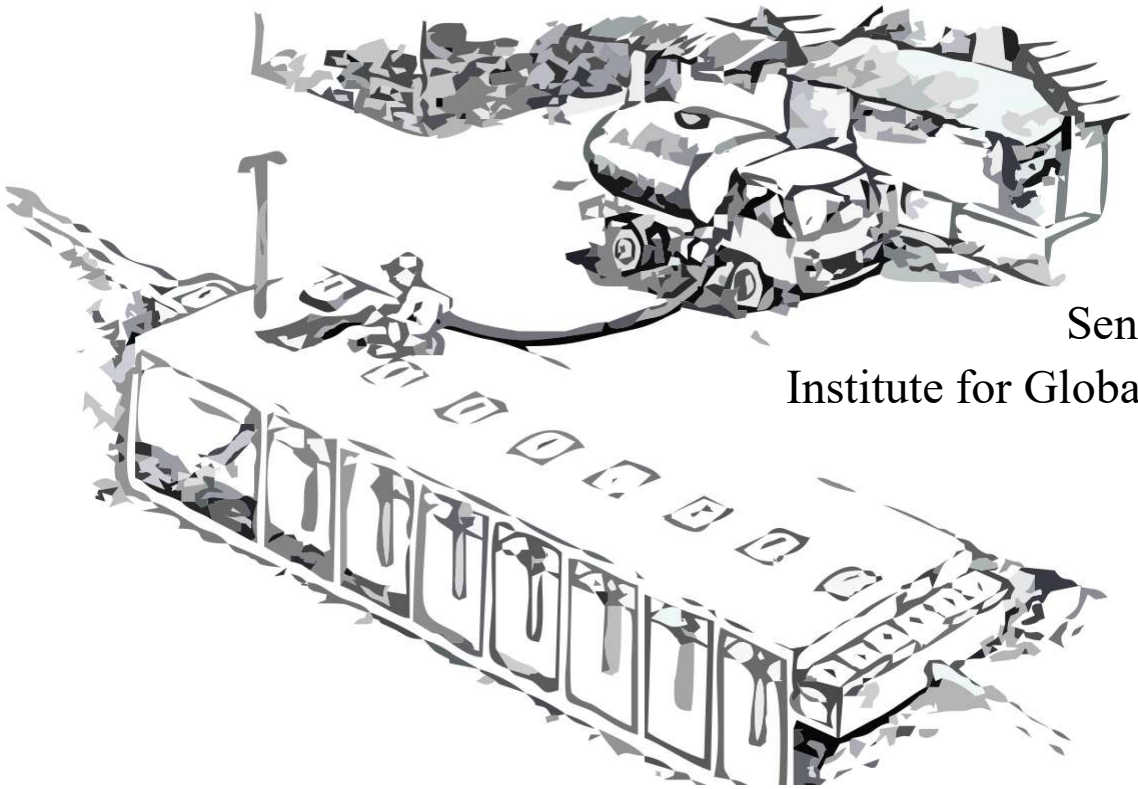
An Overview of Septage Management in Asia – Challenges and Opportunities

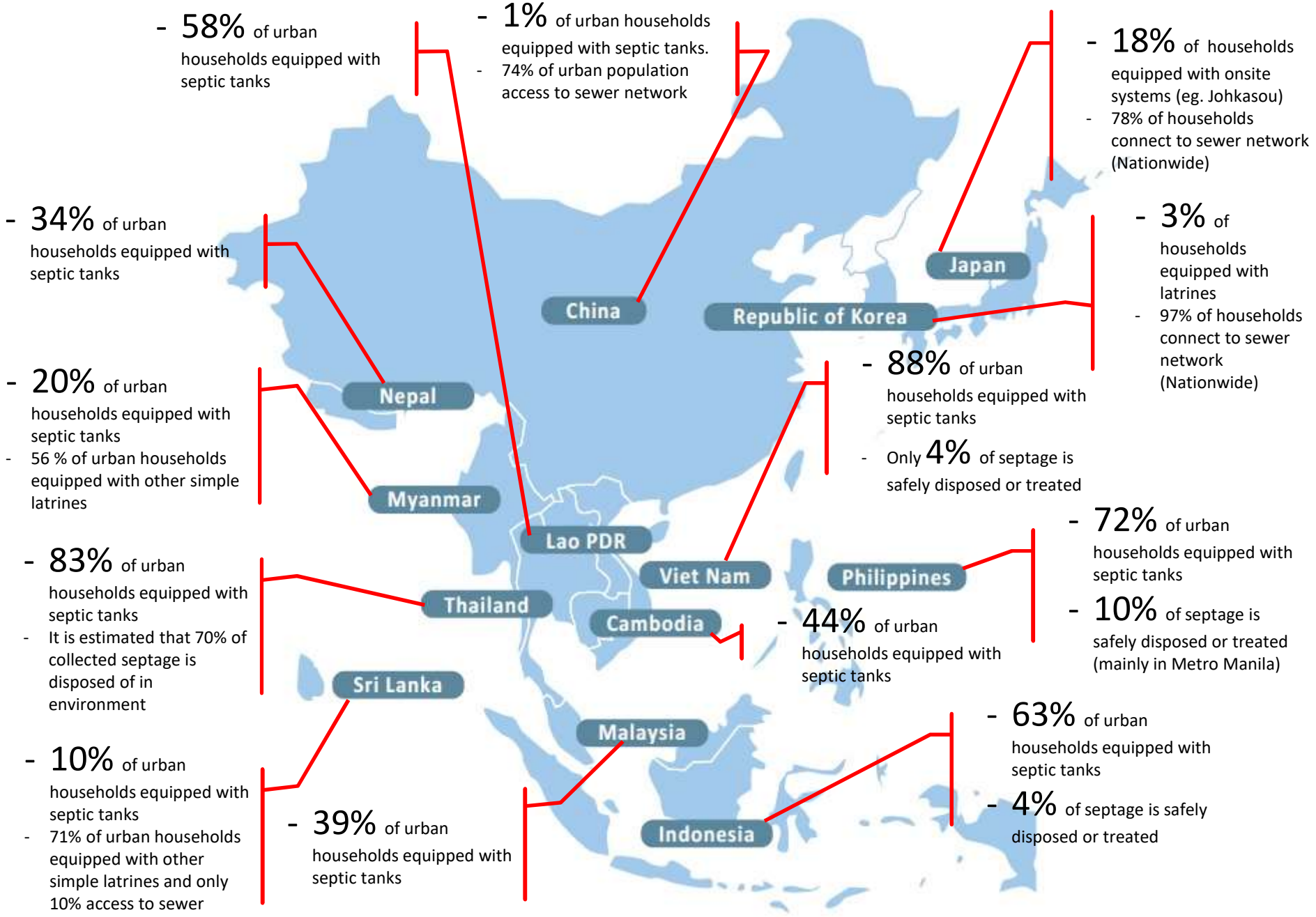


Pham Ngoc Bao, Ph.D
Senior Water and Sanitation Specialist
Institute for Global Environmental Strategies (IGES)
Email: ngoc-bao@iges.or.jp

IGES
Institute for Global Environmental Strategies

Background

- The Asia-Pacific region, with over 4.6 billion people by 2016, is the home of nearly 60% of the world population.
- Rapid population growth, urbanization, industrialization and changes in consumption patterns, including shifting diets toward highly water-intensive foods such as meats, which have led to a significant increase in water demand, and placed a huge burden on water infrastructures in the region.
- It is estimated that from 80% to 90% of generated wastewater, especially in developing countries within the region, is discharged directly into water bodies without any treatment or only partially treated by simple on-site sanitation systems such as septic tanks, causing substantial levels of contamination in ground and surface water sources, as well as coastal ecosystems, and placing a huge economic impact.



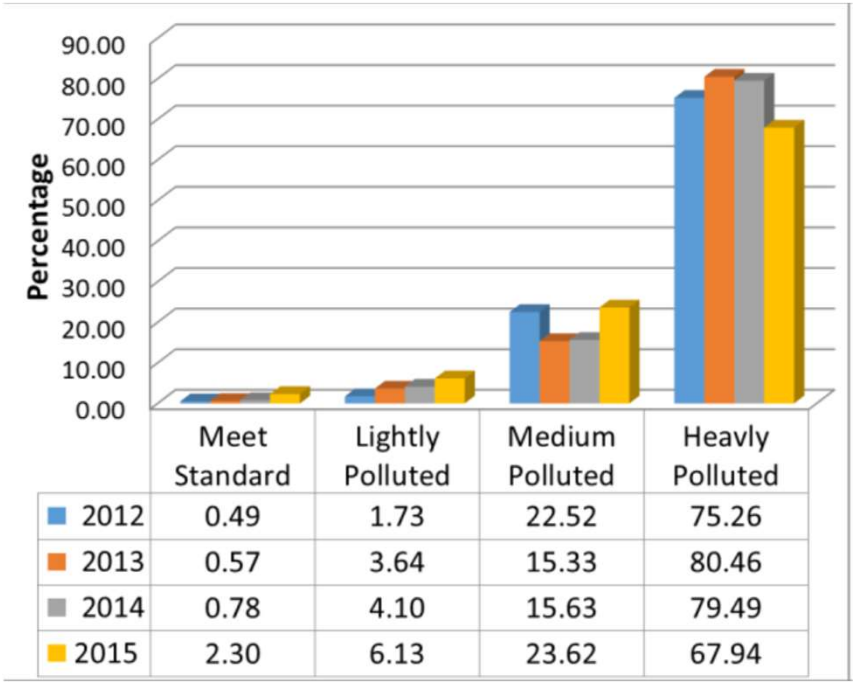
(Source: WHO and UNICEF, 2017; and database from WEPA website)

Common Challenges and Impacts of Poor Septage Management in Asia

- Predominance of septic tanks with its poor performance/maintainance as effective onsite wastewater treatment system, but considered as diffuse sources of pollution in many urban areas.
- Lack of proper septage management, including ineffective emptying, collection & transport, treatment and disposal system.

Fig. 1. Discharge of collected septage at "dumping points" in Bandung; and effluent from septage treatment plant in Denpasar, Indonesia
(Source: Author)

. Negative impacts on surface and groundwater quality



	Meet Standard	Lightly Polluted	Medium Polluted	Heavly Polluted
2012	0.49	1.73	22.52	75.26
2013	0.57	3.64	15.33	80.46
2014	0.78	4.10	15.63	79.49
2015	2.30	6.13	23.62	67.94

INDONESIA

(Source: Budi, 2015)

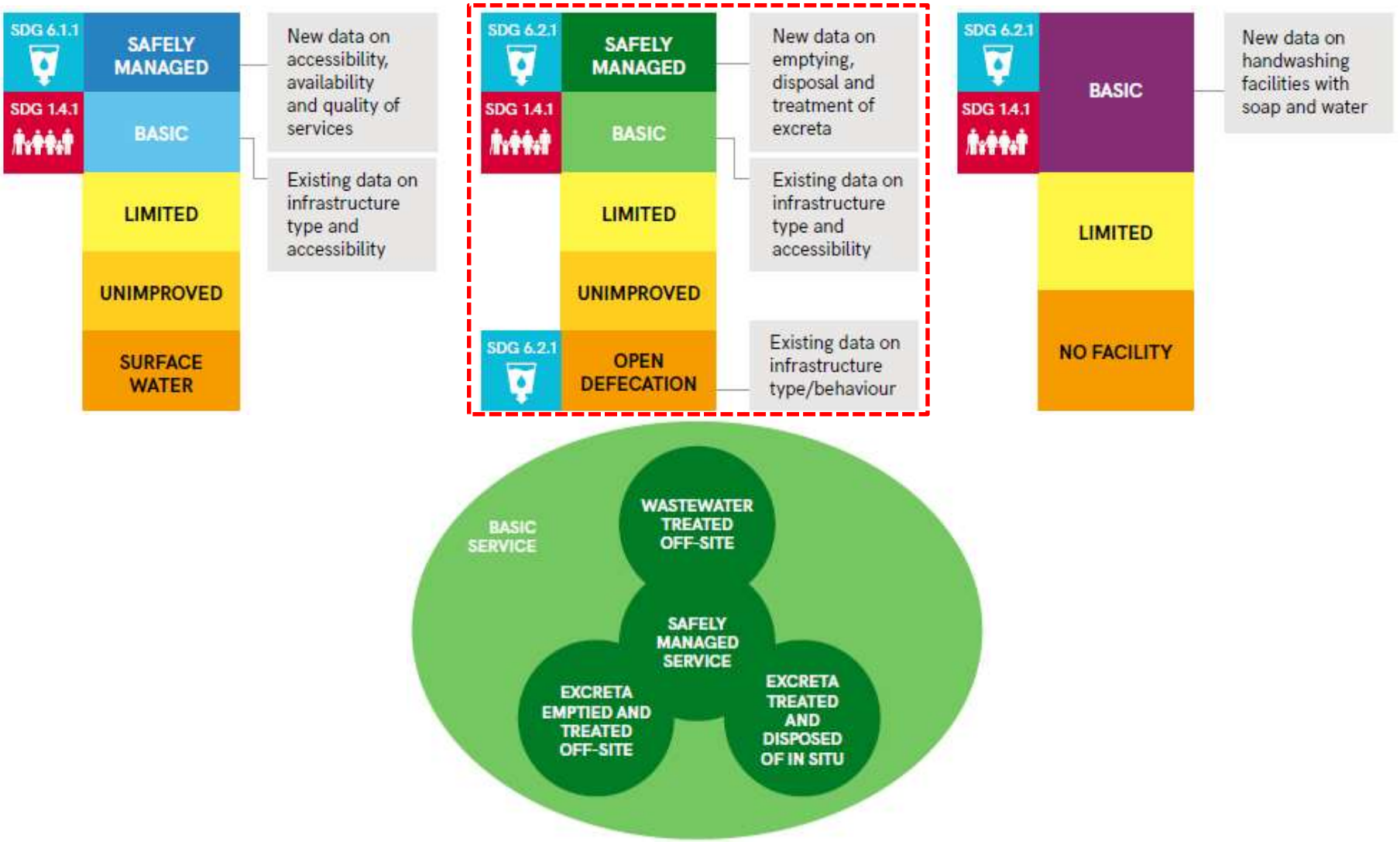
- Huge economic costs due to poor sanitation

A study from the World Bank in the East Asia and Pacific region—Indonesia, Philippines and Vietnam, showed that the previously described situation has caused huge socio-economic, ecological and environmental negative impacts in the studied countries, including Indonesia, Philippines and Vietnam, with a total cost of US$8.5 billion. The breakdown of this cost includes Vietnam—US$780 million, or 1.3 percent of GDP; Philippines— US$1.4 billion, or 1.5 percent of GDP; and Indonesia—US$6.3 billion, or 2.3 percent of the GDP (World Bank, 2013)

SDG 6

From MDGs to SDGs –
Addressing unfinished business

Updated JMP ladders for drinking water and sanitation and a new ladder for hygiene



Big Gaps between "Science - Reality"

Science seems to be clear…but **Reality & Future is NOT**

5m^3 truck load of FS dumping ~ 5,000 pe. practicing open defecation

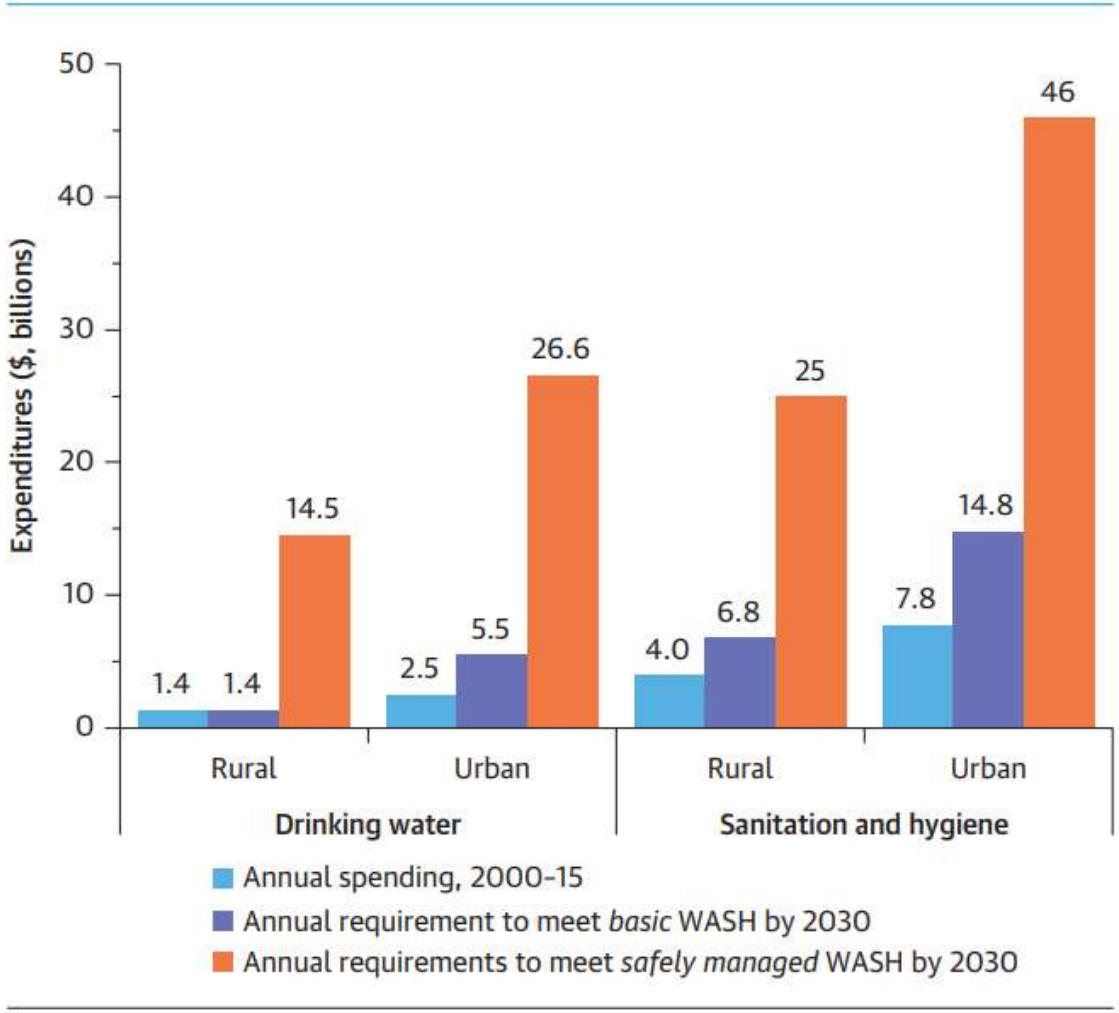
More than 150 STP have been constructed, but only **less than 10% are still under operational**…because of LACK OF APPROPRIATE TECHNOLOGIES???….**NO**

Vietnam

Bandung- Indonesia

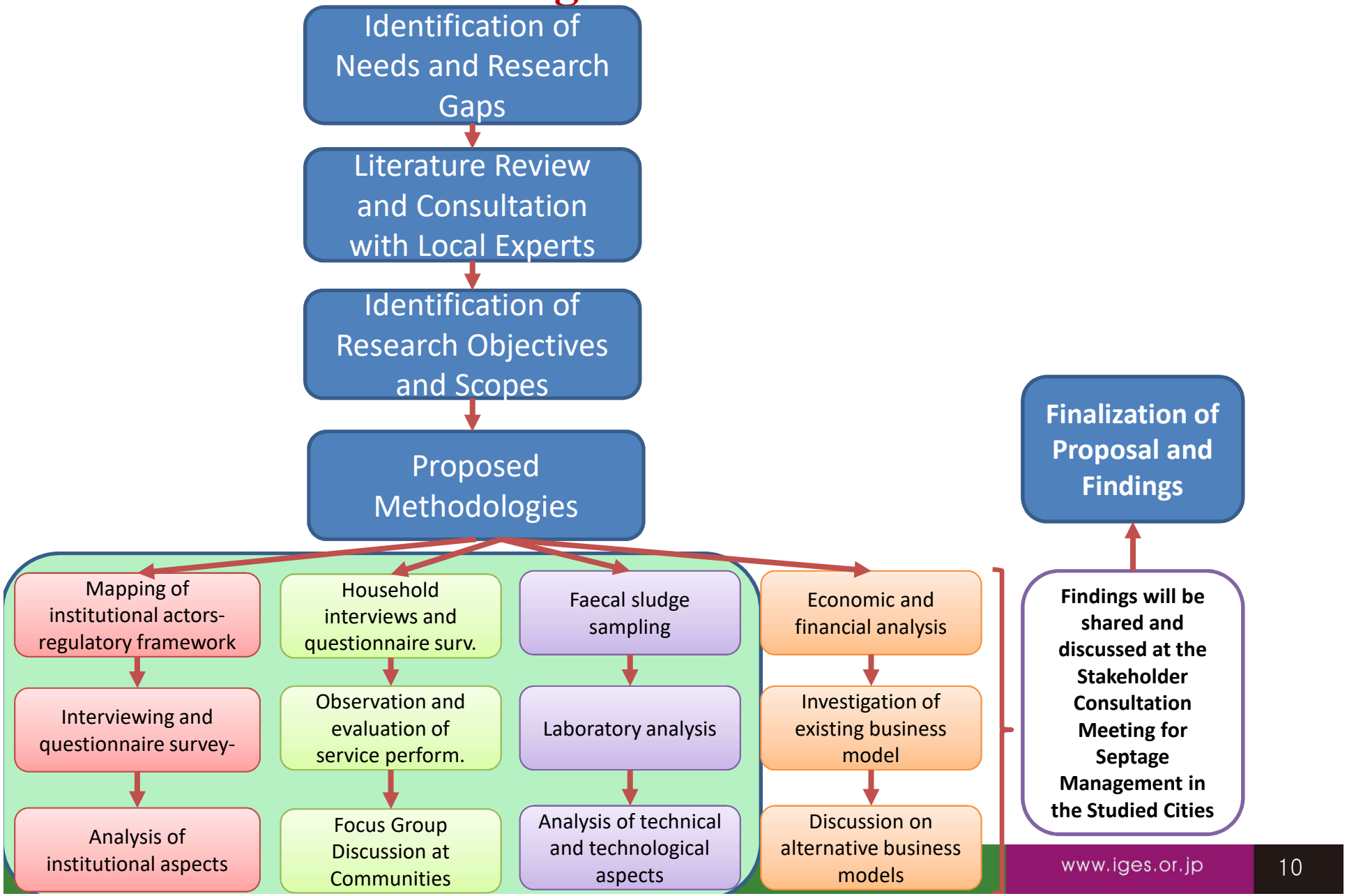
Septage management **requires an integrated system level approach, considering the overall sanitation service chain** and incorporating all relevant aspects (including technological, legal and institutional framework, financial, etc.), and especially there are strong **needs for appropriate business models for septage management in the region**

Costs of Extending WASH Access under SDGs (2016–30) Compared with MDGs (2000–15), (World Bank, 2017)



Source: World Bank/UNICEF 2017.
Note: WASH = water supply, sanitation, and hygiene.

Actual Case Study in Indonesia – Business Models for Septage Management in Urban Areas



UNIVERSAL ACCESS IN INDONESIA BY 2019

SANITATION TARGETS (2010 - 2014)

Open Defecation Free (ODF)

- 10% off-site sanitation (through 5% City-wide sewerage system and 5% DEWATS)
- 90% on-site sanitation

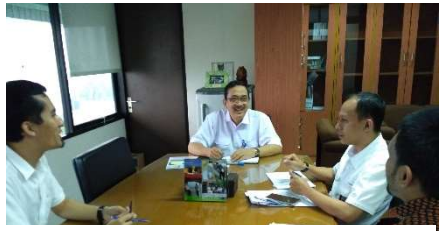
SANITATION TARGETS (2015 – 2019)

UNIVERSAL ACCESS 100 - 0 – 100

- 100% safe drinking water
- 0% slums
- 100% improved sanitation, including faecal sludge management.

National Medium-Term Development Plan 2015-2019

- **Off-site sanitation** (centralized and decentralized sewerage systems): **15%**.
- The remaining **85%** of household replying on **on-site sanitation and faecal sludge treatment**



Meeting at the Ministry of Public Work

Visit Bojongsoang WWTP

Septage dumping point

Focus Group Discussion

Meeting at the PDAM - Bandung

Meeting with Bandung Depart. of Public Work

Septage collection point at household

Collected septage from households

Meeting at the ITB

Meeting with Environmental Pollution Control Section of West Java Province Environmental Protection Agency/ and Bandung City Environmental Protection Agency

Questionnaire survey at households

Meeting with Local Planning and Development Unit/ Cleaning and Landscaping Agency/Public Works Department/Health Department/Environmental Services Agency of Denpasar City

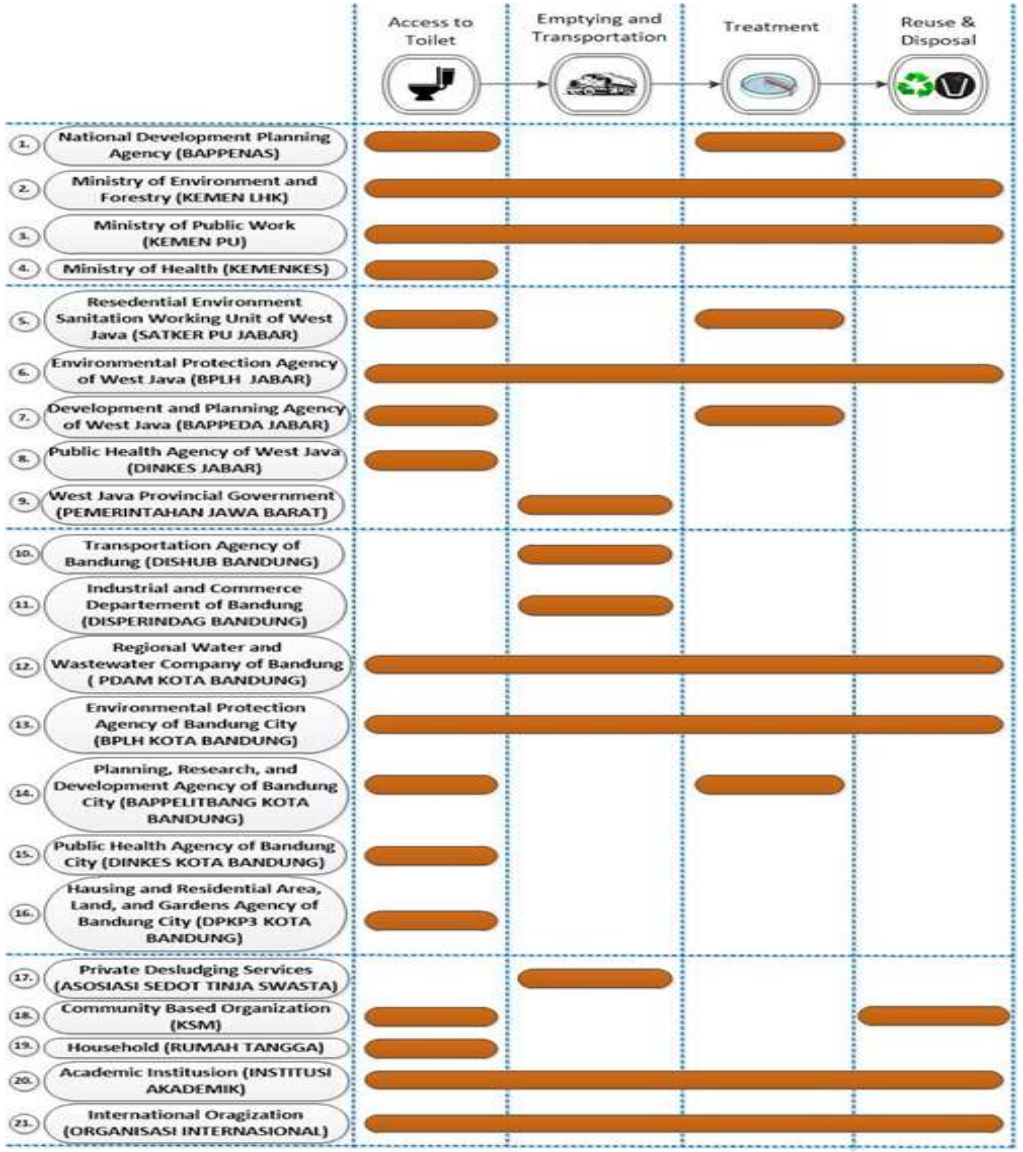
Visit Bojongsoang WWTP

Institutional Framework for Septage Management (Theoretically)

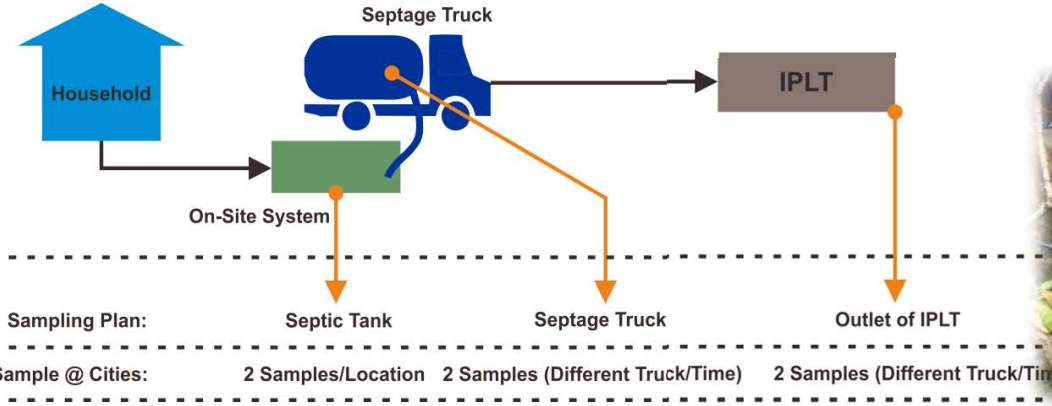
Schematic representation of different organisational arrangements for distribution of operational responsibilities among stakeholders (one block represents one stakeholder).

(Source: Bassan, 2016)

Institutional Framework for Septage Management (Actually)

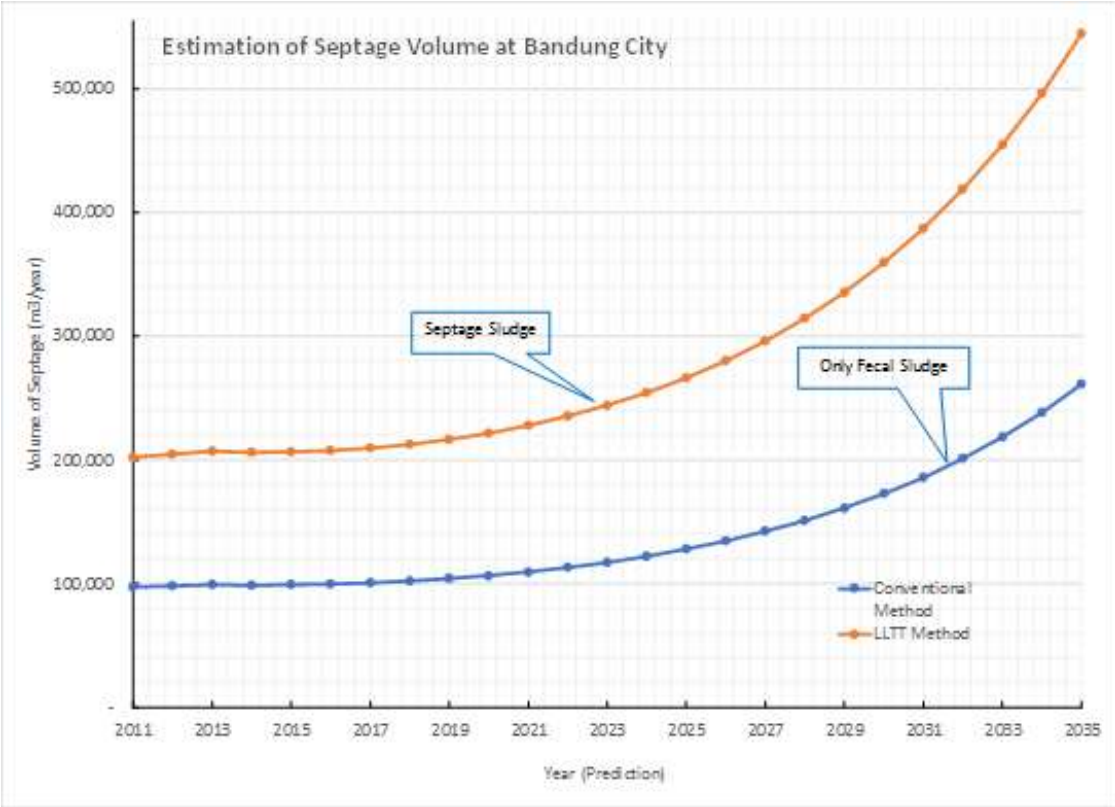


Septage Samplings and Laboratory Analysis at ITB

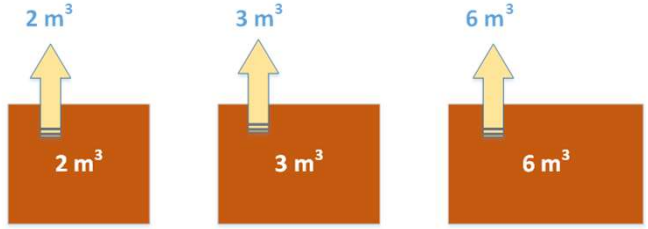


No1	Parameter	Technique
1	BOD_5	Incubation Probe
2	COD	Titrimetric
3	Total and Free Ammonia	Ion Selective Ele
4	Total Nitrogen	Ion Selective Ele
5	Total Phosphorus	Colorimetric
6	Total Solids	Gravimetric
7	Total Suspended Solids	Gravimetric
8	Volatile Suspended Solids	Gravimetric
9	E. Coli	Enzyme Substrate
10	Heat Value	Calorimeter
11	Helminth Egg	Ballinger

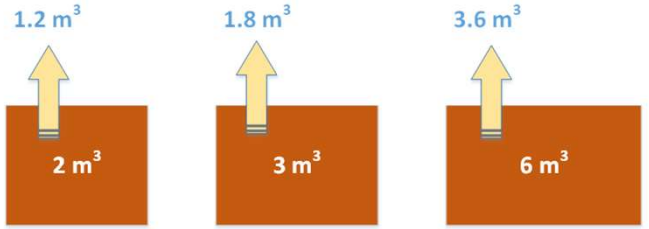
Challenges of Accurate Estimation on Generated Amount of Septage



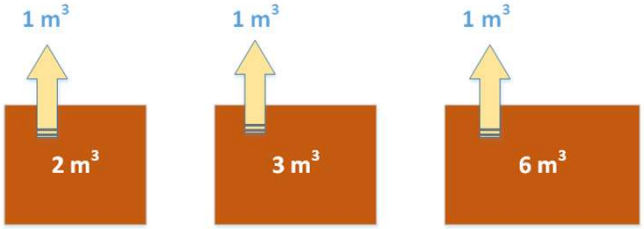
Approach A: Desludge the whole wastewater



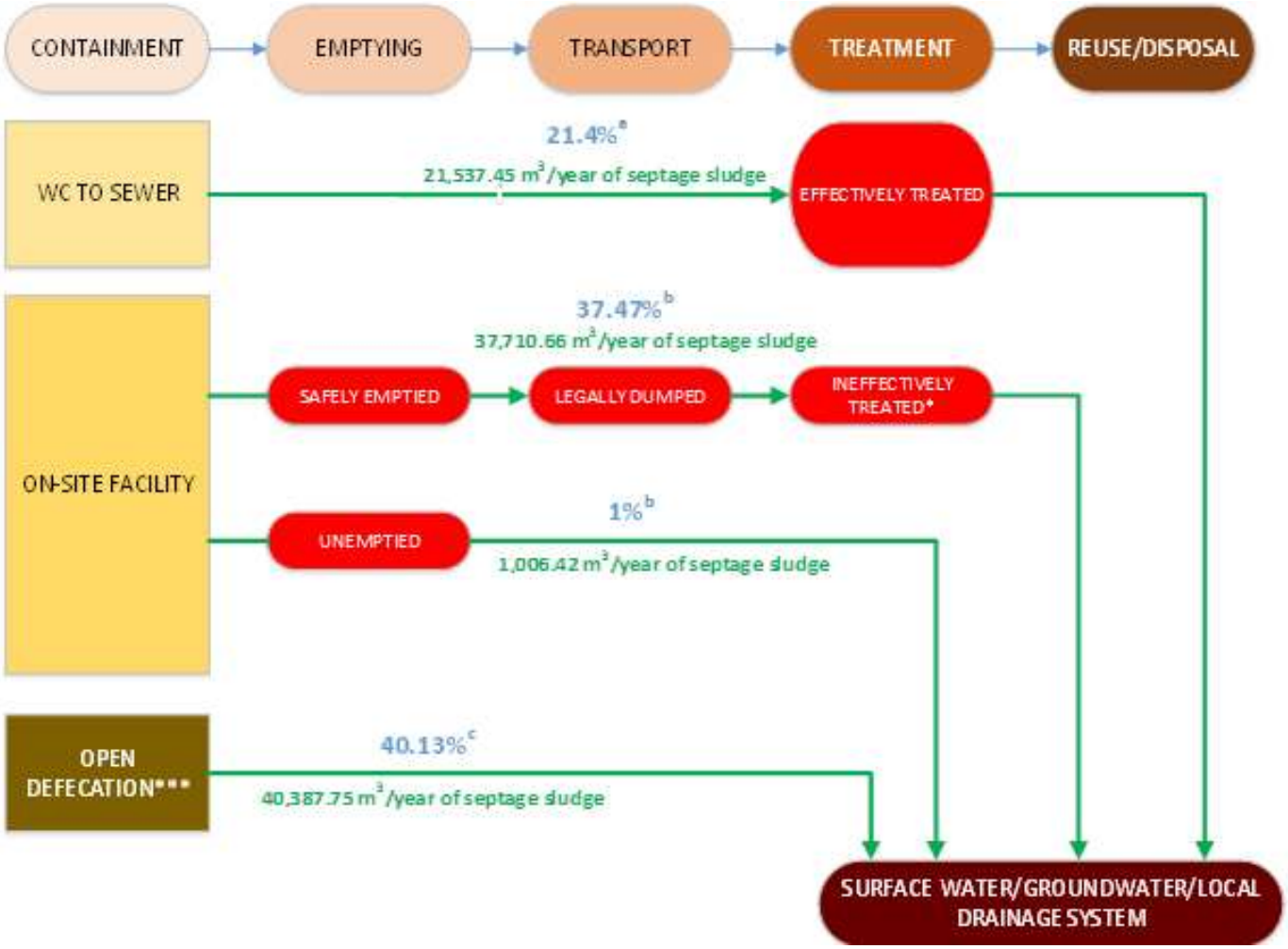
Approach B: Proportional (Example: 60% of total capacity)



Approach C: Fix Volume



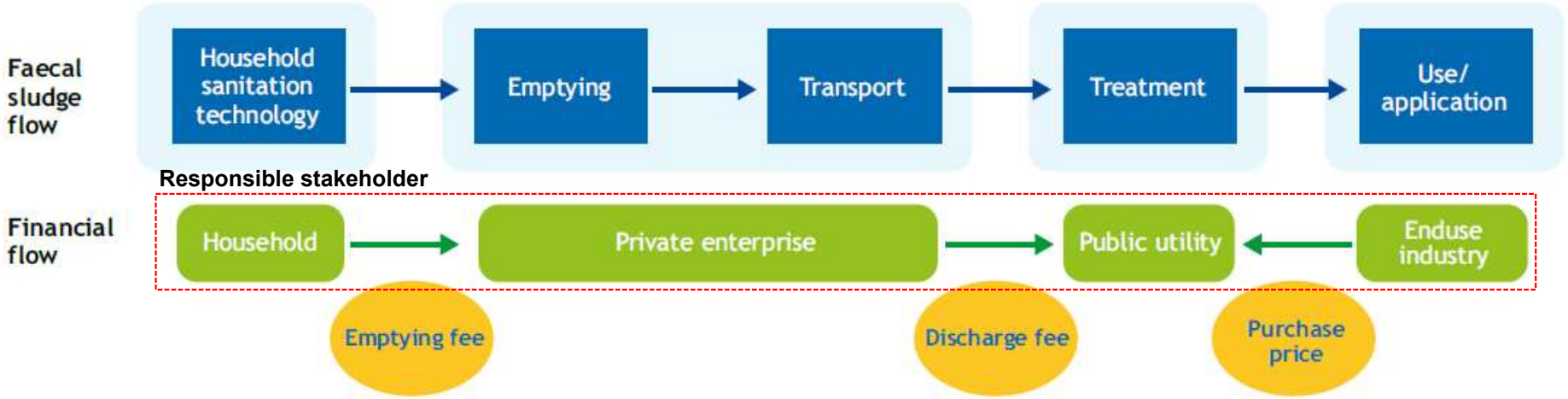
Septage Flow Diagram in Bandung



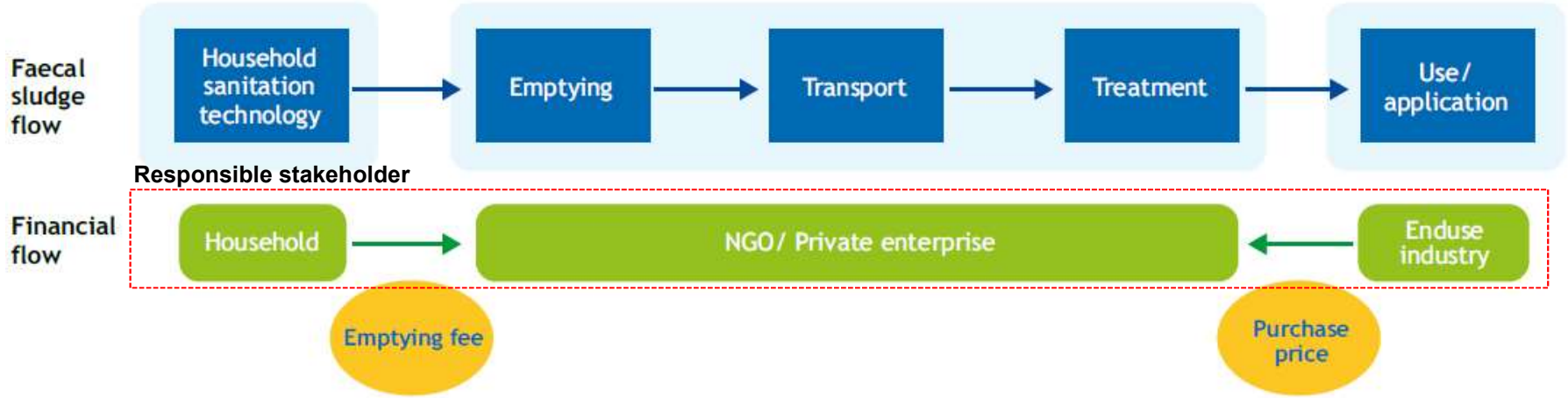
STAKEHOLDER CONSULTATIONS ON APPROPRIATE BUSINESS MODELS FOR SEPTAGE MANAGEMENT

Opportunities for Private Sector to be Involved in the Sector Area

Models of Financial and Service Flows for Septage Management



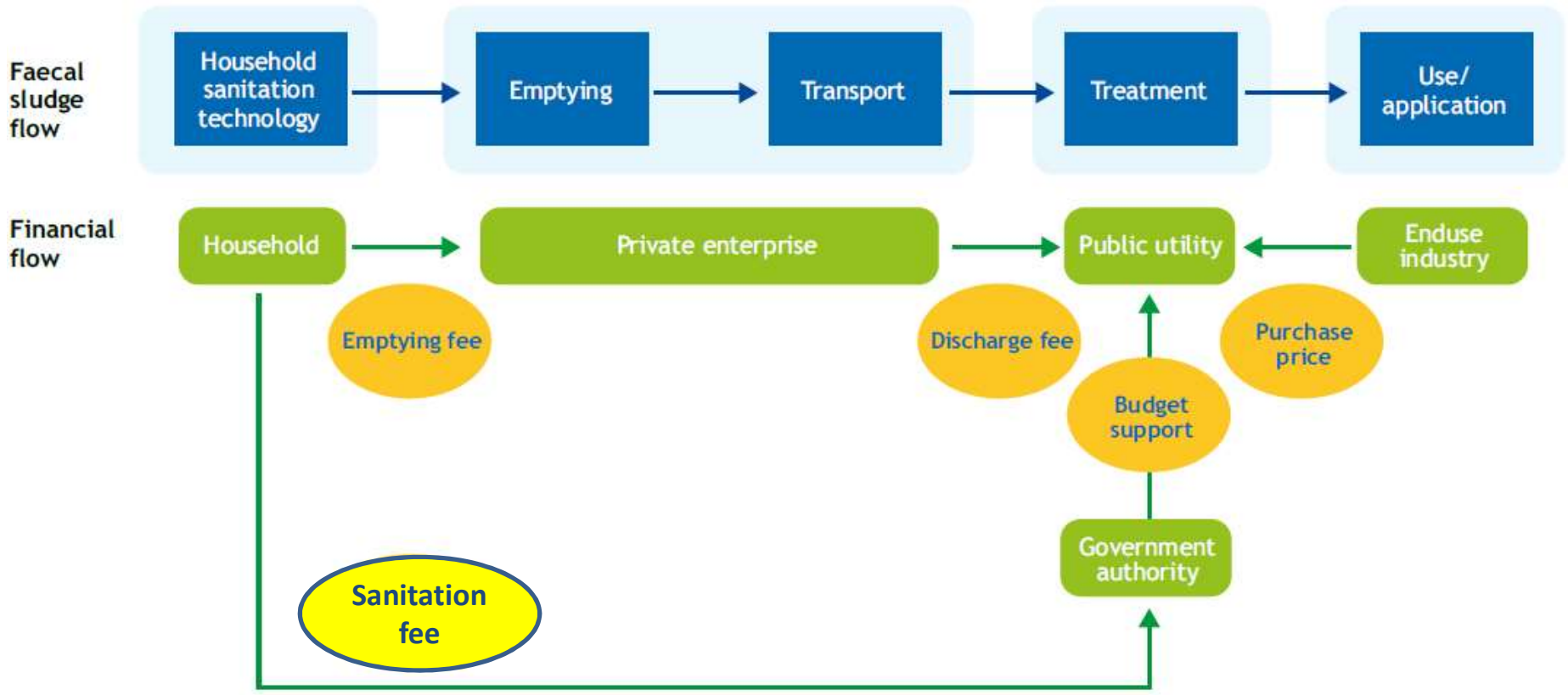
Model 1: Discrete collection and treatment model showing the responsibility of each stakeholder and the related financial transfers



Model 2: Integrated collection, transport and treatment model

(Source: Tilley and Dodane, 2016)

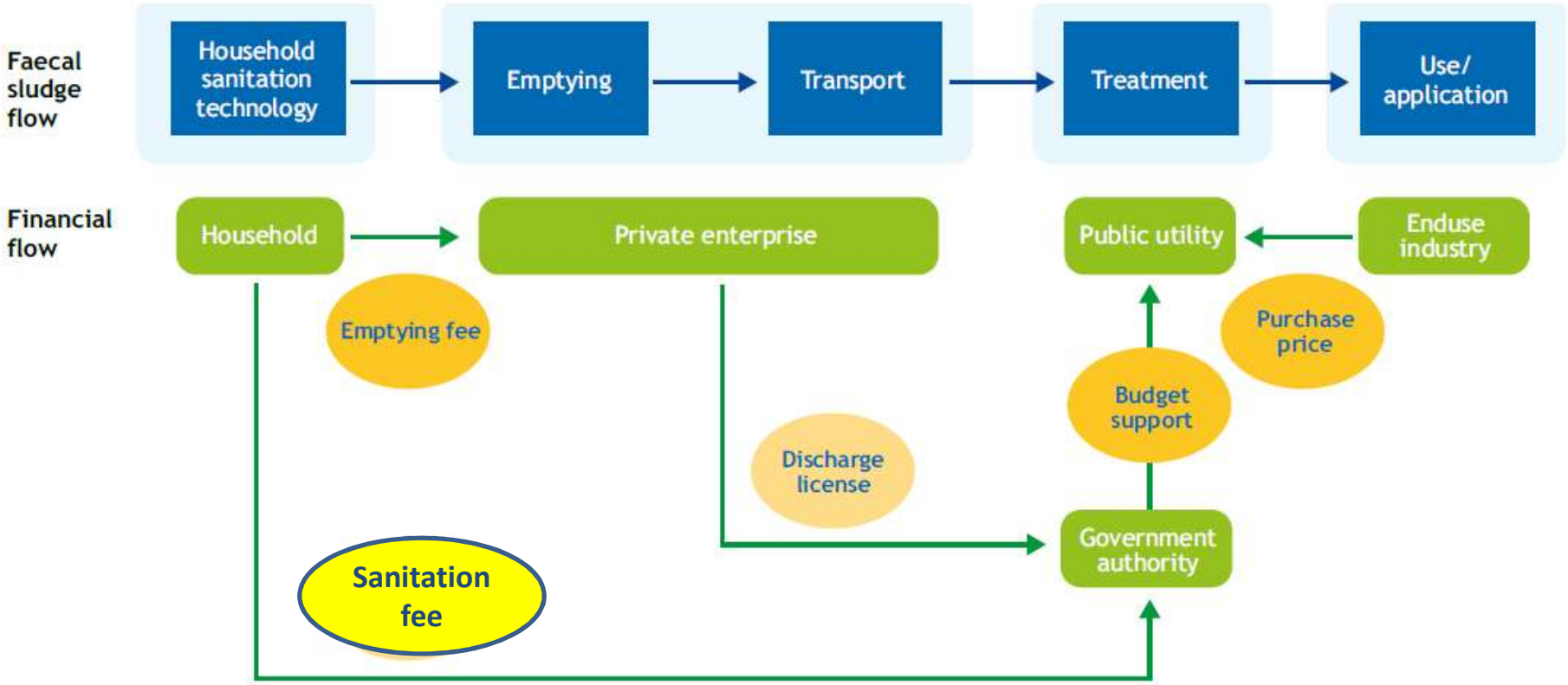
Models of Financial and Service Flows for Septage Management



Model 3: Parallel tax and discharge fee model

(Source: Tilley and Dodane, 2016)

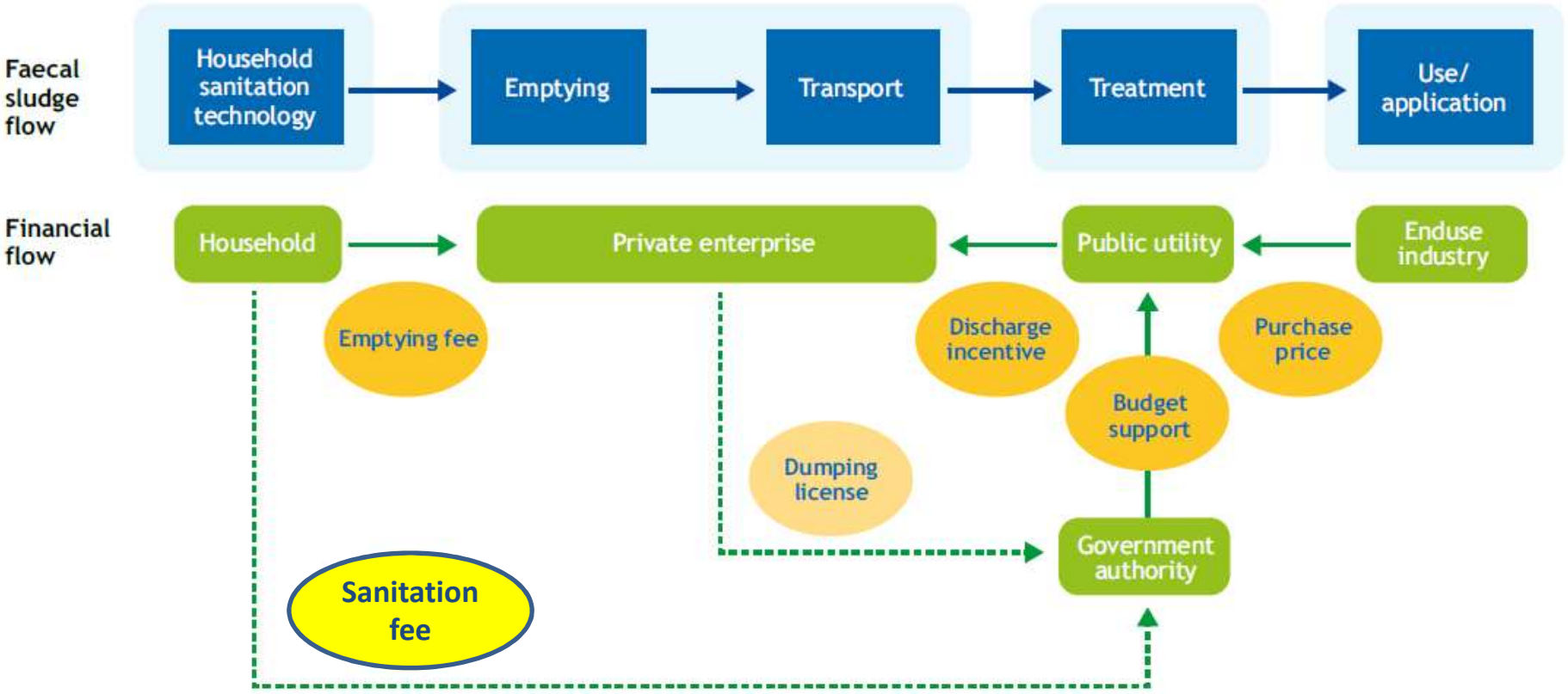
Models of Financial and Service Flows for Septage Management



Model 4: Dual licensing and sanitation tax model

(Source: Tilley and Dodane, 2016)

Models of Financial and Service Flows for Septage Management

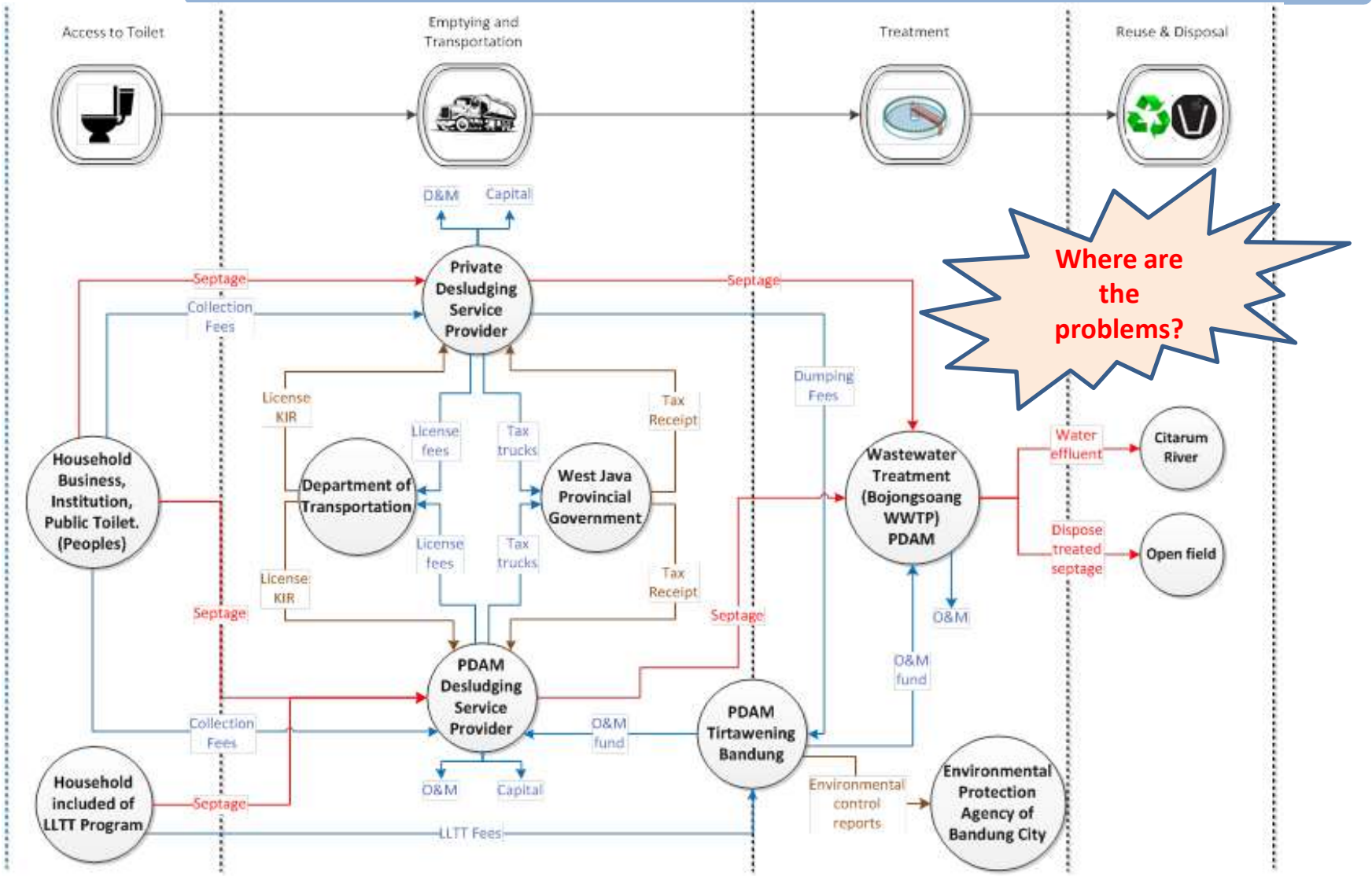


Model 5: Incentivised discharge model

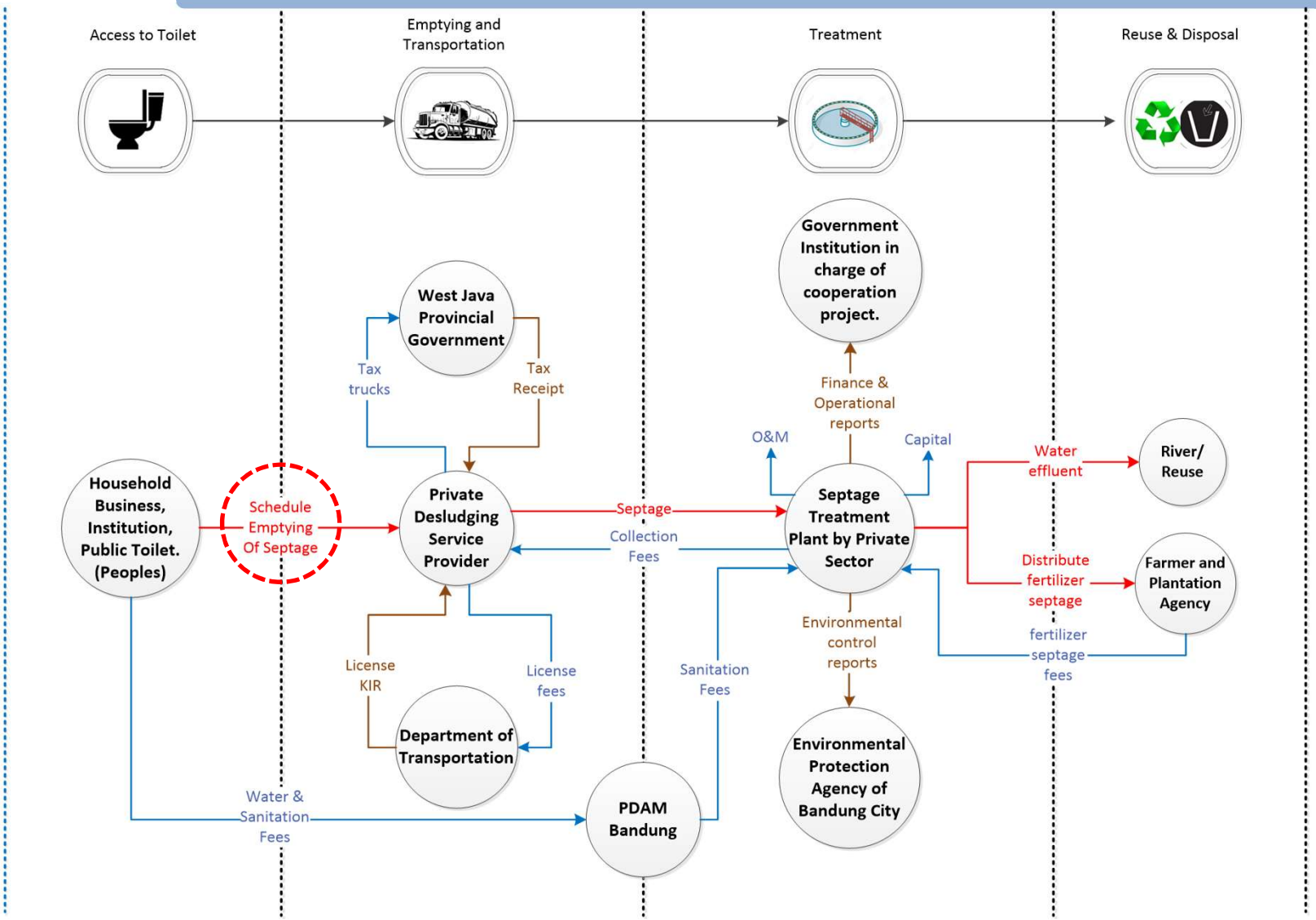
(Source: Tilley and Dodane, 2016)

RESEARCH FINDINGS

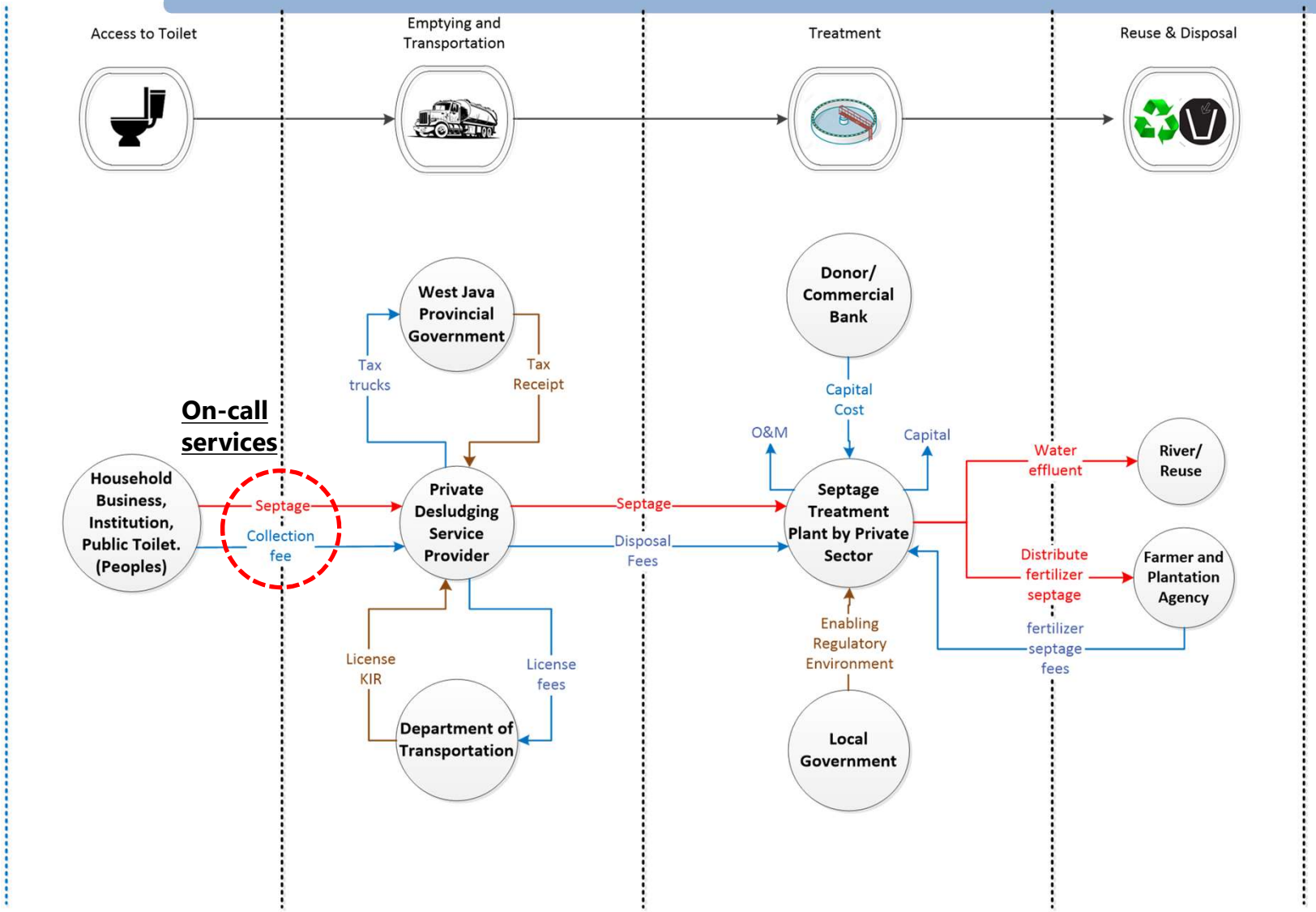
Existing Model for Septage Management in Bandung



Proposed Business Model for Septage Management in Bandung 1



Proposed Business Model for Septage Management in Bandung 2



Advantages and Disadvantages of Each Model

Model	Advantages	Disadvantages
Model 1: Sanitation Fee	a. Every households' that are not connected to the sewer may have lower costs from cross subsidies; b. Unlimited discharges minimise risk of illegal dumping c. Collection and coverage increases	Need to make the most appropriate payment scheme so that it can include people who are not PDAM clean water customers.
Model 2: Full private	a. A single operator is able to optimise the business model and improve efficiency; b. The government does not need to spend fund to improve the management of septage.	a. The government should exercise more intense supervision as all services have been undertaken by the private sector. b. Potential underserved communities. c. The cost of desludging will be greater because the private sector is profit oriented.

THE WAY FORWARD

1. Political will and strong commitments

2. Roles and responsibilities of each stakeholder

3. Appropriate business model

4. Awareness raising

5. Capacity for monitoring and enforcement of septage disposal

6. Regular desludging program

7. Collaboration with research institutions and universities

Central Gov.

Local Gov.

Private sectors

Residents

THANK YOU VERY MUCH FOR YOUR ATTENTION!

Acknowledgements: *The authors would like to express their gratitude to the Ministry of the Environment of Japan for providing financial supports through the project entitled "Integrated Approach for Dissemination of Decentralized Domestic Wastewater Treatment System in Southeast Asia" (1-1603).*