Final Report

MARKET ASSESSMENT FOR SAFELY MANAGED SANITATION IN INDONESIA

OCTOBER 2020

Prepared for

unicef

nielsen

Intentionally left blank (for Backside of the Front Cover)

Contents

ANNEXES

Tables

Acronyms

APBN	=	*Anggaran Pendapatan dan Belanja Negara*. or State Income and Expenditure Budget
BAPPEDA	=	*Badan Perencanaan dan Pembangunan Daerah*, or Regional Development Planning Agency
BAPPENAS	=	*Badan Perencanaan dan Pembangunan Nasional*, or National Development Planning Agency
BPS	=	*Badan Pusat Statistik*, or the Central Bureau of Statistics
DJCK	=	*Direktorat Jenderal Cipta Karya*, or Directorate General of Human Settlements
ICT	=	Information and Communications Technology
IDR	=	Indonesian Rupiah
IMB	=	*Izin Mendirikan Bangunan*, or Building Construction Permit
IPAL	=	*Instalasi Pengolahan Air Limbah*, Wastewater Treatment Plant
IPLT	=	*Instalasi Pengolahan Lumpur Tinja*, or Septage Treatment Plant
KG	=	Kilogram
LLTT	=	*Layanan Lumpur Tinja Terjadwal*, or Scheduled Desludging Service
MFI	=	Micro Financing Institution
MoCSME	=	Ministry of Cooperatives and Small and Medium Enterprises
MoEF	=	Ministry of Environment and Forestry
MoH	=	Ministry of Health
MoHA	=	Ministry of Home Affairs
MoPWH	=	Ministry of Public Works and Housing
PDAM	=	*Perusahaan Daerah Air Minum*, or Regional Enterprise of Water Supply
PD PAL	=	*Perusahaan Daerah Pengelolaan Air Limbah*, or Regional Enterprise of Wastewater Management
PHBS	=	*Pola hidup bersih dan sehat*, or clean and healthy lifestyle
Pokja AMPL	=	*Kelompok Kerja Air Minum dan Penyehatan Lingkungan*, or the Water Supply and Environmental Sanitation Working Group
PP	=	*Peraturan Pemerintah*, or Government Regulation
PPN	=	*Pajak Pertambahan Nilai*, or Value Added Tax (VAT)
PPSP	=	*Percepatan Pembangunan Sanitasi Permukiman*, or Acceleration of Settlement Sanitation Development
RPJMD	=	*Rencana Pembangunan Jangka Menengah Daerah*, or Regional Medium Term Development Plans
RPJMN	=	*Rencana Pembangunan Jangka Menengah Nasional*, or National Medium Term Development Plans
RT	=	*Rukun Tetangga*, or neighborhood
RW	=	*Rukun Warga*, or group of neighborhoods
SANIMAS	=	*Sanitasi Berbasis Masyarakat*, or community-based sanitation
Satpol PP	=	*Satuan Polisi Pamong Praja*, or the municipal police
SD	=	*Sekolah Dasar*, or primary school

SDG	=	Sustainable Development Goals
SES	=	Socioeconomic Status
SIUP	=	*Surat Izin Usaha dan Perdagangan*, or Business License
SMA	=	*Sekolah Menengah Atas*, or high school
SMP	=	*Sekolah Menengah Pertama*, or junior high school or middle school
SPM	=	*Standar Pelayanan Minimal*, or Minimum Service Standard
STBM	=	*Sanitasi Total Berbasis Mayarakat*, or Community-Based Total Sanitation
UNICEF	=	United Nations Children Fund
UPTD	=	*Unit Pelaksana Teknis Dinas*, or Technical Implementation Unit
USD	=	United States Dollar
VC	=	Value Chain (*Rantai Nilai*)

EXECUTIVE SUMMARY

INTRODUCTION

Realizing its commitment to providing universal access to sanitation, the **Government of Indonesia aims to shift from open defecation free into safely managed sanitation** as the national plan for sanitation is targeting to provide 15% of the population with access to safely managed sanitation. Based on the Statistics Bureau, in 2019, there are 77.44% households that have access to sanitation in Indonesia with 7.5% of them is considered as safe sanitation.

Private engagement in sanitation sector is critical as achieving RPJMN target on sanitation would need large resources.[1] The investment costs required are too large to be fully supported by government resources alone. On the other hand, the need to improve access to safely managed sanitation will create business opportunities for the private sector in the provision of toilet and septic tank products, tank emptying services and product financing to support households in building toilets and septic tanks.

The Market Assessment performs in-depth analyzes to help advance markets for safely managed sanitation products and services. Market gap and business opportunities for private sector involvement are assessed along with the supporting factors, including on how to strengthen enabling

[1] RPJMN is *Rencana Pembangunan Jangka Menengah Nasional*, or National Medium-Term Development Plans

environment. Targeted and actionable key messages and recommendations are generated to stimulate the demand and supply sites and to increase private sector involvement to ensure available and affordable products and services for all, including poor households and communities in difficult environments.

THE ASSESSMENT

The Assessment focuses on the market for products and services needed to create access to safely managed sanitation by implementing on-site solutions, as a large proportion of the population in Indonesia has a high dependence on on-site sanitation. This condition would remain unchanged for many years to come. A combination of qualitative and quantitative research methods is used in the analysis of the demand side, supply side and enabling environment. More than 700 households in t study areas were interviewed in the quantitative analysis, while there were a total of 76 respondents from materials stores, home industries of septic tank, masons, small contractors, pit emptying service providers, and septage treatment facilities interviewed in the qualitative analysis.

MARKET SITUATIONS

Market size may exceed USD 5.3 billion over the next 5 years. The safely managed sanitation market has good prospects as the demand for water-sealed toilets, wastewater pipes, standard-compliant septic tanks, pit emptying service and septage treatment is very real with a potential market size of USD 5.3 billion. Some households, especially in Banda Aceh City, Bandung District and Palu City, place construction or renovation of toilets as one of their shopping priorities.

Most households already have a basic understanding of clean and healthy living. Comfort, privacy, and cleanliness are the 3 top reasons households have a toilet. High access to improved sanitation is the result of good basic understanding that households have, apart from being considered a social norm. However, not all of their understanding is accurate. Some still think a good septic will not need pit emptying.

The market is driven by household needs and preferences. The market for safely managed sanitation relies heavily on the demand from households that places great importance on price, comfort, and cleanliness. Demand from households do not arise from reasons of preventive maintenance, pollution prevention or regulatory compliance factors. The role of the head of households is very dominant in the procurement of sanitation products and services. He or she supervises the construction, approves the selection of products and building materials, and makes decision on the pit emptying.

The market is really price sensitive. A slight increase in price will discourage households from purchasing better sanitation products and services. This can be seen clearly from the reluctance of households to use the fiberglass septic tank. The obligation to carry out regular pit emptying may be hampered by the reluctance of households to pay for it. The challenge will be even greater when it comes to low-income households that simply do not have the funds to cover additional expenses, especially for products and services that they do not consider priority.

Material store is the meeting point of safely managed sanitation market players. The material store is located in the center of the supply chain which links producers, masons, households, and occasionally financing institution (see figure). Material stores receive information from one actor and pass it on to other actors. The store clerk will find out what the many households need and then share the information to the producers. He or she will also inform the availability of the financing facility to households that may need it. He or she will share information on products available in the market to the masons, and vice versa.

Septage treatment service has not been fully utilized by private pit emptier. The reasons vary, whether because of the restrictions on private service providers, the remote locations, or simply because of ignorance on the existence of IPLT. Other reasons include mismatch of operating time and the high disposal fee charged to private pit emptier. The low utilization by private pit emptier contribute to the idle capacity of IPLTs. This problem becomes larger in times of disaster when many roads are damaged so that the desludging trucks cannot pass.

Hesitation to involve the private sector in sanitation service. The role of the private sector in sanitation service is clearly stated in regional regulations. However, most local governments still hesitate to involve them. Some feel they do not really need it, some do not know the mechanism while some just reluctant to guarantee a minimum business scale for their potential private partners. No precedence on private sector involvement in septage treatment service, so local governments are still hesitant to initiate such partnership in their areas.

Low disaster resilience to sustain access to safely managed sanitation. Access to safe sanitation in times of disaster is difficult to provide, because 1) a lack of products and services tailored to the specific needs of disaster-prone areas and (2) unclear mechanisms for moving the market during emergencies, especially when demand for products and services surges. Type of sanitation facilities built by households in disaster-prone areas are relatively similar, say the concrete ring. Not surprisingly, the disaster makes sanitation facilities completely damaged and inaccessible. Likewise,

reconstruction during the rehabilitation process is hampered due to damaged infrastructure and scarcity of workers.

The market is not consistently regulated by the authorities. Despite the availability the national standard, most septic tanks are made by masonry or using concrete rings which do not always comply to the standard. Besides the misconception on a good septic tank, no supervision and enforcement from the government on the households to use standardized septic tanks. On the emptying service, no city has required pit emptying services to be licensed and to use proper desludging vehicles. Moreover, no city has monitored septage disposal.

Key Recommendations

Several things to recommend that will stimulate safely managed sanitation market ae as follow.

A. Governments at both national and sub-national level

Enhance enabling environment to ensure **b**etter policies, regulations and institutional capacity that will make the market grows in quality and quantity. First, the target of access to safe sanitation must be institutionalized. Secondly, cities must have regulations its compliance mechanism that require the use of standardized septic tanks and regular pit emptying. More capacity of institutions should be developed and more standards should be formulated, say those for healthy toilets, squat toilet pans, pit emptying procedures, desludging vehicles and quality of treated sludge.

Improve perception on safely managed sanitation to optimize the roles of stakeholders in increasing both demand and supply sides of sanitation products and services. Messages to households should be emphasized on the use of standardized septic tanks and have regular pit emptying. While messages to pit emptying should be emphasized on the use of proper desludging trucks and septage disposal at the designated treatment facility.

Intensify investment supports by strategically utilizing government and non-governments' programs which could also involving non-sanitation related initiatives. Village Fund (*Dana Desa*), One Million Housing Development Program (*Program Sejuta Rumah*), or Village Climate Resilience Program (*Program Kampung Iklim*) are several examples of governments programs that could be aligned with the improvement of access to safe sanitation. On the other side, businesses could participate in providing assistance to build toilets and septic tanks in workplaces, workers' houses, or surrounding areas nearby the workplace.

Create easier business climate to attract more private entities to enter the market of safe sanitation. Several recommended initiatives are (a) simplify business licensing; (b) intensify promotion of

products and services; and (c) provide incentive for model private companies succeeded in providing safe, healthier, and more attractive sanitation products and services. It will help the business if there is a digital marketplace application that can help promote and transact safe sanitation products and services (see figure).

B. Finance-related parties

Intensify micro credit package for low-income households to install standardized septic tanks and emptying services. As the current standardized -especially fiberglass- septic tanks are offered in high cost, micro credit could help low-income households to purchase and construct the septic tank. And, the micro credit could also apply for the emptying, after 2 years installment, the households can get the emptying. A stronger collaboration with septic tank producers and emptying service providers, including with the material stores, would be needed.

Extend commercial loans to sanitation producers or service providers for business expansion as part of credit for small and medium enterprises. For sanitation producers, the loan would help them to fund additional workspace, modernize equipment or buy raw materials in bulk. For emptying service provider, the loan could be used to purchase new vehicles or equipment, such as a stronger vacuum pump and longer hose. Cities and districts with a mandatory desludging practice applied for their households would provide more potential demand for the loan.

C. Businesses

Support the creation and nurturing of product and service innovation that are more effective, higher quality, meets standards, affordable, sustainable and match with households current or future preferences and climate and disaster resilient**. Some of the products and services to innovate** septic tanks, pit emptying, septage transportation monitoring, septage treatment plant for limited space available and options for utilizing treated sludge (see table).

PRODUCTS AND SERVICES		DESCRIPTION	TYPE	Target
VC-1	Septic tanks	• Needed by houses with small area of land. The requirements: watertight, small, comply with the standard, easy to install, low cost, and can be produced by locally. • Needed for emergency response. The requirements: light, easy to transport, removable, less emptying frequency (as emptying service is limited during emergency period).	Product	Short-term
	Micro-financing	• For households to fund septic tanks' construction that easy to process with acceptable low rate. • For informal suppliers to increase their financing capacity to expand their business.	Service	Short-term

VC-2	Desludging vehicles	The requirements: able to pass through narrow roads and difficult roads, less desludging time, and able to carry high loads.	Product	Medium-term
	Pit emptying services	Franchising business for desludging services, particularly when the mandatory periodic desludging is implemented. The requirements: registered and licensed, use standard-compliant vehicles with a proper steel tank, have trained workers, apply SOPs.	Service	Medium-term
	Financing	For pit emptier to purchase standardized desludging vehicle.	Service	Short-term
	Digital business platform	A virtual marketplace to facilitate the promotions and business transaction of products and services of safely managed sanitation.	Service	Medium-term
VC-3	Septage treatment plant (IPLT)	The requirements: Small footprint, low O&M cost, easy to operate and maintain, and high treatment performance. Apart from its capacity to treat septage, an IPLT must be able to produce reusable sludge.	Product	Long-term
	Septage treatment services	A service contract (or Build-Operate-Transfer type of partnership) to operate the treatment plant. The contract could also be bundled with contract to produce, package, promote and sell the reused products to the market.	Product and service	Long-term

Utilizing the steady growth of property market both for low-, middle- and high-income housing**.** It will be easier to build a proper access to sanitation at the same time as housing construction. The safe sanitation market can grow rapidly by attaching itself to the property market, particularly for the first value chain.

Involvement of non-governmental development agencies. Several development agencies, both domestic and foreign, have been involved in sanitation development in Indonesia. The scope ranges from behavior change communication, institutional capacity development, operational supports to infrastructure development. Not causally linked with sanitation services, several organizations are also involved in public health improvement, housing development and public-private partnership creation. They should be convinced to adjust their scope of work to include the development of sanitation market in Indonesia.

BACKGROUND

Indonesia has made substantial improvements in the water, sanitation, and hygiene (WASH) sector in more than 2 decades. The Central Bureau Statistics (BPS or *Badan Pusat Statistik*) reported in 2018 that 74.5% of Indonesia's population already have access to improved sanitation. However, it also reported by the National Development Planning Agency (BAPPENAS or *Badan Perencanaan Pembangunan Nasional*) that only 7.4% of the population have access to safely managed sanitation while 9.4% of the population are still practicing open defecation. Henceforth, the term access to safely managed sanitation in this document will also be mentioned as access to safe-sanitation or safe-sanitation access.

The current level of sanitation access is still far below the target set by the Government of Indonesia (GoI) in their 2020-2024 National Medium-Term Development Plan (RPJMN, or *Rencana Pembangunan Jangka Menengah Nasional*), i.e. 15% of population with access to safe sanitation by 2024 in which 13% will use onsite solution. It is also stated that, within the Sustainable Development Goals (SDGs) target of 100% access to improved sanitation, Indonesia should have more than 50% of its population with access to safe sanitation by 2030. Large resources are needed by to meet the targets of access to safe sanitation. The required investment costs are too huge to be borne solely by the government. On the other hand, the requirement to increase access to safe sanitation will surely create opportunities for the private sector. Lots of construction materials, products and services are needed to build millions of toilets and septic tanks. There will also opportunities for privately-owned pit emptying services to meet the supposedly high demand. So is with septage treatment service that might open up for private sector. Opportunities will also be available for the financial sector, particularly to provide finance for low-income people to build toilets and septic tanks.

Currently, the role of the private sectors in the sanitation market is not as high as expected due to numerous reasons. This UNICEF-funded "Market Assessment for Safely Managed Sanitation in Indonesia" is expected to provide the information needed by the private sectors and other interested parties to stimulate and advance the market for safe-sanitation products and services. Opportunities for private involvement are assessed along with the supporting factors they may need. This document is the final report of the Market Assessment. Following the description on the assessment methodology, the report describes the existing condition of the three value chains of the market. The final chapter of the reports contains recommendations on the best strategy to stimulate the demand and supply sites of the market and to increase private sector involvement in the market of safe sanitation in Indonesia.

THE ASSESSMENT

This chapter describes the objectives, scope and methodology of the Market Assessment for Safely Managed Sanitation conducted by the Nielsen Consultant Team.

OBJECTIVES

The objective of a market assessment for safely managed sanitation is to provide the supporting evidence needed to formulate solutions for:

- stimulating demand at household and institutional level,
- prompting a more diversified viable sanitation materials which fulfill Human Centered Design Principles that offer affordability & inclusivity and reflect customer's aspiration with regard to products and service specifications and their willingness to pay, and
- establishing a sustainable sector for safely managed sanitations which are high quality, culturally acceptable, convenient, and affordable while being inclusive towards poor households and communities living in difficult environments.[2]

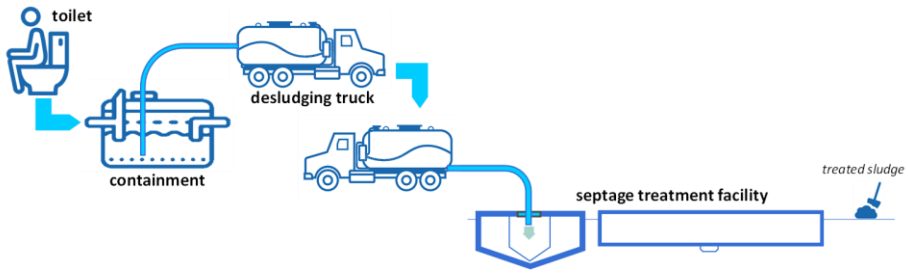
The Market Assessment also provides information needed to develop strategies for promoting safe-sanitation market opportunities to the private sector and for increasing their supply capacity. Finally, this Market Assessment is expected to contribute to the government's efforts to improve access to safe sanitation throughout Indonesia.

[2] *Difficult environments include drought, high water table, remote, coastal region etc.*

SCOPE

Focus

The Market Assessment focuses on the market for the products and services needed to create access to safe sanitation applying onsite solution (see figure). It is expected that most households in Indonesia's cities will still have their toilets connected to the septic tank, while only a few is connected to the offsite system (sewerage system).



Access to safely managed onsite sanitation consists of an individual water-sealed toilet connected to a water-tight septic tank. It is required in a safe-sanitation access that the septic tank must be periodically emptied and the septage is safely disposed in septage treatment facility.

Tasks

The Market Assessment has the following tasks:

a. **Demand side analysis**, to evaluate a) current and potential levels of demand among different household groups, b) gender perspective in making decisions about sanitation, c) household preferences and aspirations regarding types of toilets and septic tanks, d) characteristics of he last mile households, e) barriers to access sanitation market for low-income group, f) affordability of toilet and septic tank design and related services based on consumption levels, and g) financial support available to increase demand, particularly for poor households.[3]

b. **Demand side analysis**, to evaluate a) business models and delivery approaches, b) actors involved in the sanitation supply chain, along with their roles, profiles, scope and scale of work, motivation, incentives and challenges, c) types, volumes and specifications of available sanitation products and services , d) pricing and distribution of core materials (i.e. cement) and products across the country, e) distribution channels, product and service coverage and gaps, f) availability and distribution of sanitation products for emergencies, g) capacity of service providers throughout sanitation service chain, h) attitudes towards investing and providing service for poor customers, i) company perspective

[3] *The last mile refers to a group of people who still do not have access to a toilet, so that they still practice open defecation. Those who fall into the last mile are generally identified as being very poor, elderly, or landless. The last mile may include those who live in border areas, remote areas or areas with difficult terrain, or those who are nomadic and those with socio-cultural norms that prohibit them from practicing sanitation.*

on UNICEF / GoI engagement, j) constraints in the market and k) financial support for individual entrepreneurs and small to medium enterprises.

c. **Enabling environment analysis**, to evaluate a) the profile of actors in the enabling environment, b) roles, responsibilities, plans and strategies of government agencies and partners, c) policies and incentives affecting the role of the private sector, d) incentives for product innovation and e) partnership opportunities.

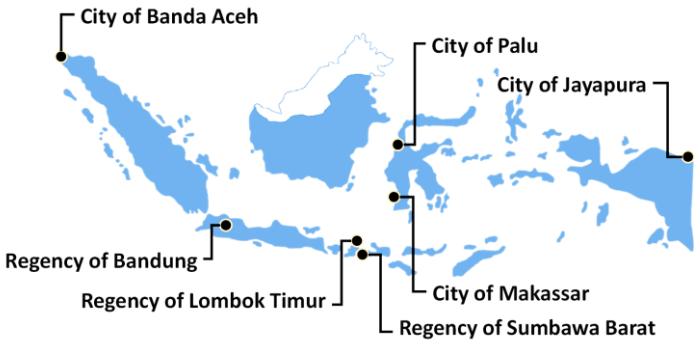
d. **Overall market assessment**, to understand a) market size and segment, b) level of market formality, c) business model, d) supply chain and e) trade opportunities between regions in the country.

e. **Formulation of recommendations regarding market development**, whether from the demand side, supply side and enabling environment side.

An industry consulting meeting is conducted as part of the Market Assessment. Representatives of private companies, government agencies and development partners are invited to share information, communicate perspectives, and discuss strategic steps to strengthen the Indonesia's market for sanitation products and services. The topics discussed at the meeting are government perspectives, market information, supplier barriers, household preferences, business models and innovation needs. In the meeting, the participants identified common goals and objectives for strengthening the sanitation market and agreed to work together to create better support for improving safe-sanitation products and services.

Areas

Seven regions were selected to be the study areas for demand-side analysis and supply-side analysis, i.e. the city of Banda Aceh (Aceh Province), the regency of Bandung (West Java Province), the city of Makassar (South Sulawesi Province), the city of Palu (Central Sulawesi Province), the regency of Lombok Timur (West Nusa Tenggara Province), the regency of Sumbawa Barat (West Nusa Tenggara Province) and the city of Jayapura (Papua Province). In addition, the supply-side analysis was also conducted on home industries in the regency of Tangerang (Banten Province), the city of Surakarta (Central Java Province), and the city of Surabaya (East Java Province).



These areas were selected to represent Indonesia's diversity, all in terms of demographics, economics, and levels of sanitation access (see table). Makassar City was selected to represent a metropolitan city, meanwhile other cities are classified as medium sized cities with populations less than 500,000 people. Palu City just experienced a huge earthquake and tsunami that claimed the lives of around 900 people back in September 2018. The Sumbawa Barat Regency was selected to represent rural areas with a lower gross regional domestic product (GRDP).

Table 1. Study Areas of the Market Assessment for Safely Managed Sanitation

City or Regency (Province)	Population of 2017 (x 1000 people)	Total Area (km^2)	GRDP Based on Current Prices of 2018 (x IDR 1 billion)	Access to Sanitation of 2018	
				Improved	Safely Managed
Banda Aceh City (Aceh)	238.8	61,4	17.571	99.21%	29.08%
Bandung Regency (West Java)	1.616.2	1.305,8	113.185	63.03%	7.21%
Makassar City (South Sulawesi)	1.334,1	175,8	160.208	92.79%	12.39%
Palu City (Central Sulawesi)	363,9	395,06	22.629	96.02%	5.67%
Lombok Timur Regency (West Nusa Tenggara)	1,389,9	1.230,7	18.844	76.23%	2.58%
Sumbawa Barat Regency (West Nusa Tenggara)	1.849,0	135,0	17.359	96,9%	1,86%
Jayapura City (Papua)	417,5	935,9	30.415	76.09%	6.27%

Sources:
- Population of 2017: Peraturan Menteri Dalam Negeri No. 137/2017 tentang Kode Dan Data Wilayah Administrasi Pemerintahan.
- Total Area: Peraturan Menteri Dalam Negeri No. 137/2017 tentang Kode Dan Data Wilayah Administrasi Pemerintahan.
- GRDP based on Current Price of 2018: Produk Domestik Regional Bruto Kabupaten/Kota di Indonesia Tahun 2016 – 2018, Badan Pusat Statistik Indonesia.
- Access to Sanitation of 2018: Badan Perencanaan Pembangunan Nasional.

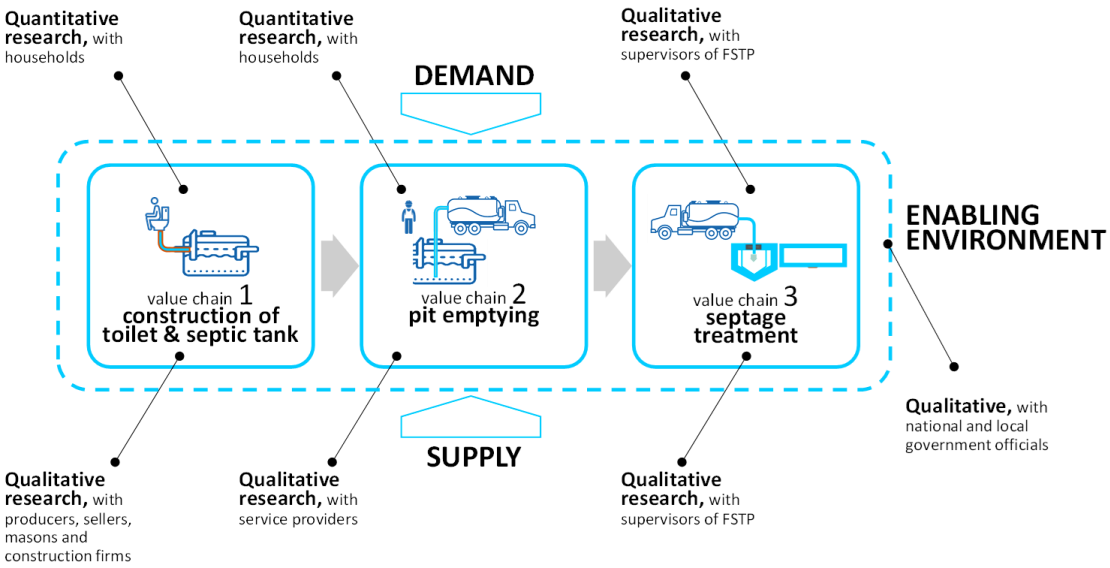
METHODOLOGY

RESEARCH FRAMEWORK

The Market Assessment for Safely Managed Sanitation uses a research framework that divides the safe-sanitation market into 3 (three) value chains (VCs), i.e. 1) construction of toilet and septic tanks, 2) pit emptying dan 3) septage treatment. A combination of qualitative and quantitative research methods is used in the analyses as follow (see figure above).

- Quantitative research in a) demand analysis of construction of toilet and septic tank and b) demand analysis of pit emptying.
- Qualitative research in a) supply analysis of construction of toilet and septic tank, b) supply analysis of pit emptying, c) demand analysis of septage treatment, d) supply analysis of septage treatment dan d) enabling environment analysis.

Some of the information used and presented in this Market Assessment are taken from local and international references. This is done to strengthen the arguments obtained from field researches.



Research framework of the Market Assessment of Safely Managed Sanitation

QUANTITATIVE RESEARCH

Quantitative research, using a face-to-face interviews technique with a pre-tested questionnaire, was conducted towards the demand of households for VC-1 (construction of toilet and septic tank) and VC-2 (pit emptying).

Respondents

The respondents are households which are represented by their decision makers for products and services of VC-1 and VC-2. Sample selection are conducted through two stages, i.e. 1) selecting a neighborhood as a primary sampling unit, and 2) selecting a household within the neighborhood through systematic random sampling. A total of 71 households were interviewed throughout Banda Aceh (102 households), Bandung (100 households), Makassar (101 households), Palu (102 households), Lombok Timur (106 households), Sumbawa Barat (102 households) and Jayapura (101 households). With a number of samples of around 100, the survey results in each study area has a margin of error of 9.8% at a 95% confidence level. Overall, with n = 704, the survey results have a margin error of 4.0% at a 95% confidence level.

Data Collection

The data collected for the quantitative research on the demand side of VC-1 and VC-2 include:

a. Household characteristics, such as socio-economic status, demography, education, media preference,
b. Current sanitation practices, such as the type and quality of sanitation facilities.
c. Factors that play a role in improving access to sanitation:

- Cognitive factors, such as concerns about diseases related to the quality of facility being used,
- Emotional factors, such as responses towards household members' wishes, for example the desired attributes of sanitation facilities,
- Social and cultural factors, such as the role of women on behavior changes, the social norms in respective communities and influences from local figures,
- Environmental factors, such as the availability of sanitation service providers and the sanitation conditions of residential areas,
- Behavioral factors, such as preference, intention, frame of mind, motivation, attitude, and understanding towards the benefits of better sanitation conditions, financial conditions, and a desire to invest in sanitation.

The following is some information regarding the preparation and implementation of the quantitative research.

- The questionnaire is structured based on the list of data needed for household demand side analysis. Overall, there were a total of more than 100 questions which were divided into 12 segments (see **Annex A**). The questionnaire was tested to several households before it was submitted to UNICEF for approval.
- The enumerators were selected based on certain criteria such as a) residing in the study area, b) minimum of high school education, c) maximum age of 45 years old, d) physically and mentally healthy. Every enumerator participated in a training conducted by the Nielsen Client Service Team in each study area. Training manuals were distributed to each enumerator on the topic of research methodology, survey implementation protocols in accordance with Nielsen global standards and the use of questionnaires. The training also included role-playing sessions among enumerators to ensure their full understanding of the research objectives and the use of the survey instrument. Enumerators are assigned to the field only if they have demonstrated a full understanding of the protocol for conducting the survey.
- A mobile tablet was provided to each enumerator for the interview. The tablet is linked to the data management computer system at the head office so the data can be transferred immediately.
- A quality control protocol use was established to check consistency and completeness of data from each questionnaire. The team used a logic checking program to ensure that the data collected was clean before it was sent to the data preparation department. If the team found inconsistencies or incomplete data, the quality control protocol required the Nielsen Team to contact the field manager for further clarification.

The maximum duration for an interview with a household respondent is 45 minutes. Enumerators recorded word-for-word each respondents' answers to open and semi-closed questions. Answers were grouped and given a numerical value so that they could be processed by Excel software.

Data Management

The collection of data or dataset was arranged in an Excel format with variable labels according to the order of questions in the questionnaire. Data was managed using statistical application software and the results were shown according to the groupings of households and individuals, be it based on socioeconomic status, access to sanitation, gender, and educational background.

Segmentation according to socioeconomic status groups households into 3 segments which are, 1) upper segment households, 2) middle segment households, 3) lower segment households. The parameters reviewed for SES segments are monthly basic expenditure, education, and occupation. The following table shows the SES segments used in this safely managed sanitation market assessment.

Table 2. Socioeconomic Status (SES) Segmentation of Households

Socioeconomic Status (SES)	Monthly Basic Expenditure	Education	Occupation
Upper	>IDR 3 million	Highschool / University	High-level employee, entrepreneur
Middle	IDR 2 million – IDR 3 million	Highschool	Middle-level employee, entrepreneur
Lower	IDR 1 million – IDR 2 million	Below high school	Low-level employee, worker, skilled labor

Meanwhile, household classification according to their sanitation access characteristics is grouped into 5 groups, namely 1) households that practice open defecation, 2) households with access to toilet, 3) households with access to improved sanitation, 4) households with access to safely managed sanitation and 5) households with access to unsafe sanitation.

QUALITATIVE RESEARCH

Qualitative research was conducted towards the supply side from Value Chain 1, Value Chain 2 and Value Chain 3, as well as the demand side of Value Chain 3. Other than that, qualitative research was also conducted towards the enabling environment. Respondent-specific discussion guides were used in the qualitative research interviews.

Respondents

The respondents of this qualitative research consist of materials stores, home industries of septic tank, masons, small contractors, pit emptying service providers, and septage treatment plants (IPLT or *Instalasi*

Pengolahan Lumpur Tinja) or wastewater treatment plants (IPAL or *Instalasi Pengolahan Air Limbah*) . Overall, there was total of 76 respondents throughout 9 cities and regencies (see table).

Table 3. Respondents of Qualitative Research

Research	Respondent Group	Respondent Criteria	Number of Respondents									
			Banda Aceh City	Bandung Regency	Makassar City	Palu City	Sumbawa Barat Reg.	Jayapura City	Tangerang Reg.	Surakarta City	Surabaya City	Total per Group
Supply – Construction of Toilet and Septic Tank (VC 1)	Store owner	Store owner, minimum 5 years experience, decision maker for products to be sold, deals with customers directly, sells and stores toilets, fiber glass tanks, cement, and sand.	2	2	2	2	2	2	-	-	-	12
	Septic tank home industry [4]	Produces septic tanks, operates a minimum of 5 years, decision maker in purchasing raw material, directly involved in the production process, directly deals with consumers.	2	2	2	2	2	2	2	2	2	18
	Mason	Works alone or as a member of a contractor team, minimum 5 years experience, directly involved in toilet and septic tank construction.	3	3	3	3	3	3	-	-	-	18
	Small contractor	Operates a minimum of 5 years, minimum of 2 masons, decision maker for products and raw materials, directly deals with consumers.	2	2	2	2	2	2	-	-	-	12
Supply – Pit Emptying (VC 2)	Pit emptying provider	Business owner, minimum 3 years experience, directly involved with the work, directly deals with consumers, decision maker in septage disposal.	4	4	4	4	4	4	-	-	-	24
Supply – Septage Treatment (VC 3)	Septage treatment plant (IPLT) / Wastewater treatment plant (IPAL)	Serves as head or operation supervisor, directly deals with pit emptying workers, decision maker in the handling of treated sludge.	1	1	1	1	1	1	-	-	-	6
Demand – Septage Treatment (VC 3)												
Total Respondents per Region			**14**	**14**	**14**	**14**	**14**	**14**	**2**	**2**	**2**	**76**

Respondents for the enabling environment analysis at the central government level are representatives from BAPPENAS, the Ministry of Public Works and Housings (MoPWH) and the Ministry of Health (MoH). At the city level, respondents are representatives from Regional Development Planning Agency (BAPPEDA

[4] *Respondents in Tangerang District, Surakarta City and Surabaya City are large-scale home industries, while respondents in other regions are small-scale home industries.*

or *Badan Perencanaan Pembangunan Daerah*), Office of Public Works, Office of Housings, Office of Health, Office of Environmental Management and Office of Small and Medium Enterprises.

Respondents were selected by a special team from Nielsen using the criteria made for this purpose (see above table). Information obtained from the quantitative research is used to help the selection of material store owners, masons, contractors, pit emptying service providers and IPLT or IPAL. UNICEF provided assistance in the selection of IPLT and IPAL respondents (see table below).

Table 4. Septage Treatment Facilities in the Qualitative Research

City or Regency (Province)	IPAL/IPLT	Capacity (m^3/day)	Institution in Charge
Banda Aceh City	IPLT Gampong Jawa	85	Office of Public Works and Spatial Planning (transition from the Office of Environment and Cleanliness).
Bandung Regency	IPAL Soreang	No specific data	Technical implementation unit (UPTD) IPAL under the Office of Public Housing, Residential Area and Land Affairs.[5]
Makassar City	IPLT Nipa-Nipa	60	UPTD Wastewater Treatment under the Office of Public Works.
Palu City	IPLT Talise	24	UPTD IPLT under the Office of Cleanliness and Parks.
Lombok Timur Regency	IPAL South Masbagik	36	Office of Environment and Cleanliness.
Jayapura City	IPLT Koya Koso	15	UPTD TPA and IPLT under Office of Environment and Cleanliness.

Source: Ministry of Public Works and Public Housing of the Republic of Indonesia, 2019

Sumbawa Barat Regency also has an IPLT located in the Taliwang Sub-district with a capacity of 25 m^3/day. However, due to limited time and resources, this current market assessment did not include this septage treatment plant as a respondent.

Data Acquisition

The following table shows the data gathered from each group in the qualitative research.

Table 5. List of Data from the Qualitative Research

Respondent Group	Data Acquisition
Material store and the septic tank home industry	• General and specific business practices, • Business dynamics with suppliers, • Demand side dynamics (according to customer type), particularly regarding the type of customer, sales volume, terms of conditions of sale, margin, and profit scheme, • Quality standards, • Operating scheme during emergencies,

[5] *The Technical Implementation Unit of Local Office (UPTD or Unit Pelaksana Teknis DInas) is the technical operational unit of a local government institution (Dinas) that has the task to carry out some of the technical operational duties of their mother institution.*

Respondent Group	Data Acquisition
	• Challenges and opportunities for storage of raw materials.
Mason and building contractor	• Scope of work, services, and daily activities, • Level of skill and knowledge in building access to safe sanitation, • Market dynamics, particularly the relationship between retailers / source of sanitation products, buying behavior, payment terms, • Operational practice in emergencies, • Current challenges and expected supports.
Pit emptying service provider	• Business practices, services offered, scale and capacity of the business, • Work safety practices, • Customer relationship dynamics, • Operational process, from waste collection to waste disposal, • Operational practice in emergencies, • Current challenges and expected supports.
IPLT	• Feature and type of IPLT, • Technical aspects (plant capacity, capacity usage, material stock for maintaining the continuity of the plant operation), • Partnership model with a pit emptying service, • End-product management approach, particularly for treated sludge, • Technological challenges, human resources, government support and regulation.

Data obtained for enabling environment analysis are:

- The definitions of access to improved sanitation and access to safely managed sanitation as set by BAPPENAS, MoPWH and MoH and regional institutions (BAPPEDA, Office of Public Works and Office of Health),
- Priorities involving regency and city development,
- National and regional strategies to achieve sanitation target in the SDGs,
- National and regional programs for the development of access to safely managed sanitation,
- Distribution of role and authority between the central and local government, public and private sector, regulator and operator of the pit emptying services,
- Standards applied in septage management services,
- Financial policies for central and regional levels,
- Private partnership policies at central and regional levels.

Several preparations were made before conducting the qualitative survey include:

- A discussion guide was prepared following the list of required data from the qualitative research (see **Table 3**). Overall, the qualitative research used a total of 6 discussion guides, i.e. material store discussion guide, home industry discussion guide, mason discussion guide, small contractor discussion

guide, pit emptier discussion guide and IPLT discussion guide (see **Annex B** to **Annex G**). Another discussion guide was also prepared for the enabling environment analysis.

- Researchers were selected based on the following criteria a) minimum of a bachelor's degree, b) maximum age of 45 years old and c) physically and mentally healthy. Each researcher attended a brief workshop to ensure their understanding on the research objectives and the use of discussion guides.
- Quality control procedures were made to check the consistency and completion of data collected. Internal meetings were regularly held to give opportunities for each researcher to share their findings and field studies.

An in-depth interview for enabling environment analysis was conducted only for representatives of the central government and representatives of the local government of Banda Aceh and Bandung.

LIMITATIONS

The Market Assessment for Safely Managed Sanitation has several limitations, i.e.

- This market assessment only covered access to onsite sanitation. By itself, information regarding the market for products and services of offsite sanitation access cannot be found in the report.
- This market assessment aimed only at households' sanitation access. Products and services needed for households is assumed to far outweigh products and services needed for non-household buildings.
- The quantitative research was conducted in 7 study areas that might not fully represent market conditions of other parts of Indonesia. For example, there is not any city or regency from the islands of Kalimantan, Bali and Maluku selected as a study area. Households and sanitation access in those regions may have different characteristics, resulting in different market conditions and dynamics.
- This market assessment used a pragmatic approach in identifying access to improved sanitation and access to safe sanitation. Access to improved sanitation is identified if a household has a water-sealed toilet connected to a septic tank., while access to safe sanitation is identified if a household has its own water-sealed toilet connected to a septic tank that regularly emptied. The septic tank condition and septage disposal location is not considered in the identification of access to safe sanitation.
- The supply analysis for VC-2 aimed only at service providers from the private sector. It is assumed that they are more instrumental in filling the demand-and-supply gap. Other than that, they are also assumed to susceptible to not adhering to safe work practices.

THE FINDINGS

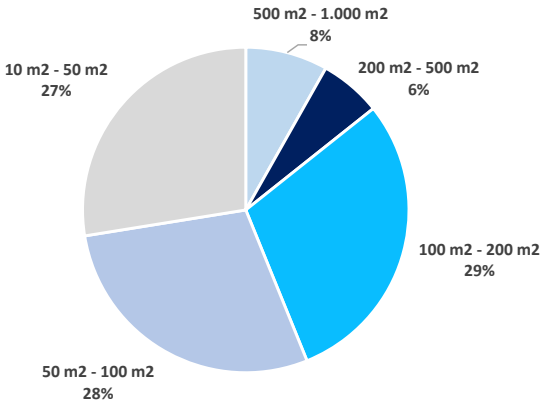
This chapter describes the findings from both the qualitative and quantitative research regarding access to sanitation and the conditions of all three value chains in the study area.

HOUSEHOLDS

SOCIOECONOMICS

The following are some of the information regarding the general condition of households in the Market Assessment.

1. **A majority have access to electricity but not piped water.** Houses in the study area, which are mostly are owned by the respondents themselves, have an average area of 162 m^2 with nearly 60% of houses having an area of 50 m^2 – 200 m^2 (see figure below). Every house is individually connected to the electricity network from the State Electricity Company (PLN), although 1% of the houses obtained the electricity from other nearby houses. Only 9% of households are connected to the piped water network and more than 65% of them purchase bottled water for their consumption needs.

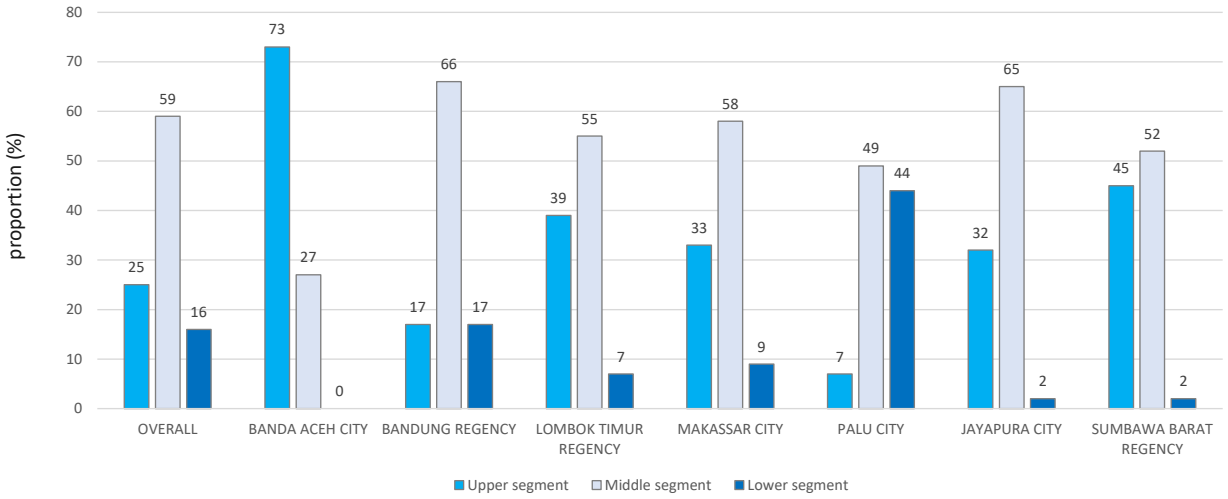


Areas of houses in the market assessment.

More than 90% of households use LPG as their main energy source for cooking. Upper-class households mostly use 5 kg or 12 kg LPG cylinders, meanwhile lower-segment households mostly use the 3 kg LPG cylinders.

2. **Average of high school education.** Respondents consist of 54% female and 46% male. Nearly 90% of respondents are married with children. Each family has an average of 4.4 members. The educational background of most heads of the households are middle school (27%) and high school (39%), although around 10% have a diploma, bachelor, and master's degree. Around 97% of respondents are Moslems, while the rest are Christians.

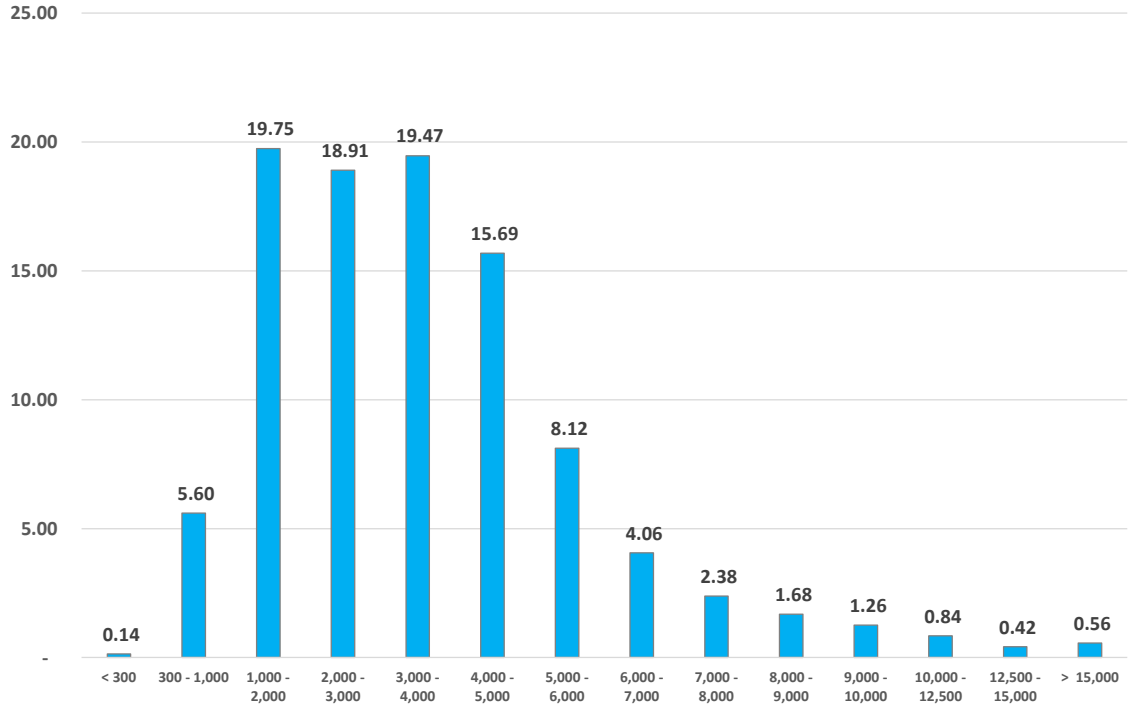
3. **The majority have middle socioeconomic status.** Based on the segmentation criteria of the socioeconomic status (SES), households in the study area consist of 25% upper segment, 59% middle segment and 16% lower segment (see figure below). The SES composition of the household respondents in each region follow the same pattern, in which the majority are middle segment households. An exception is Banda Aceh in which 73% of their households are from the upper segment.



Composition of household respondents according to Socioeconomic Status.

4. **Occupations vary.** Most of the respondents were in the productive age with an average age of 42.64 years. However, only 44% of the respondents are their family's main source of income. Their occupations vary from entrepreneurs, office leaders and employees, experts, teachers, professors, government employees and skilled workers. Individual respondents worked an average of 28 hours per week.

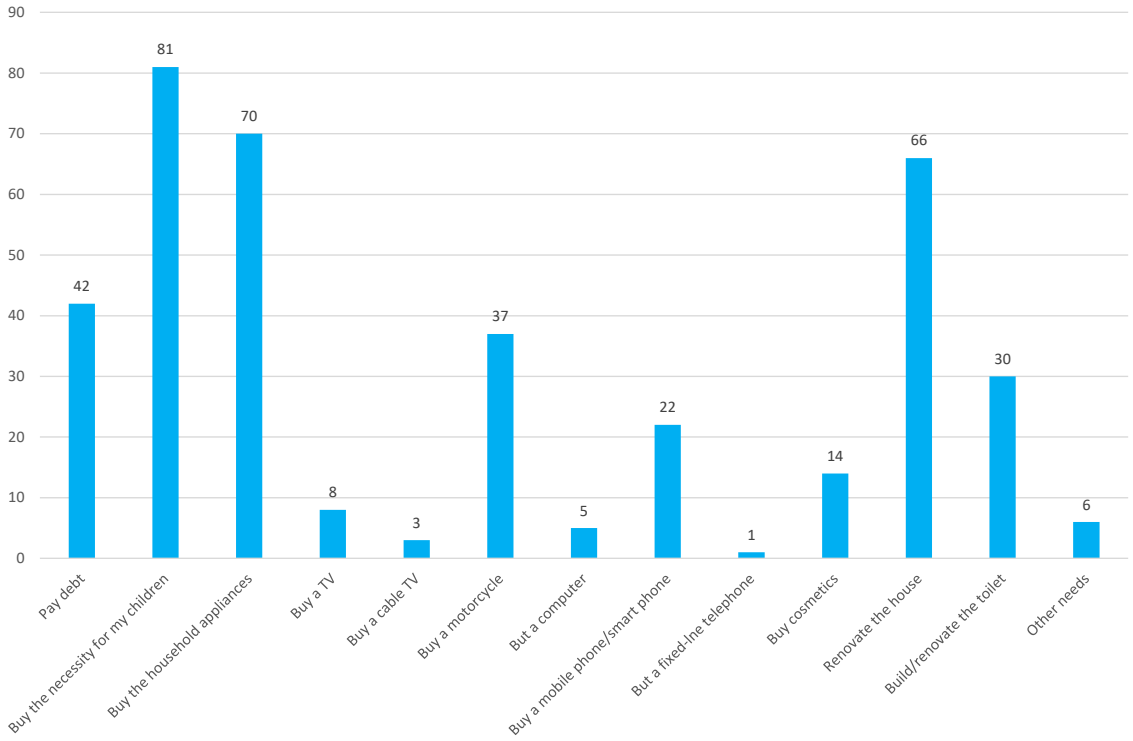
5. **Average spending is below 4 million rupiah.** The level of monthly household spending between study areas varies considerably. The highest monthly spending is found in Banda Aceh and Jayapura households, with an average of IDR 4.9 million and IDR 4.6 million.



Monthly spending of household respondents.

Meanwhile, the lowest monthly spending is noted in Lombok Timur with an average of IDR 1.8 million. Overall, the highest household spending ranges between Rp 1.0 million – Rp 4.0 million with an average of IDR 3.6 million.

6. **Some place toilet renovation as one of their priority expenses.** Households place children's needs, household utensils and home renovation as the 3 priorities for their extra use of money. These same priorities are found in most study areas, except for Lombok Timur and Sumbawa Barat, which places debt payment as one of the priorities. Several households, such as in Banda Aceh, Bandung and Palu places toilet construction or renovation as one of their priority expenses. The upper, middle, or lower SES segments have the same spending pattern.



Spending priority of households.

SANITATION AWARENESS

The following are some findings regarding the households' perception of safe sanitation in the study area.

1. **Misconception about access to sanitation.** Households from every SES segments nearly have the same conception about access to safe sanitation (see table below). Not all of them were entirely accurate because most equate access to safe sanitation as access to odorless or clean toilets. The safe aspect of access to sanitation is assessed more from observable aesthetic aspects. Some households understand that access to safe sanitation means access to "toilets with regularly emptied septic tanks". This conception is almost in line with the definition of safely managed sanitation. There is no significant difference of conception among males and females, or among levels of education.

Table 6. Top Five Perceptions about Access to Safely Managed Sanitation

No.	Overall	Groups							
		Socioeconomic Status Segment			Educational Background			Gender	
		Upper	Middle	Lower	Elementary School	Middle School	High school and Above	Male	Female
1	Odorless toilets (62%)	Odorless toilets (64%)	Odorless toilets (63%)	Odorless toilets (61%)	Routinely cleaned toilets (63%)	Odorless toilets (64%)	Routinely cleaned toilets (60%)	Odorless toilets (69%)	Odorless toilets (58%)
2	Routinely cleaned toilets (52%)	Routinely cleaned toilets (51%)	Routinely cleaned toilets (52%)	Routinely cleaned toilets (51%)	Odorless toilets (59%)	Routinely cleaned toilets (47%)	Odorless toilets (53%)	Routinely cleaned toilets (57%)	Toilets + waterproof septic tanks (50%)

No.	Overall	Groups							
		Socioeconomic Status Segment			Educational Background			Gender	
		Upper	Middle	Lower	Elementary School	Middle School	High school and Above	Male	Female
3	Toilets + waterproof septic tanks (44%)	Toilets + septic tanks (44%)	Toilets + waterproof septic tanks (39%)	Toilets + septic tanks (40%)	Toilets + septic tanks (47%)	Toilets + waterproof septic tanks (45%)	Toilets + waterproof septic tanks (41%)	Toilets + septic tanks (40%)	Routinely cleaned toilets (48%)
4	Toilets + septic tanks (42%)	Toilets + waterproof septic tanks (39%)	Toilets + septic tanks (42%)	Toilets + waterproof septic tanks (36%)	Toilets + routinely emptied septic tanks (40%)	Toilets + septic tanks (41%)	Toilets + septic tanks (41%)	Toilets + waterproof septic tanks (36%)	Toilets + septic tanks (44%)
5	Toilets + routinely emptied septic tanks (36%)	Toilets + routinely emptied septic tanks (36%)	Toilets + routinely emptied septic tanks (38%)	Toilets + wastewater piping (35%)	Toilets + wastewater piping (33%)	Toilets + wastewater piping (31%)	Toilets + routinely emptied septic tanks (40%)	Toilets + wastewater piping (28%)	Toilets + routinely emptied septic tanks (36%)

2. **More convinced there will be adverse impact.** There are 63% of households believe that adverse impact will result from the absence of safe-sanitation access. Most of the households who have this belief are those who are currently using septic tanks (see table below). Higher-educated households and the females are more likely to believe on the occurrence of the impact.

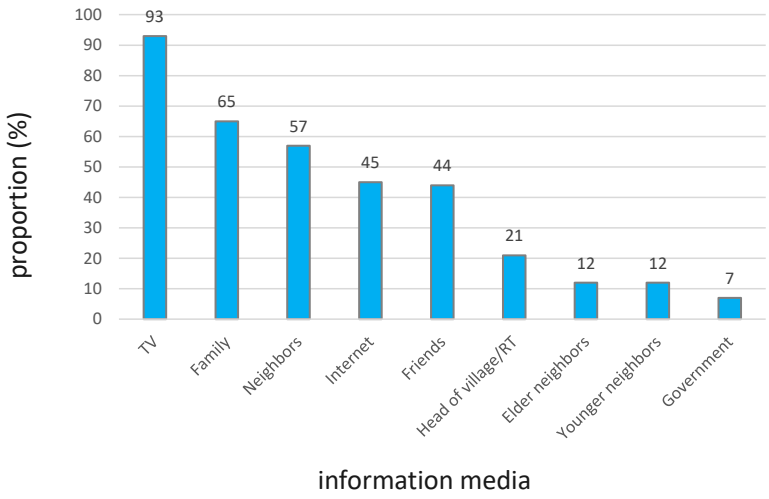
Table 7. Perception of Potential Impacts regarding Access to Unsafe Sanitation

Impact of Access to Safely Managed Sanitation	Overall	Groups						
		Access to Sanitation		Educational Background			Gender	
		Households with Toilets without Septic Tanks	Households with Toilets and Septic Tanks	Elementary School	Middle School	High school and Above	Male	Female
No Impact	**37%**	**52%**	**26%**	**36**	**41**	**16**	**47%**	**30%**
Impact	**63%**	**48%**	**74%**	**64**	**59**	**84**	**53%**	**70%**
• Creates an unpleasant odor	17%	7%	24%	17	22	18	17%	17%
• Pollutes the environment	16%	21%	12%	4	4	7	4%	3%
• Worsen health	11%	9%	12%	13	12	17	13%	8%
• Disturbs comfort	6%	2%	10%	6	8	4	6%	5%

MEDIA HABITS

The following are some findings regarding the media habits of the households.

1. **The majority still watch television.** Television is still the media most accessed by households. The favorite television stations are RCTI, Indosiar and SCTV. Families, neighbors, and friends are also a main source of information for most households, especially regarding sanitation issues. Those with higher education accesses internet websites as their source of information, such as search engine website (google.com), social media (Facebook and YouTube), news (detik.com, tribunnews.com) and messaging applications (WhatsApp).



Media habit of the households.

There are no significant differences of media habit among households with different SES segments or educational backgrounds.

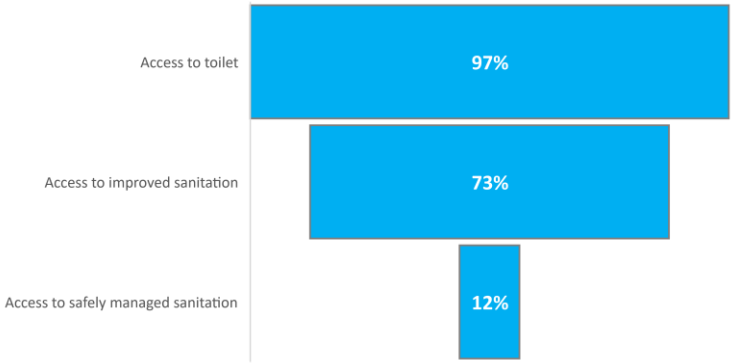
2. **High smartphone usage.** Mobile phone ownership in every study area reaches 85%, whether in the form of regular cell phones (22%) or smartphones (63%). More than half of smartphones have access to data services, so that they have access to internet services. Upper-class households have higher access to data services compared to lower-class households. Data services are generally used for messaging (70%), social media (68%), news websites (25%), and search engine websites (21%).

SANITATION ACCESS

LEVEL OF ACCESS

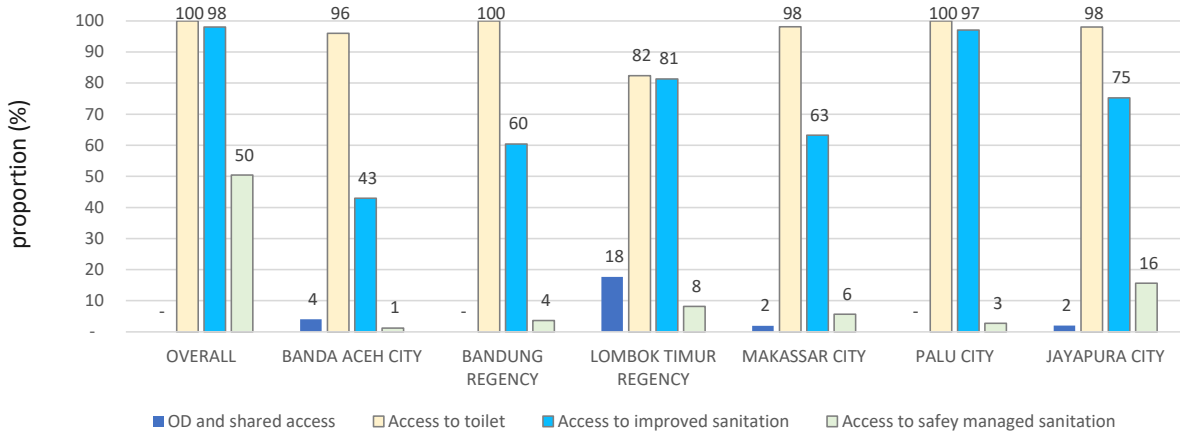
The following are some of the findings regarding the levels of access to sanitation used by household respondents in the study area.

1. **Access to safe sanitation is still low, but ownership of toilets is not the cause.** Access to safe onsite sanitation is indicated to be used by 12% of households in the study area, while access to improved sanitation is used by 73% of households. This huge discrepancy is mainly caused by the lack of of pit emptying. Access to toilet is not a major issue since 97% of households already at least have one while 13% of households have more. However, 24% of households still do not use septic tank or its kind.



Access to sanitation of the households.

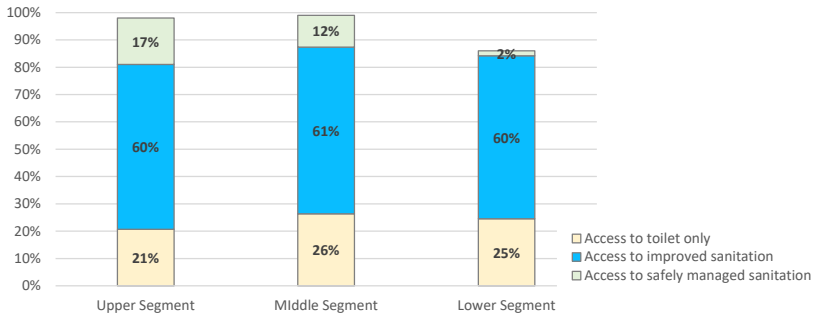
2. **Access to sanitation varies considerably between regions.** Toilet usage in the study areas is already remarkably high, however many households in Palu City still practice open defecation and use shared toilets (see figure below).



Access to sanitation in each study area.

The high level of access to improved sanitation in Banda Aceh, which is almost 100%, is the result of intensive clean and healthy behavior (PHBS or *perilaku hidup bersih dan sehat*) promotion. The data shows that more than half of households in Banda Aceh have access to safe sanitation, meanwhile such access in other regions are still exceptionally low. Some regions still have many toilets not connected to septic tanks, such as Bandung, Makassar and Lombok Timur.

3. **Lower segment households have lower safe-sanitation access.** In the lower SES segment, 60% of households have access to improved sanitation but only 2% have access to safe sanitation. On the other hand, in the upper SES segment, 60% of households have access to improved sanitation while 17% have access to safe sanitation. However, differences in the SES segment do not appear to have an effect on the level of access to improved sanitation. This indicates that the use of toilets and septic tanks has become common for most households in Indonesia while pit emptying is still common only for households with a better economic level.



Access to sanitation in each SES segment.

4. **Only a few still practice open defecation.** Overall, 4% of households do not own toilets. However, less than 1% still practice open defecation. Economic factor is most likely the cause since most of those practicing open defecation come from lower SES segment households. Uniquely, only a small portion of them feel uncomfortable with such practice. Other households without a toilet uses a public toilet or their neighbor's toilets. They not only come from lower segment households, but also from the upper and middle segment households.

CONDITIONS OF ACCESS

The following are some findings regarding the conditions of access to sanitation used by households.

1. **The majority of households uses squat toilet pans.** Around 90% of households use squat toilet pan and only 10% use seated toilet pan. Upper segment households use seated toilet pans more than middle and lower segment households (see table below). Only a small number of houses use cement toilets while the majority uses ceramic toilet pans. The tendency to use ceramic toilet pan made is found in all SES household segments.

Table 8. Usage of Squat and Seated Toilets

Type of Toilet Pan	Toilet Usage (%)						
	Overall	Socioeconomic Status Segments			Educational Background		
		Upper	Middle	Lower	Elementary School	Middle School	High school and Above
Squat toilet pan	94	87	96	99	96	94	86
Seated toilet pan	10	23	8	1	6	10	20

Note: Total usage exceeds 100% because some houses have more than one toilet.

The availability of clean water for toilets is not a problem for most households since only 1% of households still experience clean water scarcity. Regardless of the current condition, 80% of

households are satisfied with their toilets due to the comfort, cleanliness and smooth wastewater flow. Household dissatisfaction towards their toilets are only for inconvenience reasons, non-ceramic walls, and narrow room.

2. **The majority of septic tanks do not meet standards.** The septic tanks used by the households are generally made from masonry or concrete rings of various shapes (see following table). Very few households use prefabricated septic tanks made of fiberglass reinforced plastic (FRP) or polyethylene plastic. Most of the septic tanks are located in the front and back yards, although many are under the floor of the house. It is difficult to identify the specifications of the septic tank due to its underground position, however it is assumed that the walls and bottom of most septic tanks are not watertight.[6] Therefore, it is safe to assume that most septic tanks do not comply with the Indonesian National Standard (SNI or *Standar Nasional Indonesia*). The gap with the requirement for a safe-sanitation access becomes wider since only 12.5% of septic tanks have been emptied. Most households believe that their septic tanks do not require emptying, except when the septic tank smells or is full. Regardless of the current condition, 85% of households are satisfied with their septic tanks.

Table 9. Different Types of Septic Tanks Used by Households

Type	Area Suitability	Advantages and Disadvantages	Construction Cost (x IDR 1,000)
Bottomless (unplastered) single chamber concrete ring	• Area with low groundwater • Limited area • Contoured land	• Durable • Cheap • Quick construction, 0.5 – 1 day • Low capacity	• Banda Aceh: 700 • Bandung: 1,000 • Makassar: 1,500 – 2,000 • Palu: 500 – 700 • Lombok Timur: 500 • Jayapura: 2,000
Bottomless single chamber square type	• Area with high groundwater • Large area • Land with rocky soil	• Flexible shape according to land • More expensive • Longer durability therefore better value-for-money • Construction up to 5 days • Strength and watertightness vary according to raw material and construction process	• Banda Aceh: 2,500 – 5,000 • Bandung: 2,000 – 3,000 • Makassar: 3,000 – 5,000 • Palu: 2,000 • Lombok Timur: 1,000 • Jayapura: 3,000
Bottomless multiple chamber square type	• Area with high groundwater • Very large area • Land with rocky soil	• Flexible shape according to land • Better processing performance • Very expensive due to the amount of building materials used • Durable • Larger capacity therefore better value-for-money • Longer construction	• Banda Aceh: 2,500 – 5,000 • Bandung: 2,000 – 3,000 • Makassar: 3,000 – 5,000 • Palu: 2,000 • Lombok Timur: 1,000 • Jayapura: 3,000

[6] *It is concluded from the fact that the septic tank is often full during the rainy season as a result of the entry of groundwater into the septic tank.*

Type	Area Suitability	Advantages and Disadvantages	Construction Cost (x IDR 1,000)
		• Strength and water tightness vary according to raw material and construction process	
Fiberglass septic tank	• Area with low groundwater • Limited area • Land with normal and dry soil	• Durable and earthquake-proof • Excellent water tightness • Very expensive • Quick construction, 0.5 – 1 day • Tank volume vary from small to large • Can be lifted by groundwater	1,800 – 4,500, for the product 400 for installment

Households in disaster prone areas also use septic tanks of the same type and specifications, especially concrete ring. There is no additional reinforcing material for septic tanks made for households in disaster prone areas.

REASONS

The following are several reasons of households of owning toilet and using septic tank in the study area.

1. **Convenience is the main reason for toilet ownership.** There are many reasons why households have their own toilets, but the top three are convenience, privacy and cleanliness. Only 19% of households place health as the reason, which is slightly higher than preventing pollution. Women have slightly different reasons than men, since the women place safety and health issues higher than men.

Table 10. Reasons of Households for Owning Toilet

Reasons for Toilet Ownership	Overall	Groups							
		Socioeconomic Status Segment			Educational Background			Gender	
		Upper	Middle	Lower	Elementary School	Junior School	High School and Above	Male	Female
Convenience	68%	55%	72%	72%	72%	68%	59%	73%	64%
Privacy	63%	72%	61%	60%	58%	64%	67%	71%	56%
Cleanliness	46%	49%	44%	51%	52%	44%	45%	47%	45%
Safety	37%	38%	38%	29%	27%	39%	39%	27%	44%
Clean and Healthy Lifestyle	36%	33%	29%	19%	30%	26%	45%	23%	33%
Satisfaction	20%	26%	18%	21%	16%	20%	35%	20%	20%
Disease Prevention	19%	37%	14%	14%	17%	19%	29%	13%	25%

Meanwhile, households from the upper SES segment put privacy as a more important reason than convenience. Understanding these driving factors is useful for formulating sanitation promotional strategies to each target group.

2. **Using a septic tank is a norm.** Most households feel that it is a common thing to do to connect their toilets to a septic tank. Almost all households have this perception regardless of their SES segment or

educational background. Indonesian households, especially those in urban areas, have considered a septic tank as a common household item. Recommendations from friends and family also play a role in encouraging households to own septic tanks. Therefore, some have considered using a septic tank as a social norm. Awareness of potential environmental impacts is not the main reason for households to use septic tanks.

Table 11. Reasons of Households for Owning Septic Tank

Reasons for Septic Tank Ownership	Overall	Groups							
		Socioeconomic Status Segment			Educational Background			Gender	
		Upper	Middle	Lower	Upper	Middle	Lower	Upper	Middle
Norm	65%	66%	67%	52%	47%	69%	69%	59%	69%
Recommended by friends / family	42%	33%	45%	48%	62%	37%	35%	46%	39%
Recommended by builders / contractors	19%	19%	23%	5%	18%	21%	15%	16%	22%
Built by the housing developer	6%	11%	4%	2%	4%	6%	8%	8%	4%

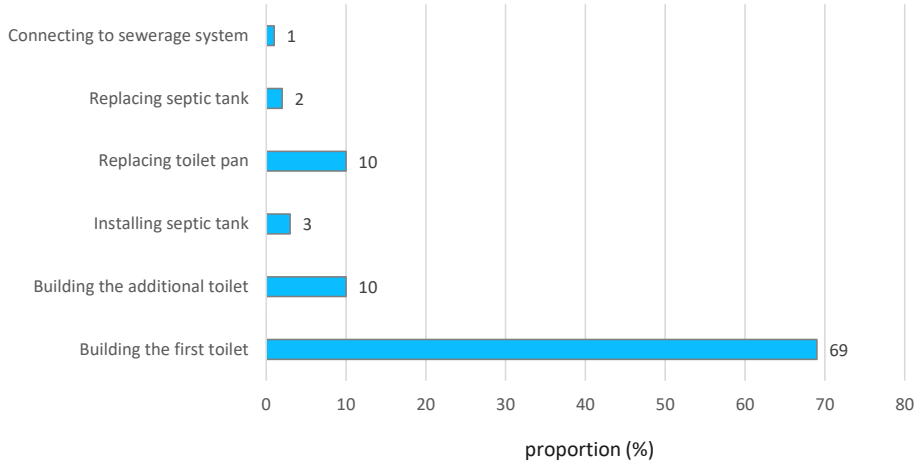
CONSTRUCTION OF TOILET AND SEPTIC TANK

The construction of toilets and septic tanks is the first value chain of the safe-sanitation market. This section contains information related to VC-1 in the study area.

CONSTRUCTION ACTIVITIES

The following are some general findings regarding toilet and septic tank construction activities.

1. **Built at the same time as the construction of the house or afterwards.** Private toilets were included during the construction of 70% of the houses. Several households later built their toilet and septic tank during renovation of their houses. In addition, 10% of households built a second or third toilet in the house. This indicates the desire of households to improve their sanitation access. This fact shows that the market for safe sanitation products and services will still exist despite a region already have a high level of access to sanitation.



Toilet and septic tank construction activities carried out by households.

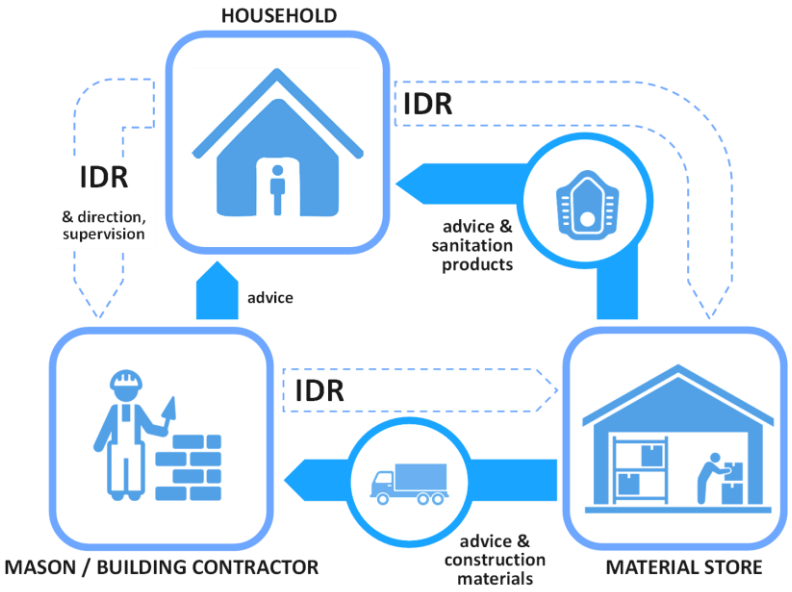
2. **Everything is available, except in times of natural disaster**. Households generally do not perceive the construction of toilet and septic tank to be difficult. The procedure is not different from construction of other structure, the products and services needed are available in their respective cities. Most households know where they can find the material store. Households generally do not find construction of latrines and septic tanks difficult. The procedure is no different from the construction of other structures, squat or seated toilet pans as well as sand and cement are available in the material store nearby. In addition, they know how to find a mason or a building contractor in their city. Product and service supply will be problematic when there is a demand upsurge in times of natural disaster. The availability of local suppliers is also a problem because they are also victims of the disaster. At such times, the involvement of suppliers from outside the region is needed.

BUSINESS PROCESS

The following are findings related to the business process of toilet and septic tank construction.

1. **Households control the construction**. The head of household plays active role in the construction of toilets and septic tanks, including in making decision on the design, types of products and building materials to be used. The head of household supervises the construction and makes design adjustment when necessary. She or he only goes to the material store to choose products like toilet pans and tiles. Masons and building contractors often are trusted by households to buy building materials after the type and price have been agreed upon. They often provide advice to households on design, construction materials and sanitation products to use, as well as on material store. Advice on proper sanitation products can be provided also by store employees, both to the head of the household and to the masons or contractors. Therefore, it is important for masons, contractors, and

material store to have accurate understanding on the access to safely managed sanitation and the required products and services.



Role of each party in the toilet and septic tank construction value chain.

2. **Selected based on experience and price.** Masons or building contractors are often contacted directly by households because of referrals from people who have used their construction services. For construction work of high value, information on job opportunities is obtained from larger contractors or from announcements in newspapers or internet. Negotiations that occur between masons or building contractors and households usually cover a) scope of work, b) type of work relationship, c) design and specifications of materials used, d) construction costs, both the amount and terms of payment. Apart from its experience, the proposed cost plays an important factor for households in choosing mason or contractor. The work can be commenced after a work agreement is signed.

PROFILE

Masons and Building Contractors

As previously mentioned, finding masons and contractors is not an issue for most households. Some of the findings regarding masons and contractors in the study area include:

1. **Classified according to work experience.** Masons and building contractors are the main actors of the construction of toilets and septic tanks (VC-1). The striking difference between the two is the formality aspect and the nature of the working relationship with the households (see table below). Their jobs include building toilets, installing toilet pans, installing wastewater pipes, building or installing septic tanks. Masons, according to their work experience and position in the project, can be classified as

foremen, seniors, and assistants. This informal classification affects wages received by each mason. Meanwhile, building contractors are divided into small contractors, medium contractors, and large contractors according to the amount of capital, experience, and human resources they manage.

Table 12. Characteristics of Masons and Building Contractors

Characteristic		Masons			Building Contractors
		Foreman	Senior	Assistant	
Work experience		At least 5 years and most experienced in the team.	Experienced enough to work without specific instructions.	Youngest and least experienced in the team.	• At least 8 years of experience • Have more educated team members • Incorporated
Role and scope of work		• Supervises and directs team members, • Carries out jobs with specific skills, • Provides advice to service users on design and building materials.	Carries out jobs with special skills such as floors, walls, foundations, plumbing, roofs, toilets, and septic tanks.	Helps foremen and seniors, particularly in doing menial jobs that do not require high skills, such as excavating, cement mixing and carrying tools.	• Supervises the work of team members • Provides advice to service users regarding design and building materials
Service users		Households, small organizations, government offices, bigger contractors.	Households and small organizations.	Does not directly receive job offers from service users.	Households, small organizations, developers, government offices, larger contractors.
Work relationship		Directly appointed by service users.	Directly appointed by service users.	Only related to foremen and seniors.	Through a tender process, particularly for government projects.
Wages	Banda Aceh City	N/A	IDR 75k– IDR 150k per day.	IDR 50k – IDR 60k per day.	IDR 700k – IDR 1.2 million per m^2.
	Bandung Regency	N/A	IDR 130k– IDR 200k per day.	IDR 120k per day.	
	Makassar City	N/A	IDR 160k – IDR 200k per day.	IDR 100k – IDR 120k per day.	
	Palu City	N/A	IDR 125k – IDR 150k per day.	IDR 75k – IDR 80k per day.	
	Lombok Timur Reg.	N/A	IDR 85k – IDR 120k per day.	IDR 50k – IDR 60k per day.	
	Jayapura City	N/A	IDR 170k – IDR 250k per day.	IDR 80k – IDR 150 per day.	

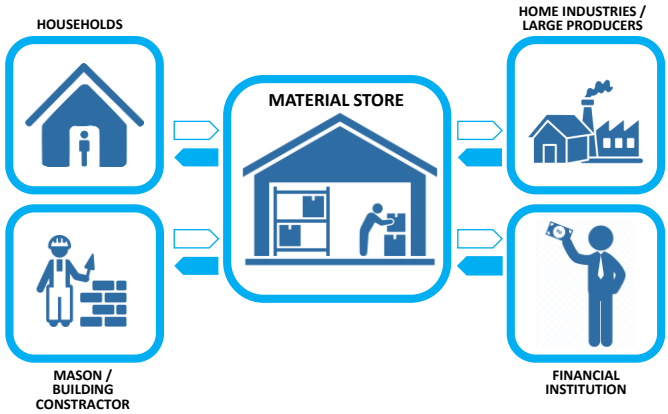
2. **Have wrong conceptions regarding safely managed sanitation.** Masons and building contractors are important sources of information for households, including for the designs and specifications of a proper septic tank. Unfortunately, the Market Assessment found that most masons and contractors have an incorrect conception of a proper septic tank. They believe that a proper septic tank is one that does not need to be emptied regularly. This is the main reason why many septic tanks are built without a watertight bottom, and therefore have the potential to contaminate. This conception is shared and liked by the majority of households because they do not want to be bothered later with frequent emptying in the future.

3. **Limited knowledge and skills hinder improvement.** Increasing access to safe sanitation requires masons with better knowledge and skills. They must understand the types and designs of toilets and septic tanks needed to build safe-sanitation access. The issue of low competence is often found in eastern Indonesia. Local workers do not always have the required level of competence so they have to bring in workers from outside, especially those from Java who are considered more hardworking. The high demand for better toilets and septic tanks will increase the need for greater working capital. The informal nature of their business makes it difficult for them to obtain working capital loans from banks or other financial institutions. They rely on their own money for working capital. Therefore, they are expected to experience working capital difficulties if they get multiple jobs simultaneously to build more toilets and septic tanks.

Material Stores

Households generally do not have difficulty finding material stores in their area. There are several types of stores, ranging from stores that only sell building construction materials, stores that also sell construction equipment and ready-to-use products to stores that only sells plumbing and bathroom hardware and accessories. The following are some of the findings regarding material stores in the study area.

1. **The meeting point for construction actors.** The material store is located the center of the supply chain of toilet and septic tank construction. It links producers, masons and households (see figure). Sometimes there are financial institutions who are ready to provide financing to potential buyers. The characteristics of the relationship between building stores and these parties are:



Central position of material stores in the toilet and septic tank construction value chain.

- **Household**: Household member comes to a material store to purchase toilets, concrete rings, or other sanitation products. She or he prefers to come to see the type and color of the products that suit her or his taste, particularly ceramic tiles, ceramic toilet pans or water taps. Most households

pay in cash, although some may take advantage of the credit facilities recommended by the material store. The presence of a household member is a good opportunity for a store clerk to share information about the most appropriate sanitation product that is suitable for her or his need. It is also common for a store clerk to recommend capable mason or contractor.

- **Producer.** Material stores have direct relationship with the home industries that produce concrete rings. The relationship is often personal, they know each other. Sales transaction sometimes take place by bartering between the concrete rings with sands and cements, as in Bandung, East Lombok and Jayapura. Home industries on many occasions have also become material store customers when purchasing raw materials for the production of concrete rings. A material store rarely has a direct relationship with large-scale industries, such as ceramic toilet manufacturers. The transaction between the two parties involves the role of a distributor. The distributor orders products from the industry, arranges their transportation, storage and delivery to the material store as agreed. The distributor receives payment from the material store before transfers the money to the manufacturer.
- **Masons or contractors**: In a lumpsum project, the mason or contractor will be the one who purchase construction materials from the store. Meanwhile, in a time-based project, the purchase is not always made by the mason or contractor. Their relationship with material stores is mutualistic. They recommend each others to the households and they share information about related products and services.
- **Financial institutions**: The relationship between material stores and financial institutions is also mutualistic. Financial institutions, including banks, cooperatives, multi-finance institutions, and microfinance institutions, provide credit facilities for households to buy products from material stores. For low-income people who cannot provide loan guarantees, material stores will recommend using microcredit from the microfinance institution partner. The existence of this credit facility will increase the sales of material store and vice versa.

The central position of the material stores can certainly be used to support safe sanitation promotional activities to households, producers, masons, contractors, and financial institutions.

2. **Easy to start and long-lasting.** The construction material business is relatively easy to enter. Material stores are not always developed by those with knowledge and experience in the construction business. Three things motivate a party to open a material store, namely 1) good business prospects, due to the high number of existing and upcoming construction projects, 2) low business risk, because the products are not easily damaged or quickly expired and 3) business network they already have, especially for those already in the construction business. Material stores are easily found in all of

Indonesia's urban areas, i.e. 80% of households know how to find material stores in their respective cities or regencies, including those in Banda Aceh, Sumbawa Barat and Jayapura. The material store business is also considered a stable business as evidenced by the number of stores that have been around for generations. Only a few resources are needed, namely a) space for store and warehouse, b) efficient delivery system and c) workers. Most material stores have a workforce of less than 10 people who are responsible for serving customers, maintaining the shop, and delivering products. No special skill is needed to become a store worker. More complex tasks, such as managing finances and selecting and pricing products, are usually done by the store owner herself or himself.

3. **Squat toilet pans and concrete rings are in great demand.** As mentioned in the Sanitation Access section, households use squat toilet pans more than seated pans. Hence, squat toilet pan is always available at the store while the seated pan must be preordered. Besides being a matter of habit, squat pans are more popular because of their lower price (see table below).

Table 13. Buying and Selling Prices of Toilets at Building Stores

Transaction		Banda Aceh	Bandung	Makassar	Palu	Lombok Timur	Jayapura
Buying price (x IDR 1,000)	Squat toilet pan	130 – 350	150	150 – 250	100 – 300	60 - 130	150 - 160
	Seated toilet pan	550 – 2.000	850	-	-	-	
Selling price (x IDR 1,000)	Squat toilet pan	150 - 400	165	175 – 275	120 - 300	80 - 150	180 - 200
	Seated toilet pan	700 – 2.500	950				
Margin (%)	-	10 – 30	10 - 25	10 - 20	10 - 20	10 - 30	20 – 30

Many material stores sell concrete rings, including those with a diameter of 60 cm, 80 cm and 100 cm, which are often used as septic tanks. Most material stores purchase concrete rings directly from the producer, either by paying in cash or bartering with cement raw materials (see the following table).

Table 14. Buying and Selling Prices of Concrete Rings at Building Stores

Items	Banda Aceh	Bandung	Makassar	Lombok Timur	Jayapura
Buying price (x IDR 1.000)	80	Barter or self-manufactured	150 – 200	60 - 70	Self-manufactured
Selling price (x IDR 1000)	95	180	250 - 300	75 - 95	600
Margin (x IDR 1.000)	15 - 20	--	100	15 - 25	--
Terms of Purchase	*Cash-on-Delivery (COD)*	*COD or bartering with raw materials*	*COD*	*COD*	--
Sales (unit/month)	2	5	2	50 - 100	N/A

Households consider the price of concrete rings in each region is still affordable, although there is significant price difference among the regions. For example, the price of a concrete ring in Jayapura can be 200% - 300% higher than the price in other regions. The price differences occur due to

variations in the production process and the price of raw materials that affect the overall cost of concrete ring production.

Concrete Ring Producer

Most producers of concrete ring are home industries. Households rarely have direct contact with the concrete ring producers and generally obtain concrete rings from masons, contractors, or material stores. The following are some findings regarding concrete ring producers.

1. **Concrete ring is only one of the products**. The home industries produce a variety of pre-cast products made from a mixture of sand and cement, such as paving blocks, ventilation blocks, concrete bricks, tank caps and concrete rings. Initially, concrete rings were made only for drainage channels or culverts. Only recently did concrete rings start being used as an alternative for septic tank. Concrete rings are made in several diameters, but the diameter of concrete rings commonly used for septic tanks are 60 cm, 80 cm, and 100 cm.

2. **Production capacity depends on market coverage.** The wider the market reach, the larger the production capacity of the home industries. Accordingly, this related to the number of workers in the home industries (see the following table). The concrete ring producer in Jayapura has a large production capacity because they also serve the surrounding regencies. Meanwhile, household industries in Banda Aceh, Bandung and Makassar are smaller in scale because they only serve the needs of their city.

Table 15. Profile of Home Industries of Concrete Ring

Region	Number of Workers	Production Capacity (unit of rings/day)	Market Coverage	Installation Services
Banda Aceh	1 – 4	5 – 10	In the city	Yes
Tangerang Regency	4 – 10	5 – 6	Out of town	Yes
Bandung	4 – 6	10	--	Yes
Surakarta	4 – 12	10 - 25	Out of town	No
Makassar	6 – 8	10	In the city	Yes
Palu	5 – 9	4 – 11	--	Yes
Lombok Timur	5 – 9	20	Out of town	Yes
Jayapura	20 – 60	20 – 30	Out of town	No

3. **Quality is determined by raw materials, molding, and workers' skill.** The quality of cement, sand and occasionally gravel determines the strength of the concrete ring. Apart from the quality of each raw material, the composition of the mixture also determines the quality of the concrete rings. Other things influence the quality of the concrete rings are the molding dan the skill of the workers. The

owner of the home industry has never provided written production procedures for the workers. Without high quality of raw materials and molding as well as skilled workers, concrete rings are often prone to cracking and sometimes even break while in the mold.

Concrete ring manufacturers in Lombok Timur Regency.

4. **The use of cement determines the price.** The selling price of a concrete ring is strongly influenced by the volume and price of cement used. Each producer has their own ideal cement mix composition and each region has their own average price of cement. Accordingly, the price of concrete rings varies greatly between regions. Those who used a higher amount of cement automatically sell their concrete rings at a higher price as indicated by concrete ring industries in Makassar, Palu and Jayapura (see the following table). The high selling price of concrete rings in Palu and Jayapura is also due to the addition of gravel to the cement-sand mixture to increase the strength of the concrete rings.

Table 16. Price and Profit of Concrete Ring Sales

Region	Cement Usage (product unit / cement bag)	Cement Price (IDR / cement bag)	Concrete Ring Selling Price (IDR / product unit)	Profit (IDR / product unit)	Sales Volume (product unit / month)
Banda Aceh	4	54,000	62,500	50,000	30 – 45
Bandung	2	56,000	150,000	50,000	40
Makassar	3	--	200,000	40,000	80 – 175
Palu	2	59,000	225,000	50,000	120 – 200
Lombok Timur	4	65,000	70,000	--	45
Jayapura	1	80,000	600,000	200,000	700

5. **Inaccurate conception about safely managed sanitation.** In general, concrete ring producers do not have an accurate conception on safe sanitation. Their conception is more focused on the physical quality and the durability of the septic tank. A septic tank is considered safe if it has sturdy walls and top. This concept is not entirely wrong, the safe walls of the septic tank must be sturdy so they do not

leak and break easily. They also understand that a septic tank must be located relatively far from a water source. After being told about the meaning of the access to safely managed sanitation, the producers expressed their willingness to support its implementation according to their role.

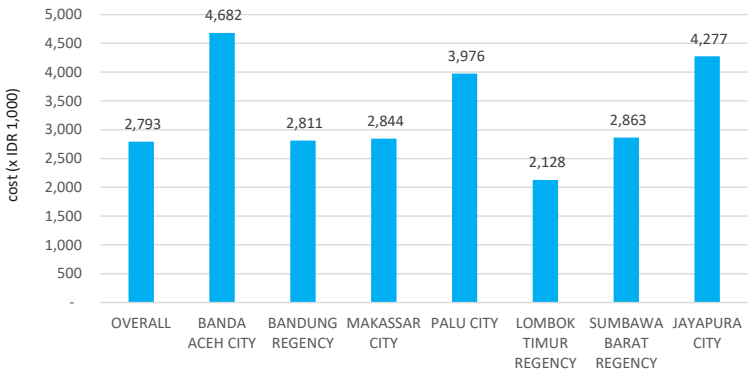
6. **Constrained by working capital, raw materials and skilled workers.** Increasing access to safe sanitation has implications on the quantity and quality of concrete rings in the market. The production capacity certainly needs to be improved to satisfy the increasing demand for better concrete rings. However, several things may hinder the improvement of their capacity, e.g.:

   - **Working capital**, that might be faced by small-scale home industries to fund additional workspace, modernize equipment, buy raw materials in bulk and pay wages of skilled workers.
   - **Raw materials**, particularly regarding the availability of cement and sand in eastern Indonesia. There is a concern that the supply of high-quality cement from Java may not be able to meet the demand for higher production rate. Consequently, the producers must rely on lower quality of cement available from local sources.
   - **Skilled workers**, which might still be difficult to find in eastern Indonesia, so they must be brought in from Java or Sulawesi.

COSTS

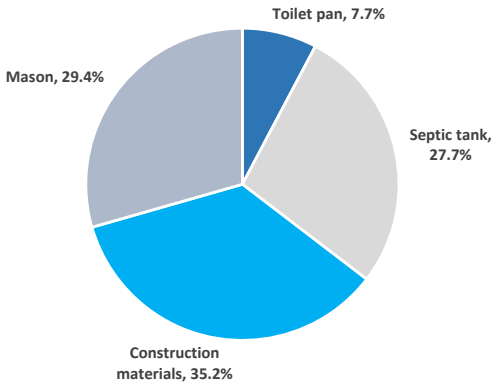
The following are findings related to the construction costs incurred by households to build toilets and septic tanks.

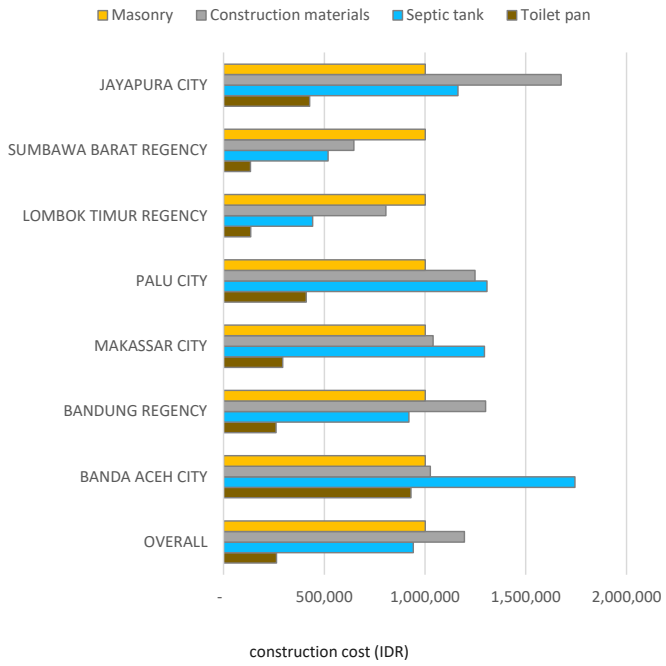
1. **High variation of construction costs in different areas.** The construction cost of a toilet, including the costs for toilet pan, septic tank, piping, construction materials and masonry, can reach an average of IDR 2.8 million. Obviously, construction costs vary widely between study areas. Assuming the technical specifications are not much different, the construction costs in Banda Aceh and Jayapura can be higher up to 2 times that of the construction costs in Lombok Timur. High variation of construction is also found among household SES segments. Households from the upper segment spend more for the construction than those from the middle and upper segments, respectively IDR 3.6 million, IDR 2.8 million and IDR 1.9



million. Many households, whether from the upper, middle and lower segments, consider the construction costs are still reasonable. This may be the reason that none of the households use credit facilities to finance the construction.

2. **The highest cost component is the construction material**. In average, the cost of construction materials can reach up to 35% of the total construction cost of toilet and septic tank (see figure), or around IDR 1.2 million. Meanwhile, mason and septic tank costs followed at 29.4% and 27.7% respectively, or around IDR 1.0 million and IDR 900 thousand. However, the cost composition is not the same among regions. Septic tank is the highest cost component in Banda Aceh, Makassar and Palu while mason is the highest cost component in Lombok Timur and Sumbawa Barat (see figure below). The cost for construction materials in Jayapura is much higher than other areas because they must import most of the materials from other islands.





Cost components for toilet and septic tank construction in each study area.

CONSIDERATIONS

The following are findings related to the considerations of households and construction actors in constructing toilets and septic tanks in the study area.

1. **Price is the main factor.** Households select sanitation products and construction services to use with one main factor, i.e. price (see the following table). This applies to households from the upper segment, middle segment and lower segment. Whether there is a warranty or not is also a common factor of consideration along with recommendations from friends, family, neighbors or masons.

Table 17. Considerations for Selecting Products and Services

No.	Products and Services for the Construction of Toilet and Septic Tank			Pit Emptying
	Toilet	Septic Tank	Masonry	
1	Price (91%)	Price (83%)	Price (74%)	Price (86%)
2	Comfort (62%)	Water tightness (53%)	Capability (62%)	Capability (51%)
3	Recommendation (41%)	Durability (42%)	Tidiness (25%)	Speed (25%)
4	Size & type (35%)	Emptying frequency (28%)	Speed (40%)	Authorized (21%)
5	Warranty (16%)	Ease of installation (21%)	Easy to contact (20%)	Easy to contact (20%)
6	Availability in store (15%)	Provided with installation (15%)	Recommendation (13%)	Ease of Agreement (16%)
7	Free installation (9%)	Warranty (12%)	Easy to contact (12%)	Correct disposal (10%)
8	Delivery service (6%)	Small area (3%)	Warranty (4%)	Warranty (10%)
9	Brand (5%)	Type of materials (3%)	Other services (4%)	Other services (4%)

The survey reveals that many households consider the water tightness of septic tank in their selection even though they also want a septic tank that does not require frequent emptying.

2. **Many considerations to maintain the safety of the septic tank.** As previously mentioned, most of the septic tanks were not built according to the national standard. However, the considerations taken by builders and contractors in the construction of a septic tank have actually taken into account safety factors concerning the strength of the tank, the risk of accidents, the potential for pollution and the ease of emptying the pit. These considerations are:

   - **Land conditions.** If the area is sloped, slippery and small, a ring-type septic tank is more suitable. If the land is wet or rocky, a square-type septic tank is more suitable because the structure is stronger. If near a water source, the septic tank should not be too deep to prevent groundwater from entering the tank.
   - **Tank Location**. The tank must be at least 10 meters from a groundwater well and have lower base elevation than the groundwater level to avoid contaminating groundwater. Selection of the location of the septic tank must also consider access to desludging services. The septic tank should also be located outside the house and not near roads or under garages to avoid heavy loads.

- **Tank strength.** To prevent the tank from collapsing, the top of the septic tank needs to be made of a concrete plate using high-quality reinforcing bars and cement. In addition, the septic tank also needs to be equipped with a T-pipe vent to reduce the risk of a gas explosion.
- **Tank Bottom**. A filtration layer, made of gravel and palm fiber, is made at the bottom of the tank to reduce contents of solids in the liquid that comes out of the tank bottom.
- **Duration of work.** The construction of a septic tank must be completed within a day so that it does not interfere with household activities. Therefore, many prefer to use concrete rings because of their speedy installation.

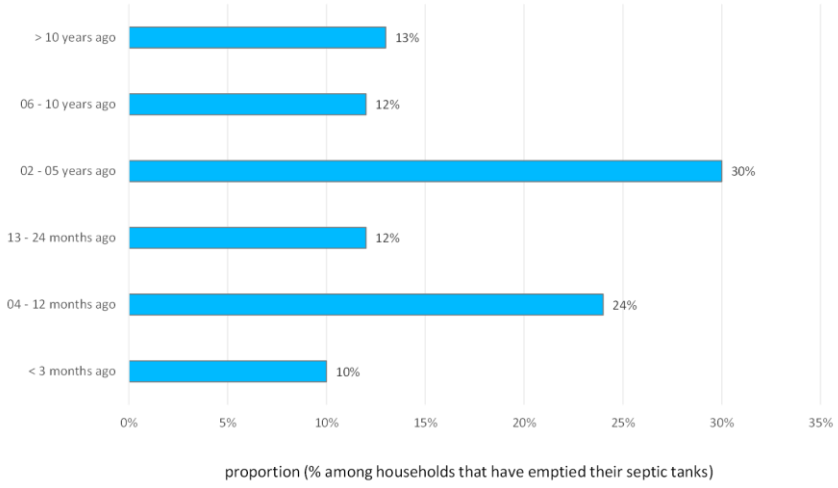
PIT EMPTYING

The pit emptying is the second value chain of the safely managed sanitation market. This section contains information related to the provision of pit emptying services.

PIT EMPTYING ACTIVITIES

The following are findings related to pit emptying.

1. **Very rarely done**. Only around 12% of households have ever emptied their septic tanks and mostly were carried out two to five years ago (see the following figure). Most households emptied their septic tanks due to unpleasant odor and obstructed wastewater flow which occur when the septic tank is full. Some emptied their septic tanks following recommendations from colleagues, family members and neighbors. None of the households emptied their septic tanks for pollution prevention or for regulatory compliance purposes. The main reason why households have not emptied their septic tanks is the high pit emptying costs. This is clearly seen from the fact that most of the households that have not emptied their septic tanks are those belonging to the low SES segment.



2. **Pit emptying is highly seasonal**. The frequency of pit emptying increases in the rainy season because the septic tanks fill up more quickly due to groundwater seepage into the septic tanks. The frequency of pit emptying decreases in the dry season as the groundwater level drops below the tank bottom. Pit emptier can get up to 6 - 8 jobs per day in the rainy season compared to a maximum of 4 jobs per day in the dry season. Fluctuation of pit emptying indicates that the walls and bottom of the septic tank are not water-tight, or even do not have any bottom at all.

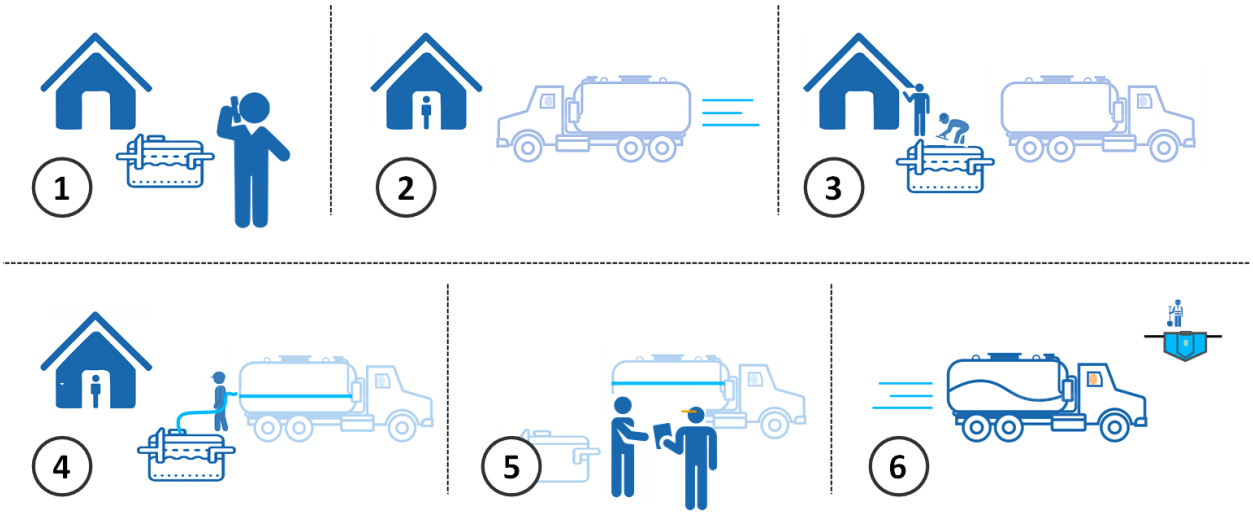
3. **Competing with the government.** In many regions, the local government also offers pit emptying service. There is no division of service zone or working hours between government-run service and private service. Therefore, government-run service is in competition with private service. Private pit emptier in Jayapura only get 5 - 6 jobs per month because households in that region prefer to use government-owned service due to the lower service charge. Moreover, government-owned service uses better and well-maintained desludging trucks than those used by private pit emptier.

4. **Offer additional services.** Most pit emptier offer other services to households. Septic tank maintenance service is offered by 76% of pit emptier, while the construction of septic tank is offered by 13% of pit emptier. Services most often used by households are the installation of toilet pan and septic tank repairment, particularly for those belonging to the upper and middle segments.

BUSINESS PROCESS

The following are findings related to the business process of pit emptying.

1. **Households decide the pit emptying.** As mentioned earlier, households empty their pit when there are problems. Therefore, they always want the pit emptier to come immediately and solve the problem. In addition to deciding the time, the household also decided who will do the pit emptying. Households selects pit emptier based on recommendation from neighbors or friends, as well as based on information from outdoor advertisements. During the operation, the control is in the pit emptier. Most pit emptying takes between 1 hour to 2 hours or at anytime the pit emptier decide to stop. In the region where the supervision is very weak, the pit emptier decides where to dispose the septage. The pit emptier often provides advice to households, whether on how to prevent blockage, improve septic tank condition and the time for the next pit emptying.



Pit emptying business process. *It starts with the household contacting the pit emptier in which the time and basic charge are agreed (1). Upon arrival (2), the first task of a pit emptier is to find and open the cap of the septic tank, followed by a thorough observation on the contents (3). The estimated volume and condition of the septage decide the overall service fee. The emptying of the septic tank is carried out until it reaches the desired level of the tank remaining contents (4). As agreed, the household pays the service fee before the truck leaves the property (5). If the desludging truck tank is full and there is no more house to serve on the same day, the truck will transport the septage to the treatment plant (6).*

2. **Operates without control and supervision.** There is no city and regency that have a licensing mechanism for pit emptying services. Most local institutions that are responsible for domestic wastewater services do not yet have the capacity to regulate private services in their area. As a result, service providers can operate everywhere in the city, because there are no service zoning among service providers. There is no obligation for service providers to use personal protective equipment. In several other areas, pit emptying service providers also carry out emptying of wastewater tank from non-domestic sources, such as restaurants, cafes, small industries and hospitals. This practice can have devastating consequences, especially for the treatment process at a designated septage treatment plant.

PROFILE

The following are findings related to the profile of pit emptying service providers, particularly those from the private sector.

1. **Informal and small scale.** Privately-owned pit emptier are available in every region. They are generally small-scale businesses in terms of the number of workers, the number of desludging vehicles, and the volume of their business. They are generally an informal family business with no legal status as a

registered company. Pit emptiers involve one to four workers including the business owner. Most of them has one unit of desludging truck, although there are a few who has two units. On average, each service provider receives pit emptying orders for 3 - 4 septic tanks per day.

2. **Use a six-wheeler or others**. Pit emptiers use various types of motorized vehicles, such as 6-wheeler trucks, pick-ups, and 3-wheel motorized cart. The specification standard for desludging vehicle is not yet available, however, there are general requirements and road load limitation to follow.

Pit emptying service providers use a 6-wheel truck with steel tank as in Makassar City (left picture), and use a pick-up with fiberglass tanks as in Lombok Timur Regency.

Many uses 6-wheel truck, like those in Banda Aceh, Bandung, Makassar and Jayapura, because its ability to a) carry a 3 m^3 – 6 m^3 steel tank with 5 mm wall thickness, b) reach high elevation and overcome bad road condition, c) lower operational unit cost. All government-owned pit emptying services use a 6-wheel truck. Pick-ups, such as in Palu and Lombok Timur, are used because they are cheaper, small enough for small alleys, not easily identified as desludging vehicles and multi-purposes. Pick-up vehicles generally use a fiberglass water tank with a volume of 0.8 m^3 - 1.0 m^3.

Table 18. Prices for Pit Emptying Vehicles and Tanks

Vehicle and Equipment		Price	
		New	Used
Vehicle	Truck	IDR 125 million – IDR 180 million	IDR 16 million – IDR 40 million
	Pick-up	IDR 169 million	IDR 16 million – IDR 40 million
Tank	Steel 4 m^3 – 6 m^3	IDR 25 million	IDR 15 million – IDR 20 million
	Fiberglass 1 m^3	IDR 1.2 million	--
Equipment	Vacuum pump	IDR 10 million – IDR 12 million	--
	Hose	IDR 1.7 million per 50 meters	--

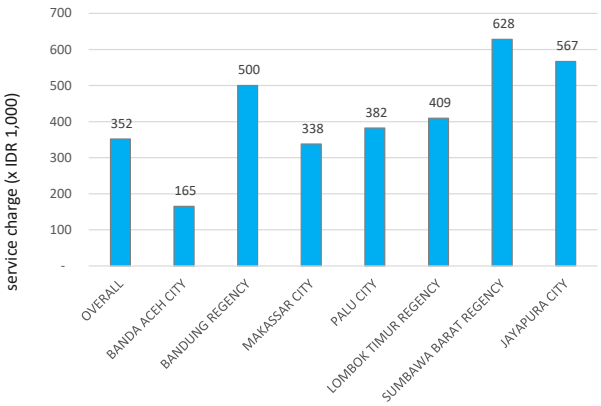
When demand is low, the pick-up is often utilized for other services, such as garden watering and goods delivery.

3. **Limited capital prevents improvement.** Increasing access to safe sanitation, especially with the implementation of mandatory periodic desludging, will require pit emptiers to serve more septic tanks. They must increase their number of vehicles to serve every septic tank, including those located far from the accessible road. It is expected that they must use a stronger vacuum pump with longer hose. They may need smaller vehicles that can houses located on narrow streets. They also must use larger steel tank to make their transportation more efficient. In addition, they must employ workers with better competence and equipped with protective gear. Availability of capital will be a major obstacle for them to meet the future demand. They, as mentioned earlier, are small-scale entrepreneurs who do not have legal status, making it difficult for them to access bank loans.

SERVICE RATE

The following are findings regarding the service rate to be paid by households and its cost components.

1. **Left to the market mechanism**. In contrast to the service rate of government-run service, the service rate for private pit emptying is left entirely to the market. The service rates vary among pit emptiers and among regions, but the average rate is around IDR 352k. Households in Sumbawa Barat and Jayapura pay the highest, while those in Banda Aceh pay the lowest (see figure below).



The service rate of a pit emptier is influenced by service rates of other pit emptiers. Some additional fees are usually charged on top of the basic service rate. The rationale for determining the additional fees varies. Some pit emptiers take into account the volume and shape of the septic tank (ring or square), the distance to IPLT, the difficulty in accessing septic tank and the hardness of the contents. These factors cause a wide variation of the service rates (see the following table). Most households consider the current service rate is expensive.

Table 19. Variation of Pit Emptying Service Rates

	Banda Aceh	Makassar	Palu	Jayapura
In the city	IDR 120k– IDR 150k (ring), IDR 150k – IDR 250k (box)	IDR 250k	IDR 450k	IDR 800k
Out of town	IDR 150k– IDR 250k (ring) >IDR 350k (box)	IDR 400k– IDR 500k	IDR 500k	IDR 1.5 million

The service charge for private pit emptiers is also influenced by the disposal fee at the septage treatment facility. The increase in septage disposal fee will increase the service charge of the private pit emptiers.

2. **Fuel is the highest cost component.** Pit emptying service operations have at least these 6 main cost components, i.e.

    - Fuel: Generally, IDR 100k to IDR 200k per day based on the distance traveled and the frequency of daily emptying,
    - Wages: Pit emptiers generally pay their workers IDR 50k per emptying job, although some pay their workers a salary of IDR 2.0 million - IDR 2.7 million per month.
    - Vehicle maintenance: Ranges between IDR 350k- IDR 500k for minor maintenances, such as oil and filter changes, while heavy maintenance such as tire changes ranges between IDR 1.5 million–IDR 5.0 million per 6 months.
    - Vacuum pump maintenance: Ranges between IDR 500k - IDR 4.0 million per 6 months.
    - Tank cleaning: Ranges between IDR 100k - IDR 200k per 3 - 6 months in Banda Aceh City, or between IDR 2 million per 3 months in Makassar City.
    - Tax and fee: Approximately IDR 2.5 million per year for vehicle tax and IDR 1.0 million per 6 months for road eligibility inspection fee.

    The cost of fuel is the largest cost component, although it depends on the distance traveled. In contrast to the same unit price of the fuel in all regions of Indonesia, wages and vehicle maintenance costs vary widely among regions.

CONSIDERATIONS

The following are findings related to the considerations taken by households in selecting pit emptiers.

1. **Service rate is the main consideration.** Similar to the construction of toilets and septic tanks (VC-1), households select pit emptiers mainly based on the price of their service, or the service rate (see previous **Table 17**). No difference among upper, middle, and lower segments, all put service rate as their main consideration. Only 10% of households consider where and how the septage is disposed as an important factor, which is far below the considerations on capability, speed, and ease of contact.

2. **Expensive but more flexible and responsive.** Compared with the service rate of pit emptying provided by the government, the rate of private pit emptying service can be twice as high. In Palu, the rate for private pit emptier can reach up to IDR 450k while the rate of government-run service is only IDR

250k. Despite the fact, many households continue to use private pit emptiers. The reasons are the private pit emptiers are more flexible, accessible and responsive. Private pit emptiers are ready to work outside normal working hours and outside the city. Households only need to contact private pit emptiers by phone or by messaging applications. Negotiations regarding rates and schedule can be done and agreed immediately. On the other side, households must come to their office, fill an order form and waiting for days to get a government-run pit emptying service.[7]

SEPTAGE TREATMENT

Septage treatment is the third value chain of the safely managed sanitation market. This chapter contains information related to the provision of sludge treatment.

TREATMENT ACTIVITIES

The following are findings related to septage treatment activities.

1. **Applies low energy technology**. Every study area has a septage treatment facility, either IPLT or wastewater treatment plant (IPAL). They still use simple and low energy technology. Solid and liquid separation relies on gravity, while the biodegradation of organics relies on natural processes such as anaerobic degradation processes and natural oxygen infiltration. Sludge drying relies solely on the heat of the sun. The application of such technology requires a large area of land which only can be found at the outskirts of the city. Some treatment plants emit unpleasant odors in addition to the annoying sight.
2. **Insufficient capacity.** Relative to the population of each city (see **Table 1**), assuming desludging is mandatory for every household, most IPLTs have capacity lower than the theoretical needs (see **Table 2**). For example, IPLT in Palu only has a capacity of 24 m^3/day while theoretically the city with a population of 365 thousand people needs a treatment plant with a capacity of 110 m^3/day. Only IPLT Gempong Jaya in Banda Aceh with a capacity of 85 m^3/day that can treat septage of their 240-thousand people. Considering their current capacity of IPLT, the septage treatment value chain can be the bottleneck of the improvement of access to safe sanitation in Indonesia.

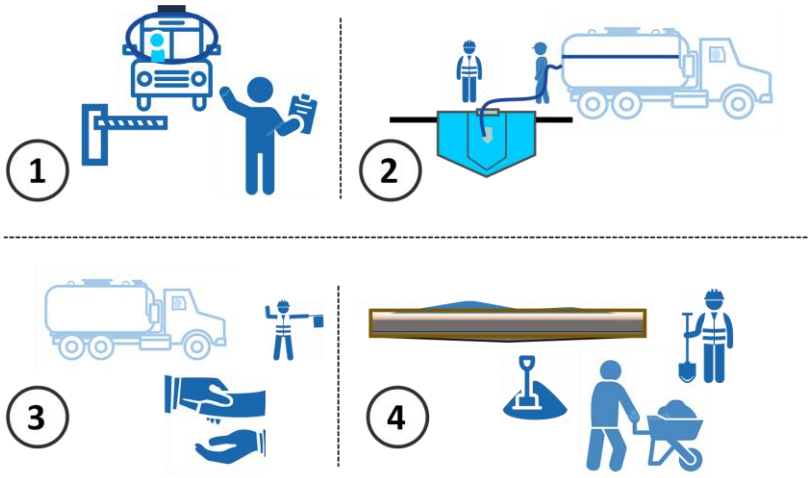
[7] *Improvement have been carried out in DKI Jakarta, Bekasi City and Sidoarjo Regency so the ordering process can also be made via smartphone applications or internet sites.*

3. **Not all are used by private pit emptiers**. The reasons vary, whether because of the restrictions on private service providers, the remote locations, or simply because of ignorance on the existence of IPLT. Other reasons include:

   - Private pit emptiers have not been registered as legal entities therefore they feel that they are not eligible to use IPLT, as happened in Lombok Timur Regency.
   - Local government policies regarding the use of IPLT by pit emptying services have not been communicated, as happened in Palu City.
   - Operating time of IPLT is limited to working days and hours (08.00 - 17.00) while pit emptying services operates at 06.00 - 21.00, as happened in Bandung Regency.
   - The high rates of septage disposal charged to private pit emptying services, as happened in Bandung Regency and Jayapura City.

   The low utilization of septage treatment facility by private pit emptiers contribute to the idle capacity of some IPLTs. The idle capacity becomes bigger in times of disaster when a lot of roads is damaged and cannot be passed by desludging trucks.

4. **The manager controls the operation**. The sewage treatment service is fully controlled by the IPLT manager, especially in the IPLT where there is no SOP. He decides whether a desludging truck can enter the IPLT area and whether the septage can be unloaded into the receiving unit. IPLT performance is determined initially by his decision to allow the truck to unload. In many cases, a pit emptier brings wastewater that is not suitable to be treated in the IPLT.



***Septage treatment business process**. Arriving at IPLT gate, the eligibility of desludging truck will be verified before allowed to enter (1). If permitted, the desludging truck will unload its septage at the receiving unit (2). Desludging truck driver pay the fare to IPLT manager, or sign the record, after the unloading is complete (3). Septage treatment is carried out (4).*

5. **Generates useful products.** IPLT Gampong Jawa (Banda Aceh) produces gas from the biodegradation process of the septage. However, the gas production rate is too low to be supplied to the surrounding communities. Most IPLTs produces dry sludge that can be used as soil amendment. Local governments

often use the treated sludge for enriching soils in their parks. Many IPLTs allow the community to take the treated sludge for their personal use. Only IPLT in Lombok Timur and Jayapura that have commercialized the treated sludge. After being pulverized and packaged, the treated sludge is sold for IDR 1,000 per KG as in Lombok Timur or IDR 20,000 per pack of 20 KG as in Jayapura.

The biodigester in the IPLT Gempong Jawa (Banda Aceh) generates gas that can be used as a source of energy (left picture) and the sieving facility used at the IPLT Koya Koso (Jayapura) produces finer sludge particles to be used as a soil enrichment material (right picture).

6. **Poor treatment performance.** Most IPLT's performance are in doubt. The resulting outputs, both effluent and treated sludge, are not always safe for disposal into the environment or to be utilized. Apart from the technology being used, some of the causes of the poor performance include:

    - IPLT often receives septage in amount less than its design capacity,
    - IPLT occasionally have to operate even though some of its units are damaged,
    - IPLT is not supported by adequate operating costs,
    - IPLT is not operated according to its SOP.

Availability of the operating costs is also one of the main causes of the low performance of the IPLTs.

PROFILE

The following are findings regarding the septage treatment service providers in the study area.

1. **Operated by government with non-permanent workers.** All IPLTs in the study areas are operated by the local government agency (Dinas) as in Banda Aceh and Lombok Timur or by their technical implementation unit (UPTD) as in Makassar and Jayapura. Until now, no treatment service is provided by private sector. The IPLT organization generally consists of only two to four workers. They are mostly non-permanent workers with long experience in their respective IPLTs.

2. **Many obstacles to have higher treatment capacity.** Increasing access to safe sanitation, especially with the mandatory desludging program, will require greater treatment capacity. The existing IPLT must be modernized so that its capacity will increase or a new IPLT must be built. Apart from the investment budget issue, another main obstacle is the difficulty to find land for a new IPLT. Higher IPLT capacity meaning higher operational budget which local government may not be able to allocate.

TARIFF

The following are findings regarding the tariff that must be paid by private pit emptiers.

1. **Only charged to private pit emptiers.** The local government charges the septage disposal tariff to private pit emptier with an amount as set in the Regional Regulation (*Peraturan Daerah*). The tariff of septage disposal in Banda Aceh is between IDR 10,000 to IDR 15,000 per disposal. A higher tariff is applied in the IPLT of Makassar, i.e. IDR 25,000 per disposal. Payment in Banda Aceh and Makassar are made accumulatively per month to related agency and not to IPLT officer. A different pricing is applied in Bandung where the local government charge a monthly subscription rate to private pit emptiers. By paying the subscription rate, a private pit emptier can dispose of the septage with no limitation in a month. Although the treatment tariff is relatively low, there are still a number of pit emptiers refuses to pay the tariff.
2. **Revenues cannot be spent directly.** Given its status as a government agency, all revenues from the treatment service tariff must be deposited as a Regional Original Revenue (PAD or *Pendapatan Asli Daerah*) to the Local Finance and Assets Management Office (BPKAD, or *Badan Pengelolaan Keuangan dan Aset Daerah*). The local government at the beginning of each year will allocate an annual budget for IPLT operations. In addition to the low budget allocation, the governmental budgetary system makes it difficult for IPLT to cover the cost to fix a damage in a treatment unit.

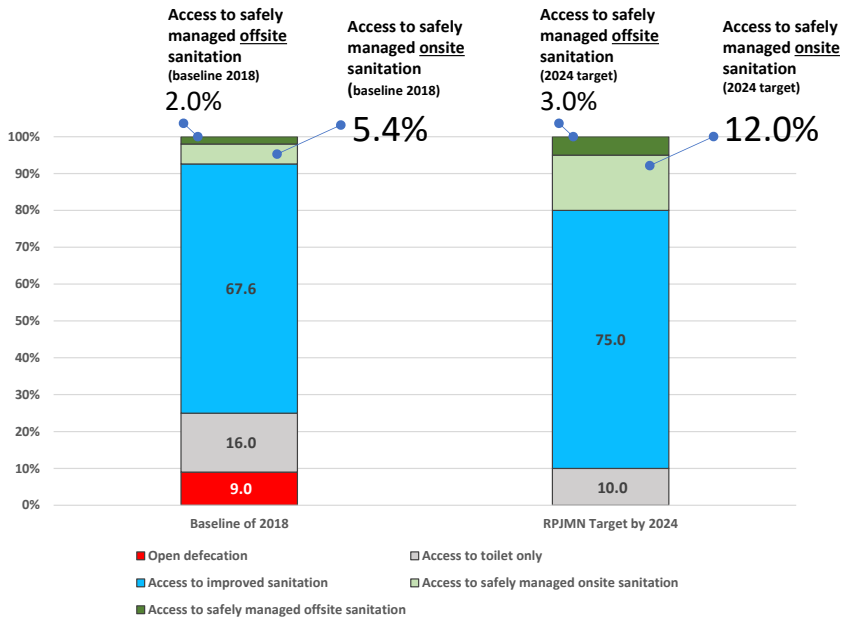
ENABLING ENVIRONMENT

The enabling environment for the safely managed sanitation market relies on policies and regulations, the capacity of relevant government institutions, infrastructure and social conditions that directly and indirectly affect the demand and supply sides of sanitation products and services, both in terms of volume, quality, safety, affordability and sustainability. The following are some information regarding the enabling environment of the safely managed sanitation market in Indonesia.

NATIONAL LEVEL ENVIRONMENT

National Policies

At the national level, increasing access to safely managed sanitation is supported by policies, targets and sanitation development programs issued by the central government. The 2020-2024 National Medium-Term Development Plan (RPJMN) targets 15% of population should have access to safely managed sanitation by 2024 in which 12% will use onsite solution (see figure). There is a gap of 9.6% of population to have safe sanitation access that must be addressed in 5 years, both in urban and rural areas. The gap translates to 26.87 million people or 5.97 million households. [8]



Sanitation development targets of 2024.

Every province, city and regency in Indonesia should translate that national safe sanitation target into target of their respective region. Until now, the target for access to safe sanitation for city and district is will unavailable.

National Programs

The government launched the Accelerated Settlement Sanitation Development (PPSP or *Percepatan Pembangunan Sanitasi Permukiman*) program in 2009. The PPSP program encourages cities and regencies

[8] *It is calculated based on assumptions that Indonesia will have a projected population of 279.96 million people in 2024 (BPS), and an average number of household members is 4.5 persons, while the access to safely managed onsite sanitation in Indonesia in 2018 is 5.4% (BAPPENAS).*

in Indonesia to have a City Sanitation Strategy (SSK or *Strategi Sanitasi Kota*) which functions as a 5-year guideline for planning, development, supervision and monitoring of the provision of domestic wastewater, solid waste and drainage services in a city. When a city has set their target for access to safe sanitation, they need to update the SSK so it contains programs and activities needed to achieve such target. This includes programs and activities that affect the market of safe sanitation within the city.

The Ministry of Public Works and Public Housing (MoPWH), in this case the Directorate General of Human Settlements (*Direktorat Jenderal Cipta Karya* or DJCK), has several programs and routine activities that improve access to safe sanitation, for example the community-based sanitation program (SANIMAS), Onsite Wastewater Hibah (*Hibah Air Limbah Setempat*), technical assistance for the development of mandatory scheduled desludging (LLTT, or *Layanan Lumpur Tinja Terjadwal*) and IPLT development assistance[9]. Meanwhile, the Directorate General of Housing (*Direktorat Jenderal Perumahan*) has programs and routine activities to build and improve housings for low income communities, both in the form of landed houses and flats, as part of the One Million Housing Program (*Program Sejuta Rumah*).[10] Various safe sanitation products and services are needed to support the programs, such as toilets, sewage pipes, individual septic tanks, communal septic tanks, desludging trucks as well as mason and building contractor services.

The Ministry of Health (MoH) in 2008 introduced the Community-led Total Sanitation (STBM or *Sanitasi Total Berbasis Masyarakat*) approach to empower communities in rural and per-urban areas to apply the cleaner and healthier lifestyle (PHBS), particularly to stop practicing open defecation, to wash their hands with soap, to safely store drinking water and food, and to manage their garbage and wastewater properly. Without any funding subsidy, the STBM approach succeeded in making hundreds of thousands of rural households stop practicing open defecation and building toilets in their homes. Until 2017, there are almost 15 thousand villages out of around 76 thousand villages that had been declared free from open defecation as a result of the STBM approach. In the future, the STBM approach will still be expected to create demand for toilet pans, septic tanks and construction materials in the rural areas of Indonesia.

---

[9] In the Onsite Wastewater Hibah program, the Ministry of Public Works and Public Housing provides reimbursement funds to replace city or regency government expenditures in building septic tanks for houses in its area. Meanwhile, the Ministry of Public Works and Public Housing in the SANIMAS program provides funds to help low-income household communities build a simple wastewater piping network in their residential areas. The piping systems produced by the SANIMAS program will be managed directly by community groups.

[10] Houses built under the One Million Housing Program. Annually, the MoPWH builds around 1 million proper houses, 70% of which are intended for low-income communities. Every house according to its standard specifications must be equipped with a toilet and a septic tank.

Involved Parties

Several ministries and state institutions have been active in supporting sanitation development in Indonesia. They are BAPPENAS, MoPWH, MoH, Ministry of Home Affairs (MoHA) and Ministry of Environment and Forestry (MoEF). While BAPPENAS plays a coordinating role, MoPWH plays a major role in the development of sanitation infrastructure and services.[11] These ministries and state institutions are incorporated into the Water Supply and Environmental Sanitation Working Group (Pokja AMPL or *Kelompok Kerja Air Minum dan Penyehatan Lingkungan*) which is an ad-hoc coordination forum for the preparation of programs, activities, policies, execution and monitoring of drinking water and sanitation development activities. Since 2018, Pokja AMPL has merged into the Working Group for Housing and Settlements, Drinking Water and Sanitation (Pokja PPAS, or *Kelompok Kerja Perumahan, Permukiman, Air dan Sanitasi*) to further strengthen coordination and synergy between housing development and drinking water and sanitation service development.

Although relatively insignificant, several other ministries can be assumed to have contributing roles to the development of the safe sanitation market. These ministries are the Ministry of Trade, Ministry of Industry, and Ministry of Cooperatives and Small and Medium Enterprises (MoCSME), Ministry of Villages, Development of Disadvantaged Regions, and Transmigration (*Kementerian Desa, Pembangunan Daerah Tertinggal, dan Transmigrasi*), Ministry of Research and Technology as well as Ministry of Agriculture. Collectively, they play a role in developing the management, technical and financial capacity of the market actors, providing utilities for low-income and rural households, providing investment capital for businesses, and developing innovative products and services.

SUB-NATIONAL LEVEL ENVIRONMENT

As previously mentioned, the national target of access to sanitation in the 2020-2024 RPJMN have not been translated by provinces, cities and regencies into access to safe sanitation target for their respective region. The sanitation development target that cities and districts currently have in their Regional Medium-Term Development Plan (RPJMD, or *Rencana Pembangunan Jangka Menengah Daerah*) and SSK documents are only related to access to toilet or access to improved sanitation (see the following table). It is expected that the access to safe sanitation target will be included in the next RPJMD and SSK.

[11] *The role of the MoPWH includes formulating policies and development plans for the public housing sector and the sanitation sector, developing institutional capacity and competency for regional personnel, providing technical assistance and investment assistance for the development of public housing and sanitation services, setting technical specification standards and innovative technology development.*

Table 20. Sanitation Development Targets of Cities and Regencies

Regions	Access to Sanitation (%)			Source
	Classification of Access	Baseline	Target	
Banda Aceh	Toilet	91,72%	91,97%	RPJMD 2017 - 2022
	Improved sanitation	98,45%	100%	SSK 2020 - 2024
Bandung	Toilet	57,32%	100%	RPJMD 2016 – 2021
	Toilet	51,4%	68%	SSK 2016 - 2020
Makassar	Improved sanitation	81%	91%	RPJMD 2014 - 2019[12]
Palu	Improved sanitation	91,03%	100%	RPJMD 2014 - 2019
Lombok Timur	Improved sanitation	51,4%	68%	SSK 2017 - 2021
	Scope of IPLT	15%	40%	SSK
Sumbawa Barat	Toilet	73,59%	85%	SSK 2016 - 2021
Jayapura	Toilet	87%	100%	RPJMD 2018 - 2023

However, the absence of targets for access to safe sanitation should not be considered a barrier to the development of safe sanitation access in a city or regency. This is because the Government Regulation (PP or *Peraturan Pemerintah*) No. 2/2018 concerning Minimum Service Standards (SPM or *Standar Pelayanan Minimal*) has asked local governments to provide domestic wastewater services to all its citizens. All houses in regions with domestic wastewater regulations are required to use a standards-compliant septic tank and conduct regular pit emptying. The same regulation also requires pit emptying service to dispose of the septage in an IPLT. These provisions by itself have already required households to have access to safe sanitation.

Demand-Side Environment

Analysis of the enabling environment on the demand side of safe sanitation market is focused on households' awareness, local obligations and prohibitions, social pressures, and property market. Some conclusions from the enabling environment analysis of the demand side of the market are:

1. **Low compliance keeps the demand low**. Several provisions in the regions prohibit practices of open defecation and disposal of untreated wastewater into the environment. The prohibitions implicitly encourage households to use toilets connected to a septic tank or sewerage system. Not only in the domestic wastewater regulation, those obligations and prohibitions can also be found in regulations

[12] *Makassar City is yet to have a new RPJMD due to the vacant position of the mayor in the 2020-2021 period.*

concerning public order, public health, building codes and environmental management.[13] The obligation to carry out periodic desludging is stated in the local regulation on domestic wastewater management, as is the obligation for pit emptiers to dispose of their septage in the IPLT. Local regulations related to environmental management also implicitly prohibits direct disposal of the septage or sludge. [14]

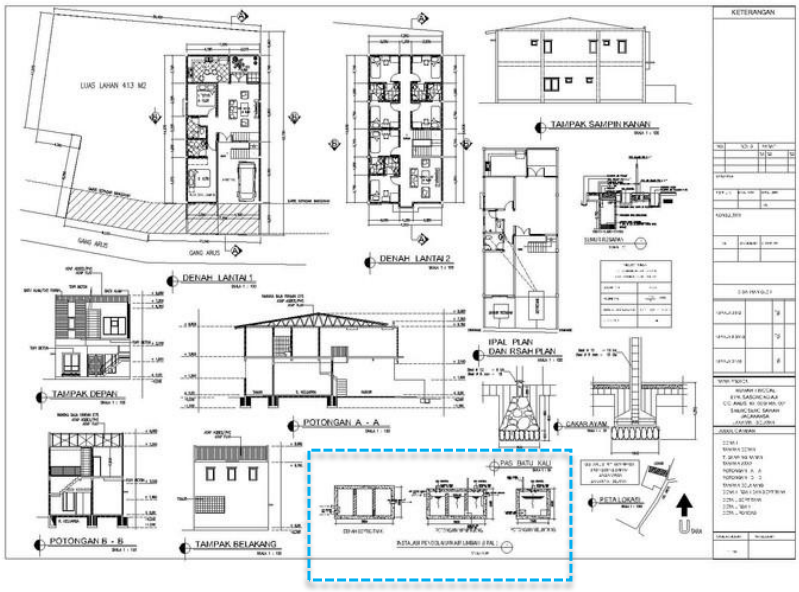
Several cities and regencies have responded to the obligation to regular desludging by organizing mandatory scheduled desludging services (LLTT). As in Surakarta, the LLTT has significantly increased the demand for pit emptying as well as the demand for a higher septage treatment capacity. (Photo: Municipal of Surakarta).

Obligations and prohibitions in several local regulations should stimulate household demand for safe sanitation products and services, including toilets, septic tanks and pit emptying. Unfortunately, the implementation of these regulations is not accompanied with a compliance and enforcement mechanisms. There has never been any legal action against households for not using septic tanks or not conducting regular pit emptying. Weak monitoring capacity allows the illegal septage disposal to continue. The only compliance mechanism related to septic tank ownership is the process of obtaining a Building Construction Permit (IMB or *Izin Mendirikan Bangunan*) which requires a septic tank plan drawing to be included as a prerequisite for the permit process.[15] Weak regulatory compliance is evident in the lack of household demand for pit emptying services (see discussion on Sanitation Access). This in turn causes the level of access to safe sanitation in Indonesia to be exceptionally low.

[13] *For example, Bandung Regency's Local Regulation No. 31/2000 concerning Cleanliness, Beauty, Order and Environmental Health, Banda Aceh City's Qanun No. 5/2003 concerning Cleanliness and Beauty, Jayapura City's Local Regulation No. 10/2007 concerning Cleanliness, as well as Bandung Regency's Local Regulation No. 31/2000, Makassar City's Local Regulation No. 1/2016 Bandung Regency's Local Regulation No. 4/2013 concerning domestic wastewater management.*

[14] *For example, Makassar City's Local Regulation No. 9/2016 regarding Environmental Protection and Management,*

[15] *Building Construction Permit (IMB) is given by the city or regency government to building owners to build, change, expand, reduce, or maintain buildings in accordance with the administrative and technical requirements. One of the technical requirements is the existence of a proper sewage system, including a septic tank.*



The building blueprint drawing must be accompanied by a septic tank design drawing (box) as one of the requirements for obtaining a building permit.

2. **Health and public works agencies play major roles.** Several local agencies, both directly and indirectly, have encouraged households to use safe sanitation products and services. The health agency has promoted clean and health lifestyle (PHBS) since years ago which has succeeded in increasing the demand for toilets and septic tanks. Despite that, the agency is rarely promoting the issue of pit emptying. The public works or housing agency has an authority that can force new buildings to build proper septic tanks (see previous description). Unfortunately, they do not have sufficient capacity to inspect the usage of septic tanks in existing houses. As the implementing agency for national assistance program, the public works agency often coordinates the implementation of the construction of toilets and septic tanks for low-income households. In rural areas, the toilet assistance program is managed by the community and village empowerment agency through the Village Fund (*Dana Desa*) allocation.[16] Apart from these agencies, there are no other agency actively involved in sanitation. The municipal police (Satpol PP, or *Satuan Polisi Pamong Praja*) have not carried out their functions to enforce household compliance with the domestic wastewater regulation.

3. **Financing facilities are available.** Several non-governmental organizations have contributed to increasing the volume and quality of demand for sanitation products and services. One of them is the microfinance institution (MFI), either in the form of a cooperative or a rural bank, which can provide

[16] *Dana Desa (Village Funds) are funds sourced from the state budget (APBN) allocated for villages to finance governance, infrastructure development, community development and empowerment of village communities. Each village in 2019 can receive an average of IDR 960 million. Some villages use part of the funds to build shared sanitation facilities.*

low-income households with micro credits to build toilets and septic tanks. Although not used by households in the study area, MFI in other cities and districts have provided micro credits to tens of thousands of low-income households.

4. **Social factors cause high demand for toilets and septic tanks.** There are reasons for comfort, privacy, and cleanliness that lead to a high level of toilet use among households. Certainly, these reasons arise due to the influence of the socio-cultural interactions of households. Religious and local wisdom require them to live more respectfully, healthier, and cleaner. Day-to-day interactions with the neighbors create social pressure for households to stop practicing open defecation and thus to have toilets and septic tanks. School education definitely plays some role in creating household awareness. As mentioned earlier, the availability and use of toilets and septic tanks have become a social norm. This is also evident in the property market. No one make a house without a toilet and a septic tank.

Supply-Side Environment

Some conclusions from the enabling environment analysis of the supply side of the market are:

1. **Not all products and services are standardized.** A number of SNIs is available for products relevant to safe sanitation, for example for seated toilet pans, septic tanks, and wastewater pipes. However, local governments do not always require manufacturers or service providers to meet the specification standard. In the pit emptying value chain (VC-2), no city or regency has issued specification or operation standards of desludging truck, pit emptying, septage treatment and treated sludge. As businesses, a pit emptier is required to have a business license (SIUP, or *Surat Izin Usaha dan Perdagangan*). However, there is no specific licensing mechanism applied to the pit emptier. This allows them to operate with unsafe vehicles, minimal equipment and untrained personnel.

2. **Supports are available but limited.** Public works or other agency responsible for domestic wastewater,[17] collaborated with DJCK (MoPWH), often organize a number of trainings and workshops to improve the technical and management capacity of service providers and the competence of personnel.[18] Collaborating with the health agency, they also conduct training to improve the capacity

[17] *Each regency and city delegates responsibility for domestic wastewater management to a different regional apparatus organization (OPD). Banda Aceh handed it over to the District Public Works and Spatial Planning Office, Bandung Regency handed it over to the District Public Housing, Settlement Areas and Land Office, Makassar to the District Public Works Office, Palu to the District Health and Parks Office, meanwhile Jayapura City handed it over to the District Environment and Cleanliness Office.*

[18] *Each regency and city delegates responsibility for domestic wastewater management to a different regional apparatus organization (OPD). Banda Aceh handed it over to the District Public Works and Spatial Planning Office, Bandung Regency handed it over to the District Public Housing, Settlement Areas and Land Office, Makassar to the District Public Works Office, Palu to the District Health and Parks Office, meanwhile Jayapura City handed it over to the District Environment and Cleanliness Office.*

of local entrepreneurs or community groups in manufacturing cement toilet pans and concrete rings. There are also other local agencies that indirectly increase the supply capacity of sanitation products and services. Their involvement is non-specific to sanitation-related producers and service providers. For example, the labor agency regularly conduct training regarding occupational health and safety for all manufacturers in their area.[19] Banks and cooperatives are always ready to provide working capital to individuals and companies as long as the prospective creditors and their activities are deemed bankable. The activities of these institutions have contributed to improving the quality of the supply side of safe sanitation products and services, but not so much on the quantity.

3. **Private partnerships are now possible.** Several local governments have opened the opportunities of public-private partnerships for sanitation services, especially in regions already have domestic wastewater regulations. However, such public-private partnership in practice is still uncommon. The involvement of the private sector in pit emptying purely occurs because there is a demand for it and not because there is a request from local government. In some areas, private pit emptying service even compete with government-run service. Agreements on the use of IPLT, such as in Banda Aceh and Makassar, cannot be classified as a public-private partnership that gives private parties the rights to provide a certain service. The exceptions are in cities where mandatory scheduled desludging is implemented. Private pit emptiers are involved as desludging contractors with formal agreement. In septage treatment value chain (VC-3), no private sector has been involved as operators or investors although a few cities has initiated the discussions toward the privatization. However, most local governments still do not consider septage treatment privatization is necessary.

4. **Public infrastructure is sufficient to support supply side**. Generally, urban areas already have sufficient public infrastructure to support commercial activities. Infrastructure for transportation are sufficient to bring raw materials to production facilities or bring products to the intended market locations, except inter-island transportation. Limited electricity supply is still occasionally experienced in some parts of eastern Indonesia, however many industries relies on their own electricity genset. Communication is no longer a big problem because all urban areas in Indonesia are covered by telephone networks and internet connection, including in Jayapura and Sumbawa Barat.

[19] *As stated in the Bandung Regency Local Regulation. No. 3/2013 concerning Labor Administration.*

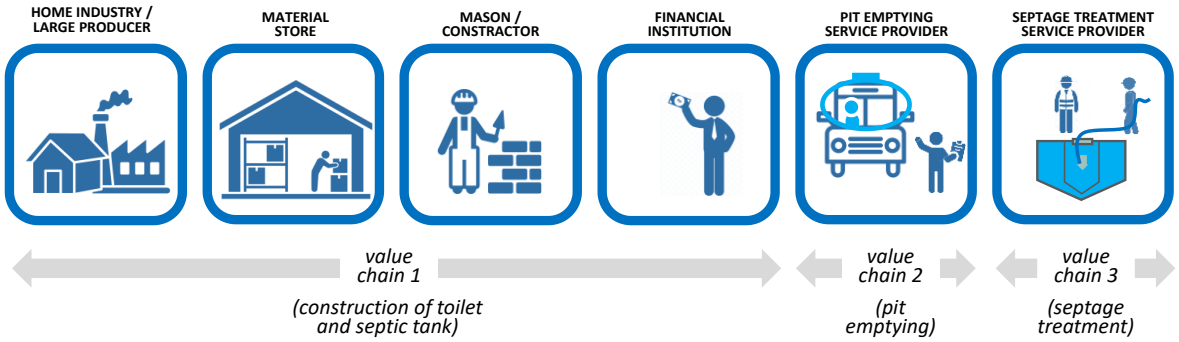
THE MARKET

This chapter provides a brief summary of the situation of the safe sanitation market. The challenges and opportunities to stimulate the market are discussed in the next section. The following descriptions will form the basis for preparing recommendations in the next chapter.

SITUATION

The following are description on general situation of the market of safely managed sanitation in Indonesia

1. **There is a market for safely managed sanitation.** Not many households have an accurate perception about it, but like it or not, there is a market for safely managed sanitation. The demand for water-sealed toilets, wastewater pipes, septic tanks, pit emptying and septage treatment is real. The supply of these products and services is available in all regions of Indonesia, although they may have a problem with the quality. There are not many households with access to safely managed sanitation, which means that safe sanitation products and services will still be needed. The safe sanitation market is expected to grow significantly in line with the government's plan to address the safe sanitation access gap of 9.6% of population (+ 6 million households). Not only in urban areas, but also in rural areas and remote areas.
2. **The market has 3 value chains with different actors.** The market of safe sanitation can be divided into 3 (three) value chains, which are 1) construction of toilets and septic tanks, 2) pit emptying and 3) septage treatment. Each value chain is filled by different supply side actors who are independent with each other, or in other words, the market is a segregated market (see figure below). The supply side of the sanitation market in Indonesia is filled with many small and informal actors, especially for VC-1 and VC-2. Most do not involve large capital and workforce in their businesses, and accordingly they have limited business reach only within their own city border.



Supply-Side Actors in the Market of Safely Managed Sanitation.

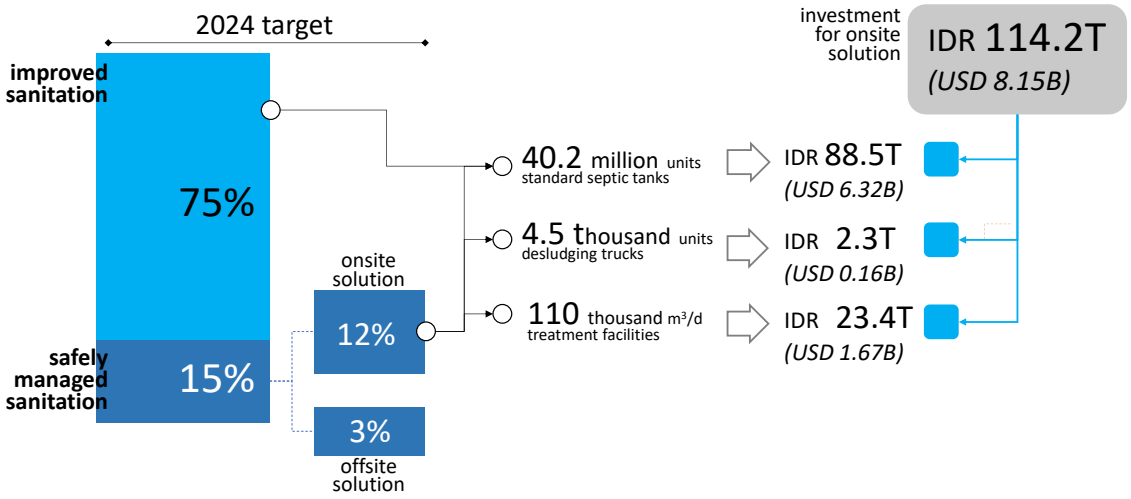
Inter-city business is not really developed yet in the current sanitation market, apart from ceramic toilet pans which is produced by large business with a wider distribution network.

3. **The market is not highly regulated.** The market for safe sanitation works without much control and supervision from the authorities. Producers comply with the SNI or other specification standards more because of competition in the upper-middle class market and not because of pressure from the government. In the second value chain, the local government still has not monitored and licensed private pit emptiers. Even in some regions, the local government also provide the same services to the households thus they are in competition with the private sector. This clearly shows a conflict of interest of the government, on one hand they act as a service regulator, but on the other hand they act as a service provider. The dominant government involvement can be seen in septage treatment (VC-3). Only local government agency is allowed to deliver the treatment service. This often results in unfairness to the private pit emptiers. The local government agency prioritizes their own desludging trucks to dispose the septage in the facility. In fact, private pit emptying trucks in certain regions are not allowed to come to the treatment facility.

4. **Market size may exceed USD 10.9 billion over the next 5 years.** The market of safe sanitation has a very good prospect. The current low level of safe sanitation access, combined with the significant gap with the government's target and the high population of Indonesia, make the demand for sanitation products and services is very large. Additional septic tanks, desludging trucks and septage treatment facilities are needed to meet the 2024 targets, both for access to improved sanitation, i.e. 87% of the population, and for access to safe onsite sanitation, i.e. 12% of the population. It is estimated that Indonesia needs around IDR 114.16 trillion (or USD 8.15 billion) to meet those targets of onsite sanitation.[20] The largest amount, i.e. IDR 88.5 trillion (or USD 6.3 billion), will be required for the

[20] *The calculation uses an exchange rate of 1 USD = IDR 14,000 (August 2020).*

construction of septic tanks where most of the funds will come from households, while IDR 2.3 trillion (or, USD 0.16 billion) and IDR 23.4 trillion (or, USD 1.67 billion) are required for additional desludging trucks and treatment facilities, respectively.



Assumption: USD 1.0 = IDR 14,000

Estimated investment cost to meet the targets of onsite sanitation access by 2024.

On the other hand, assuming a 3-year desludging period, the market for pit emptying and treatment service will have a turnover of IDR 36.0 trillion (USD 2.57 billion) and IDR 0.86 trillion (USD 0.06 billion) in 5 years, respectively. The spending will be even higher given the government's target in 2030, i.e. 100% of population with access to improved sanitation and 53.7% of population with access to safe sanitation.

5. **The market is open to the private sector.** The private sector with all its limitations has been involved in the supply side of the safe sanitation market, particularly VC-1 and VC-2. Their involvement is of course based on the desire to obtain financial benefits and not necessarily to improve public health and environmental quality. The government allows them to take advantage of existing market opportunities because the government also benefits. Apart from helping local economic growth, the involvement of the private sector also reduces the obligation of local governments to allocate budget for investment and operation of sanitation services, particularly of the pit emptying service. Formal public-private partnerships have not yet occurred, even in areas that have regulations that allow such partnerships.

6. **Problems with the quality of products and services**. Quantitatively, there is no major issue on the supply side of the sanitation market to meet the demand. Masons, contractors, material stores and septic tank producers can be found in every region, although there is a bit of limitations in eastern Indonesia. So is with the case of private pit emptying that is available in all regions. However, qualitatively, the products and services currently available on the market do not always meet the specifications required by safe sanitation access. The problem is not necessarily on the technical capabilities of masons, contractors, producers, and service providers, but rather their lack of understanding of access to safe sanitation and the required specifications. The construction of healthy toilet and safe septic tanks is not a difficult thing to do providing the masons and building contractors understand the requirements and more importantly, as long as the households demand for them.

CHALLENGES

Despite the huge market potential and government recognition of the role of the private sector in improving safely managed sanitation access, the current market is not functioning as expected, especially in ensuring safely managed sanitation criteria. The market assessment identifies several challenges that must be addressed to create a safely managed sanitation market. Those challenges are:

- **Challenge-1: Poor governance of sanitation services.** The enabling environment for sanitation services is not yet well established. The terminology of access to safe sanitation has not been mentioned in regional development policies, making it difficult for the local government to allocate resources for its development. Enforcement for households to use proper septic tank is yet to be practiced. No local government agency really plays the role of a regulator of sanitation service, leaving private pit emptier to operate with no control and monitoring. The operational licensing has also not been implemented, so the government does not have an effective tool to ensure the compliance of a pit emptier to the regulation.

- **Challenge-2: Chronic misconceptions of households and actors in sanitation market.** Most people already have a good understanding of clean and healthy lifestyle. Toilet and septic tanks are already considered as inseparable parts of a house and even considered as a social norm. However, their understanding is not all accurate. There is still a strong and long-lasting conception that a good septic tank does not require pit emptying. Accordingly, many septic tanks are built without a watertight bottom. The misconception is not only belonging to households but also to masons and contractor. Although the misconception sounds trivial, the absence of an impermeable bottom layer causes polluted environment, fewer pit emptying, and prevents the creation of access to safe sanitation.

- **Challenge-3: The market is driven by household needs and preferences.** The market for safe sanitation relies heavily on the demand from households that places great importance on price and aesthetics. Demand from households does not arise from preventive maintenance, pollution prevention or regulatory compliance purposes. Accordingly, many households ask for product and service which do not always meet the criteria of safe sanitation. In the absence of intervention from the local government and other parties, households will still use a non-watertight septic tank and will empty their septic tank only if there is am emergency.
- **Challenge-4: Reluctance or inability of households to pay more.** Households are price sensitive. A slight increase in prices is expected to discourage households from purchasing better products and services. A higher increase will create more reluctance, for example in the case of a household which is asked to use a fiberglass septic tank that costs 2 times - 4 times than a concrete ring. The obligation to carry out regular pit emptying may be hampered by the reluctance of households to pay for it. The challenge will be even greater when it comes to low-income households that simply do not have the funds to cover additional expenses, especially for products and services that they do not prioritize.
- **Challenge-5: A highly fragmented market**. Businesses involved in VC-1 and VC-2 are generally small-scale, informal and do not necessarily have legal entity status. This reality will make it more difficult for standardization of the production process and outputs or the operating procedures and performance. Not to mention that products and services appear to be independent from one value chain to another. Each value chain has its own different actor(s), even though VC-1 and VC-2 have the same customer group, namely households.
- **Challenge-6: Hesitation to involve the private sector.** The role of the private sector in sanitation service is clearly stated in regional regulations. The need for private sector involvement has been repeatedly stated by local governments. However, very few local governments have implemented it. There are those who feel that they do not really need it, those who do not know the mechanism while some just do not able to guarantee a minimum business scale for their potential private partners.[21] There is no precedence on private sector involvement in the provision of septage treatment service, so local governments are still hesitant to initiate such partnership in their respective areas. The hope of having an integrated public-private partnership across the value chain is still far from reality.

[21] *Only Surakarta City and Balikpapan City, which has implemented mandatory scheduled desludging, has the courage to promise a minimum volume of work to private pit emptying service partners.*

- **Challenge-7: Lack of capacity of the private sector to develop.** Achieving the target of safe sanitation access requires a bigger role of the private sector, not only in terms of quantity and continuity but also in quality. They must have better equipment, procedure, and human resources. The products and services offered must also be more diverse. All of this requires financial capital which they may not necessarily have. As mentioned earlier, most businesses in sanitation market is small scale and informal. The larger business actors have not been attracted to the sanitation market for various reasons. They may not realize the existence of this market with all its business potentials.
- **Challenge-8: Low disaster resilience to maintain access to safely managed sanitation.** Access to safe sanitation in times of disaster is not easy to provide, because 1) a lack of products and services tailored to the specific needs of disaster-prone areas and (2) unclear mechanisms for moving the market during an emergency, especially when demand for products and services surges. It is found that the types of sanitation facilities built by households in disaster-prone areas were relatively similar with other areas in general, namely the concrete ring without water-tight bottom. Not surprisingly, the disaster makes sanitation facilities completely damaged and inaccessible to households. Likewise, construction during the rehabilitation process is hampered due to damaged infrastructure and scarcity of workers that reduce the capacity of the material supply chain.

OPPORTUNITIES

The market for safely managed sanitation will not thrive in a vacuum. There are already several policies, regulations, government institutions that have supported and may provide better supports in the development of the market. Households also consist of individuals with a relatively good understanding of sanitation issues. Each city and district also have their own sanitation market supply-side actors, although there are some limitations impeding their work performance and the quality of their products and services. The following describes several things that can be assumed as opportunities to support the development of the market for safely managed sanitation.

- **The existence of local regulations and agencies.** Many cities and districts already have regulations that require households to use a standard septic tank and conduct a regular pit emptying, in addition to requiring pit emptiers to be licensed and dispose the septage at the IPLT. The existence of those regulations provides local government with a basis to expedite the development of compliance strategies. Cities and districts already own agencies that can be assigned to support the development of access to safe sanitation. Such agencies include public works, housing, public health, environment, transportation, public orders, trade and industries. Their current capacity may not be sufficient to

carry out the expected functions, but their existence is an important asset for cities and districts to move forward more quickly.

- **Most households have a basic understanding of clean and healthy living**. The high level of access to improved sanitation is a result of the understanding of households on clean and healthy living (PHBS). Even, using a water-sealed toilet dan septic tank is already considered as a social norm. This level of understanding must be considered in the planning of future sanitation awareness raising programs. Thus, the awareness program can focus on disseminating messages to encourage households to perform regular pit emptying.
- **Market actors are already in place.** Masons, building contractors, material store, pit emptying service providers and IPLT are available in cities and districts. Even though their capacity is still not as high as expected, their existence is an important asset in the improvement of a safe sanitation market. Increasing supply-side capacity can start with these actors before more supply-side actors are invited to join the market. The good business performance of the existing actors is itself an attraction for new business actors.

Sanitation market actors are available in all regions of Indonesia.

- **The on-going and future government-funded assistance programs.** Until now, the governments are still providing assistance to improve public health, develop public housing, improve river quality, provide septic tanks, establish LLTT and construct IPLT which will eventually require many sanitation products and services. Market actors must be able to take advantage of the demand generated from

these programs. It is possible that more assistance programs will be available in the near future, either funded by central government or by local government.

- **Involvement of non-governmental development agencies.** Several development agencies, both domestic and foreign, have been involved in sanitation development in Indonesia. The scope ranges from behavior change communication, institutional capacity development, operational supports to infrastructure development. In addition, several organizations are also involved in public health improvement, housing development and public-private partnership creation which somehow can help the development of sanitation services. They should be convinced to adjust their scope of work to include the development of sanitation market in Indonesia.
- **The steady growth of property market both for low-, middle- and high-income housing.** It will be easier to build a proper access to sanitation at the same time as housing construction. The safe sanitation market can grow rapidly by attaching itself to the property market, particularly for the first value chain.

Apart from the above, there are several good examples and success stories that can be adapted or replicated cities and districts. Some of them are the home industries of ceramic toilet pan and fiberglass septic tanks, the use of Information and Communications Technology (ICT) for the promotion and sales of products and services and commercialization of products derived from treated sludge.

RECOMMENDATIONS

This chapter recommends several initiatives that can be considered to stimulate demand for access to safe sanitation, promote a more diverse safe sanitation products and services and create a sustainable safe sanitation business sector. In addition, this chapter also contains several recommendations regarding the role of the private sector in the improvement of safe sanitation market, as well as recommended products and services that might be needed by the future safe sanitation market.

MARKET STIMULATION

This section describes the recommended initiatives to stimulate and improve the market. The initiatives are described under 3 subsections according to the party who will carry out the initiative. Summary of the recommended initiatives is listed in **Table 22**.

GOVERNMENTS

Enhance Enabling Environment

An increase in the safe sanitation market should be preceded or accompanied by improvement of its enabling environment. With better policies, regulations and institutional capacity, the safe sanitation market will automatically grow, both in terms of quality and quantity. Some recommendations for the governments, both at national and subnational levels are:

- **Institutionalize targets.** With the inclusion of definitions and targets for access to safe sanitation in the RPJMD and SSK, local governments will have stronger foundation for improving the work plans of their agencies and programs as well as for allocating greater resources to meet the targets. [22]
- **Complete regulations**. City and regency governments must have specific regulations that require households to use septic tanks according to the national standard and carry out regular desludging services. Other than that, there should be a requirement for the pit emptiers to dispose the septage in IPLT. Additional tasks for institutions also need to be formalized in the regulation regarding local government agencies.
- **Build institutional capacity**. Agencies within and outside of the sanitation sector, such as transportation, public order, trade, industrial, *kecamatan dan kelurahan* and financial institutions, must have sufficient capacity to support the safe sanitation market (see the following table). Development of capacity includes (a) strengthen organizational management, (b) develop human resources to create competent personnel and (c) provide work facilities.
- **Create standards**. Quality standards and procedures are needed to serve as a reference for producers and service providers in operating their business. As mentioned earlier, not all products and services already have national standards. A few standards that need to be developed are standards for healthy toilets, squat toilet pans, pit emptying operating procedures, pit emptying vehicles, treated sludge and competency for pit emptying and treatment personnel.

Table 21. Expected Roles of Local Government Institutions

Institution	Expected Roles		
	Toilet and Septic Tank Construction (Value Chain 1)	**Pit Emptying (Value Chain 2)**	**Septage Treatment (Value Chain 3)**
Health institutions	• Promotion of safe toilet usage. • Promotion of wastewater management using septic tanks.	• Promotion of desludging services. • Promotion of health and work safety during desludging operations.	• Promotion of health and work safety for desludging service providers.
Public works institution or housing institutions	• Septic tank design examination. • Development of construction implementers' technical capacity. • Inspection of septic tank construction. • Provision of toilet and septic tank assistance.	• Promotion of desludging services. • Development of desludging service providers' technical capacity. • Development of desludging service personnel's competency. • Development and supervision of scheduled desludging services.	• IPLT provision and repairs. • Development of desludging service providers' operational capacity . • Development of desludging service personnel's competency.
Municipal police	• Compliance with the prohibition of open defecation and wastewater disposal. • Compliance with septic tank usage.	• Compliance with the provisions of scheduled desludging. • Compliance with the provisions of sludge disposal.	• Monitoring the disposal of processed sludge.

[22] *In particular, the integrated scope of assistance programs in the domestic wastewater management sector, housing development and environmental management in order to optimize efforts regarding access to safely managed sanitation.*

Institution	Expected Roles		
	Toilet and Septic Tank Construction (Value Chain 1)	**Pit Emptying (Value Chain 2)**	**Septage Treatment (Value Chain 3)**
Community and village empowerment institutions	• Promotion of toilet and septic tank usage. • Allocating village funds for toilet and septic tank construction in rural areas.	--	--
Environmental institutions	• Promotion of open defecation prohibition. • Promotion of septic tank usage for non-residential buildings.	• Promotion of desludging for non-residential buildings.	• Monitoring the environmental impact of sludge treatment. • Monitoring the utilization of treated sludge.
Sub-districts and districts	• Promotion of toilet and septic tank usage. • Monitoring of compliance with the wastewater disposal prohibition. • Septic tank registration.	• Promotion of desludging services. • Monitoring of household compliance for regular desludging.	--
Licensing institutions	• Examination of the septic tank plan as part of the building permit requirements.	• Licensing of desludging services.	--
Parks institutions	--	--	• Buyer and user of treated sludge.
Cooperative institutions along with small and medium-sized enterprises	• Promotion of toilet and septic tank products and services to small and medium-sized enterprises. • Development of small-scale products and service providers' business capacity. • Increasing the role of cooperatives in providing micro financing facilities.	• Promotion of pit emptying service business opportunities to small and medium-sized entrepreneurs. • Development of pit emptying service providers' business capacity.	--
Transportation institutions	--	• Formulating and enforcing the desludging truck specifications. • Desludging truck registration. • Compliance with desludging transportation regulations.	--
Trade and industry institutions	• Promotion of the safely managed sanitation market to business actors. • Development of producer's capacity.	• Licensing for private pit emptying services.	• Licensing for treated sludge commerce. • Inspection of the quality of treated sludge.
Labor institutions	• Promotion and compliance regarding health and work safety. • Protection of labor rights.	• Promotion and compliance regarding health and work safety. • Protection of labor rights.	• Promotion and compliance regarding health and work safety. • Protection of labor rights.

Improve Perception

The perception of households and other stakeholders on access to safely managed sanitation needs to be improved. They, at least, should understand that an access to safe sanitation needs a watertight septic tank that must be periodically emptied. The most effective communication method to reach each stakeholder must be identified and applied (see the subsection on Media Habits). Awareness raising at least should target:

- **Households,** by involving sub-district and village officials, women's groups, neighborhood (RT and RW) administrators, in order to make them aware on their current condition of sanitation access and required actions to create access to safe sanitation.
- **Housing developers,** in order to make them aware on the current conditions of sanitation access of their home and housing areas, actions that must be taken to increase access to safe sanitation and ensure that access to safe sanitation will be a part of the future housing development plan.
- **Septic tank producers,** in order for them to understand the obligation and demand of households for standard septic tanks, the required specification of a standard septic tank and their role in promoting access to safe sanitation.
- **Masons and building contractors,** in order for them to understand the obligation and demand of households for access to safe sanitation, the required specification of a healthy toilet and a standard septic tank and their role in promoting access to safe sanitation.
- **Pit emptiers**, in order for them to understand on the obligation of households to carry out regular pit emptying, know their obligation to properly dispose the septage, and know their role in promoting access to safe sanitation.

Create Better Business Climate

The government and other interested parties need to create an easier and more attractive business climate to draw more private entities to the market. Some of the recommended initiatives are:

- Expand development programs and financial supports that will increase demand for sanitation products and services, including the Onsite Wastewater Grant Program (*Program Hibah Air Limbah Setempat*) and the One Million Housing Program (*Program Sejuta Rumah*) from the MoPWH.
- Support for promotion of products and services to households and other potential buyers.
- Exemption from Value Added Tax (PPN or *Pajak Pertambahan Nilai*) for pit emptying services.
- Support for business licensing, particularly when the pit emptying operational licensing is in effect, by lowering requirements, reducing the license fee, and providing online application.
- Providing award and incentive for model private companies succeeded in providing safe, healthier, and more attractive sanitation products and services.

Another thing that should be considered is the elimination or reduction of the septage treatment tariff for licensed desludging service providers.

Intensifying investment supports

Investment supports can be intensified by strategically utilizing government and non-governments' programs which could also involving non-sanitation related initiatives. Village Fund (*Dana Desa*), One Million Housing Development Program (*Program Sejuta Rumah*), or Village Climate Resilience Program (*Program Kampung Iklim*) are several examples of governments programs that could be aligned with the improvement of access to safe sanitation. On the other side, businesses could participate in providing assistance to build toilets and septic tanks in workplaces, workers' houses, or surrounding areas nearby the workplace.

Initiate Compliance Mechanisms

Compliance mechanisms are recommended to be put in place to prevent violations of domestic wastewater regulations, both by households and by pit emptiers. A household compliance mechanism will increase their demand for standard septic tank and pit emptying, while a pit emptier's compliance mechanism will improve the quality and safety of the service. Proposed compliance mechanisms are:

- **Registration of septic tanks**, where every septic tank must be registered with the local administration office (*kecamatan* or *kelurahan*) so that their location, specifications, and conditions can be identified and monitored. This registration process will encourage every house to use a standardized septic tank. Ownership of registered septic tank will eventually become the object of inspection by the local government to identify any violation of septic tank usage requirement.
- **Certificate of septic tank transfer**, which the house selling party must include when relinquishing the ownership rights of the house to the buyer. This certificate indicates that the house being sold already has a registered septic tank and is in a clean condition (recently emptied). Owning a septic tank is a legal obligation, therefore the home buyer must ensure that they have avoided legal liability due to any violation by the previous owner. The certificate of septic tank transfer will encourage a house to have a standardized septic tank and to empty septic tank before the house ownership is transferred.
- **Licensing of pit emptier,** applied as a means to ensure their compliance to have a legal entity, using vehicles according to the standard, involving trained personnel and working according to SOPs.

Compliance will occur if the local government implements the mandatory scheduled desludging, which has actually been stated in the domestic wastewater regulations in several regions. Every 3 or more years, septic tank should be emptied by a designated service provider. In a mandatory scheduled desludging

scheme, each septic tank is registered and emptied regularly, pit emptier are licensed, septage transportation and treatment operation are monitored.

Optimize Public-Private Partnerships

Several cities and regencies already have regulation that allows private sector involvement in domestic wastewater services. A public-private partnership will create many benefits to the local government, including increased service availability in the city, release of budgetary burdens for service provision and improved compliance of the products and services to quality standards and SOPs. The private sector also benefits because business certainty and continuous income. Several partnerships to recommend are septic tank compliance inspection, pit emptying service for certain areas and septage treatment service. Partnership can also be developed between a housing estate with a pit emptier. A more-specific assessment is needed to identify, map and model opportunities for private sector involvement in the safe sanitation market.

Prepare Disaster-Resilience Market

Floods, earthquakes and volcanic eruptions are the three most common types of disasters in Indonesia. The identification and development of disaster-resilience sanitation products and services needs to be the focus of efforts to increase regional resilience to disasters. Not only toilets and septic tanks, but also pit emptying and septage treatment services must be prepared to withstand emergency situations. It is also important to improve the market's ability to adapt and respond to sudden demands for safe sanitation products and services during emergencies. Stocks and distribution channels of disaster-resilience goods must be prepared by involving the authorized disaster management agency. Likewise, in the provision of emergency sanitation services by both the public and private sectors. Mechanisms and division of roles for actors must be established and communicated clearly to the community to ensure their commitment.

FINANCIAL INSTITUTIONS

Intensify Microcredits

More microfinancing institutions (MFIs) should be involved in the safe sanitation market so the availability of the micro credit package for low-income households will be intensified, both for purchasing standard septic tank and for pit emptying. The low-income households can afford standard septic tanks, including those those made of fiberglass, by utilizing the micro credit. Through a special agreement, the use of micro credit can ensure households to empty their septic tank after 2 years of installments. A good collaboration with mason, material store, septic tank producer and pit emptier is required. The availability of

microfinance must be promoted so that more households are willing to use them. As the use of microfinance increases, it is possible that the interest charged to households can be reduced or discounted. There is a possibility to blend microfinance with other financing facilities, including grants from the government, philanthropists and companies. The blending of funds from those sources will create a larger and a more sustainable source of funds that can provide support to a greater number beneficiaries. An example is the blending of the ZISWAF funds with micro-financing to support the construction of toilets and septic tanks for low-income people.[23]

Extend Commercial Loans

Reliance on public grants and soft loans may create uncertainty for local governments in developing and sustaining their sanitation services. The existing loans only cover a small part of the total needs of cities in Indonesia. Commercial loan will allow a local government to expand their services. Commercial loan, as part of credit facility for small and medium enterprises, could create a more sustainable source of capital for private sector. For producers, the loan would help them to fund additional workspace, modernize equipment or buy raw materials in bulk. For pit emptiers, the loan could be used to purchase new vehicles, bigger vacuum pump and longer hose. The supply of sanitation services will increase, both in terms of quantity and quality, with commercial loan. In the longer run, participation by local financial institutions will also improve sector accountability and governance[24].

BUSINESSES

Develop Capacity

The technical and management capacities of product and service providers need to be improved, particularly to ensure that their products and services will have quantity and quality required to create more access to safe sanitation. Capacity development is recommended for building contractors, septic tank producers and pit emptiers. Training, exposure visits and on-the-job training should be conducted with collaboration with government, business association and professional networks.

[23] *ZISWAF stands for Zakat, Infaq, Sedekah and Wakaf. This is a set of funds collected from the moslems as manifestation of gratitude to Allah. The use of the funds is diverse including to fund infrastructure development.*

[24] *World Bank 2017. "Crowding-In Commercial Finance in World Bank Water and Sanitation Operations: A How-to Guide for World Bank Task Teams." World Bank, Washington, DC.*

Innovate Products and Services

The Market Assessment also identifies the need for innovation, in terms of technology or business models, to close the gap towards a better safe-sanitation market. The private sector should study these needs and develop suitable innovative products and services. Collaboration with other parties should be developed to increase the quality and commercial value of the innovations. The private sector collectively may support the development or sustainability of innovation centers run by the government, the higher education institutions or other development partners. An innovation center is expected to encourage many parties to innovate, as well as helping the private sector to prepare innovative products and services for the market. Apart from being beneficial for the private sector, the involvement of the private sector can increase the benefits of the innovation center to other parties as a whole. Private companies with larger capital, more complete facilities, human resources and networks can help innovators to mature and market their products and services. It is expected that an innovation facilitation center can a) stimulate ideas for innovation, b) provide technical, management and financial assistance to improve innovation, c) assess business and commercial feasibility of the innovation, d) facilitate pilot testing of innovation, e) promote innovative products to the market, f) link innovators with potential investors, g) provide a platform for managing and disseminate knowledge on innovation. Innovations may focus on 'the low hanging fruits', say low-cost sealed septic tanks and pit emptying equipment. Other innovations may include septage transportation monitoring, small septage treatment and treated sludge utilization. Innovation of climate- and disaster-resilience products and services should also be encouraged by the center. Other areas to innovate are finance support models for households and ICT applications to facilitate business process across value chains.

Promote More Effectively

Promotion is the key for private sector to increase sales of their products and services. Various promotion media are available, but the use of ICT with internet network has proven to be very effective in promoting various products and services. Several digital marketplace application are already available and can be used by private sector to promote and sell their product and service. It should be considered for the private sector to collectively develop their own digital marketplace application. Apart from promoting and selling their products and services, the digital marketplace application can also be used as a platform to offer products and services in a more integrated manner. It also can be used by the authorities to monitor the development of safe sanitation access in certain areas as well as to increase public awareness of safe sanitation access.

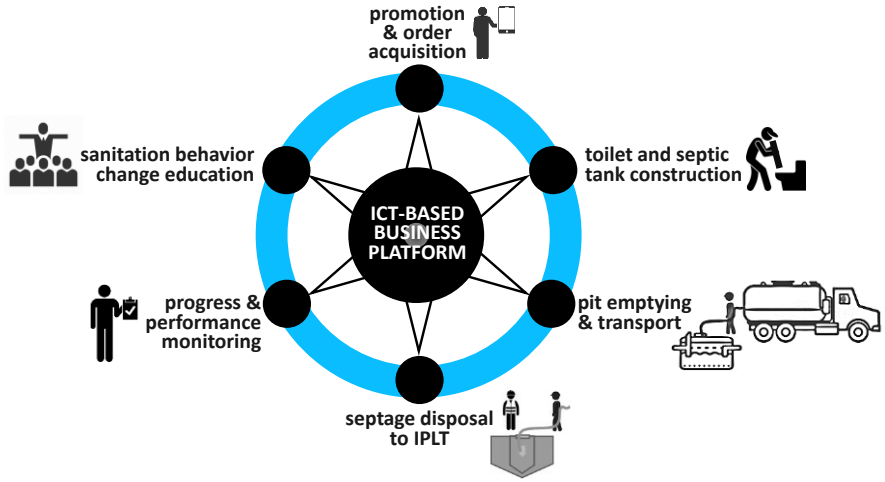


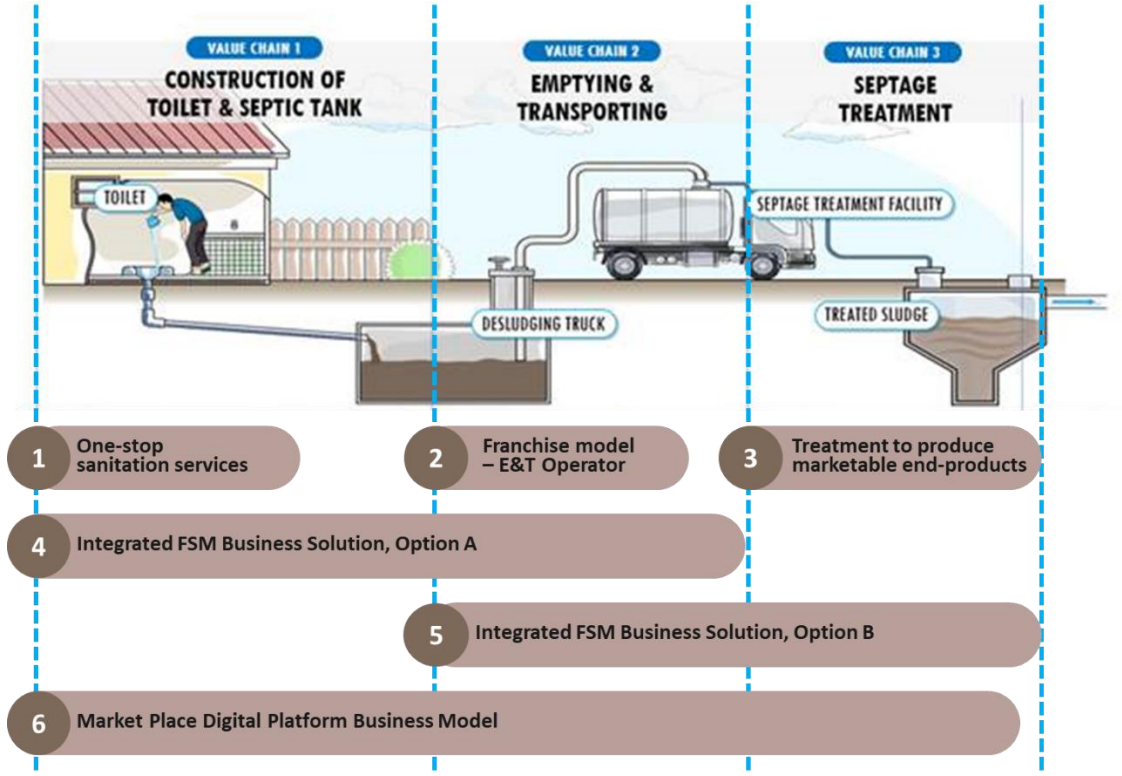
Diagram of the digital marketplace application to facilitate business process by various market actors. It can integrate all business models of VC-1, VC-2 and VC-3 while also can be used to monitor progress and performance of safe sanitation access development.

Affiliate with the Property Market

Product and service providers need to take advantage of the steady growth of the property market both of low, middle- and high-income housings. The safe sanitation market can thrive if product suppliers attach themselves to the property market. They have to promote their products to the developers so that they can be involved in the construction of the houses, particularly of the toilets and septic tanks. Prior to that, they must educate the developers about the safe sanitation access and the products needed to make the access. Business opportunities also exist if a pit emptier can be appointed as official pit emptier in the housing areas.

Introduce New Business Models

As previously mentioned, products and services among value chains of the sanitation market appear to be independent from each other. Businesses in VC-1 were not involved in VC-2, neither were businesses in VC-2 and VC-3. This limits product dan service suppliers to get more profit, besides making it difficult to sustain an access to safe sanitation. A new business model that combines services in several value chains should be introduced, particularly a combined service between VC-1 and VC-2 as well as between VC-2 and VC-3 (No. 3 and No. 4 in the following figure). As an illustration, a private company can offer a lease of septic tank to a household in conjunction with periodic emptying during the lease term. This practice is conducted in Japan where licensed companies offer leasing of Johkasau septic tanks along with maintenance contract for periodic inspection and desludging. Another idea is the one-stop business model that consist of promotion, technical advice, order placement, provision of materials, construction, payment and after sales service (No. 1 in the following figure). In full, several new business models to consider are:



Alternative Business Models

- **Model 1: Provide one-stop process: promotion, technical advise, order placement, provision of materials, construction, payment, after sales.**
    - Product: septic tanks with main specification of small footprint, watertight, comply with standard, easy installation, low cost and made locally, and additional specification for emergency response: light, easy to transport, removable, less emptying frequency.
    - Complementary service: micro-financing for households to fund septic tanks' construction with acceptable low rate.
- **Model 2: Franchise model – E&T Operator**
    - To Increase availability of credible E&T operators to deliver a timely, safe, comfort desludging services
    - Desludging vehicles that meet the requirements of able on narrow and difficult roads, less desludging time and able to carry high loads.
    - Pit emptying services: Franchising business for desludging services, particularly in a mandatory periodic desludging. Requirements: registered/licensed, proper vehicle with steel tank, trained workers, SOPs.
    - Financing for pit emptier to purchase proper vehicle.

- **Model 3: Treatment to produce marketable end-products**
    - Septage treatment plant (IPLT) that meets the requirements of small footprint, low O&M cost, easy O&M and high performance., able to produce reusable sludge.
    - Septage treatment services: A service contract (or Build-Operate-Transfer type of partnership) to operate the treatment plant, bundled with contract to produce, package, promote and sell the reused products to the market.
- **Model 4: Integrated FSM Business Solution, Option A**
    - Integrated service combining service in VC-1 with service in VC-2.
- **Model 5: Integrated FSM Business Solution, Option B**
    - Integrated service combining service in VC-2 with service in VC-3.
- **Model 6: Market Place Digital Platform Business Model**
    - Facilitating business model #1-4 to create standardized products and services across value chains
    - Market place for products and services including various end-used products produced by business model #4

The implementation of alternative business models will depend on the local market situation such as level of household sanitation access, capacity of business actors, institutional access to markets, and others.

Provide Assistance to Workers

Private companies should ensure that all of their workers have access to safely managed sanitation, not only in workplace but also in their house. Therefore, it is recommended that the companies can provide financial assistance for their workers to build toilets and septic tanks in their houses that meet the criteria of a safe sanitation access. The assistance for toilets and septic tanks in workers' houses or workplaces from private companies is an extension of UNICEF's WASH4Work initiative.

ROLES OF PRIVATE SECTOR

It is obvious that the private sector has the main role to supply products and services needed for creating access to safely managed sanitation. Other than that, there are several additional roles that are expected from the private sector. Those include roles in providing inputs in policies and standards formulation, providing resources to improve the market and participating in the business association (see the following table).

Table 22. Recommended Initiatives to Stimulate the Market

	Current Condition	Expected Results	Additional Role(s) of the Private Sector
GOVERNMENTS			
1	**Enhance Enabling Environment**		
	Not every city has a target of access to safe sanitation.	The target for access to safe sanitation are stated in the RPJMD and SSK so that agencies and programs will have common direction and more resources to achieve the target.	None.
	Not every city has regulations to support the creation of access to safe sanitation.	The demand and supply sides will improve due to regulations that require households to have safe sanitation access and require service providers to supply safe sanitation products and services.	None.
	Many local government agencies are yet to have better understanding and capacity to support the creation of safe sanitation access.	The quality of the demand and supply sides will improve due to better involvement of local government agencies that have good understanding on their role in improving safe sanitation market.	None.
	Some products and services do not have quality or operational procedure standards.	The quality of the supply side will improve with the introduction of national standards for all major products and pit emptying service.	Provide technical inputs in the formulation of sanitation product and service standards.
2	**Improve Perception**		
	Households and housing developers do not fully understand their obligations to use safe sanitation access.	The demand side will improve due to a better understanding of households and developers to use standard septic tanks and carry out regular pit emptying.	Provide resources to support awareness raising activities.
	Sanitation product and service suppliers are yet to understand what should be provided to create access to sanitation for their customers.	The supply side will improve due to a better understanding of product and service suppliers regarding the meaning and implications of safe sanitation to their business.	Provide resources to support awareness raising activities.
3	**Create Better Business Climate**		
	Government assistance programs are insufficient to meet the real demand and some do not cover the creation of safe sanitation access.	The demand side, particularly regarding the construction of standard septic tanks, will improve as the intensity and scope of government assistance programs expands.	None.
	Promotion is carried out by private sector themselves without any assistance from the government or company associations which causes the scope and target of the promotion to be limited.	The demand side will improve thanks to the involvement of the government and company associations in promoting the products and services available in the area.	Provide input in the preparation of a promotion plan.
	The method of ordering and transactions is still carried out conventionally. The use of marketplace websites and applications are still limited.	The demand side and supply side will improve due to applications that will support the promotion and sale of safe sanitation products and services in accordance to better sanitation market business model.	None.
	Pit emptying services, especially those with legal entities as companies, are subject to 10% value-added tax (PPN) for their service fee. In addition, no incentive is provided by the government for model product and service providers.	The demand side, particularly regarding the pit emptying service, will improve due to lower service rates that are already subject to value-added tax exemption. The introduction of other incentives, such as awards, technical support, and funding, is expected to improve the supply side, both in terms of quality and quantity.	Provide input in the policy dialogue.
4	**Initiate Compliance Mechanisms**		
	There is no enforcement to households to use standard septic tanks and carry out periodic pit	The demand side will improve due to the introduction of mechanisms by the local	Promote the compliance mechanism.

	Current Condition	Expected Results	Additional Role(s) of the Private Sector
	emptying, including in cities with domestic wastewater regulation.	government to the households, particularly regarding the use of standard septic tanks and the periodic pit emptying.	
	Licensing for pit emptiers is not implemented, including in cities with a regulation that requires it. Accordingly, many pit emptiers still use improper equipment and untrained personnel.	The quality of the supply side, particularly the pit emptying, will improve thanks to a licensing mechanism that requires them to have legal entity, use proper desludging vehicle, assign trained personnel and apply SOPs.	None.
5	**Optimize Public-Private Partnerships**		
	With no formal partnership agreement with the private sector, the local government has no tool to make pit emptiers to maintain a good quality of their service. A public-private partnership has been established in cities that have implemented mandatory scheduled desludging, such as Surakarta and Balikpapan.	The supply side will improve, both in terms of quantity and quality, due to a formal partnership between the government and the private sector that ensure the rights and responsibilities of both parties.	Provide input in developing the concept of public-private partnerships.
6	**Prepare Disaster-Resilience Market**		
	There is a a lack of products and services tailored to the specific needs of disaster-prone areas and a lack of mechanisms for moving the market during an emergency, especially when demand for products and services surges.	The supply side of disaster resilient products and services will improve, as well as the mechanism to ensure that the market is responding to emergencies.	Produce disaster resilient products and services.
FINANCIAL INSTITUTIONS			
7	**Intensify Microcredits**		
	Microfinance facilities are still unavailable in some parts of Indonesia and can still be used to build unsafe toilets and septic tanks.	The demand side, particularly regarding the construction of toilets and septic tanks, will increase in line with the availability of microfinancing facilities for the households.	Intensify micro financing facilities (particularly for microfinance institutions) to all parts of Indonesia. Promote and assist the utilization of financing facilities to their customers.
8	**Extending Commercial Loans**		
	Commercial loans are rarely used to finance investment of sanitation products and services suppliers. This will be a major issue when private sector wants to improve their capacity in response to the increased demand for sanitation products and services.	The capacity of the supply side will improve, quantitatively and qualitatively, due to the availability of commercial loans with lower interest rates and tenors for t the private sector that supports the creation of safe sanitation access.	Provide commercial loan (particularly for financial institutions).
BUSINESSES			
9	**Develop Capacity**		
	Masons, building contractors, material store, septic tank producers, as well as pit emptying and septage treatment service providers do not always have the management and technical capacity to produce safe sanitation products and services.	The supply side will improve due to training, observation visits, on-the-job training, consultations, and other activities to develop their capacity to create safely managed sanitation products and services.	Provide resources to support activities improving understanding.
10	**Innovate Products and Services**		
	The market needs innovations to fill gaps in the availability and quality of safe sanitation products and services. In the other hand, many ideas and research results cannot develop into marketable products and services due to the lack of technical and business knowledge as well as lack of capital.	The supply side will improve, particularly in terms of the quality and variety of products or services offered to households, thanks to an innovation facilitation center that provides technical assistance, financial and promotional support, as well as collaboration support with	Provide resources to support the development and operation of the innovation facilitation center. Promote the innovation facilitation center.

Current Condition		Expected Results	Additional Role(s) of the Private Sector
		other innovation centers, individuals, organization and businesses.	
11	**Promote More Effectively**		
	The private sector generally still promotes its products and services through conventional media. The use of digital marketplace applications has not been maximized even though it is clear that the application offers a wider reach at a lower cost.	The supply side will increase due to the use of digital marketplace applications, either the ones already available or the one developed independently. The use of this application allows the private sector to educate their potential customers about safe sanitation products and services.	Provide resources to support the development of a dedicated marketplace application.
12	**Affiliate with the Property Market**		
	The property market does not yet recognize access to safe sanitation, even though the houses built by the developer already use toilets and septic tanks.	The supply side will increase, both quantitatively and qualitatively, along with the growth of the property market, Many toilets, septic tanks, and finally emptying services, will be absorbed by the property market as long as the suppliers are willing to promote their products and services to the developers.	Promote access to safe sanitation to the developers.
13	**Introduce New Business Model**		
	No business currently can cover more than one value chain of sanitation market. Products and services among value chains appear to be independent from each other.	The supply side will qualitatively increase due to the introduction of a new business model that offer a combined service across value chain. This open opportunities for private sector to get more profit and for households to sustain their access to safe sanitation.	Develop and implement the new business model as well as promote its availability.
14	**Provide Assistance to Workers**		
	No assistance provided by companies to their workers to build safe toilets and septic tanks.	The demand side, particularly regarding the construction of toilets and safe septic tanks, from the workers' households will increase as a result of the assistance provided by their companies.	Provide funds for the construction of toilets and septic tanks in workers' homes.

POTENTIAL PRODUCTS AND SERVICES

The market of safely managed sanitation requires various sanitation products and services which are more effective, higher quality, in compliance with the specification standards, affordable and matched with household preferences. There are several sanitation products and services expected to be in great demand in the next few years (see the following **Table 23**). Some products and services are needed in the short term, while some are needed in the medium or even long term.

Table 23. The Need for Products and Services in the Safely Managed Sanitation Market

Products and Services		Description	Current Availability	Category
VC-1	Septic tanks	• Needed by houses with small area of land. The requirements: watertight, small, comply with the standard, easy to install, low cost, and can be produced by locally. • Needed for emergency response. The requirements: light, easy to transport,	Concrete rings are widely used as an option for prefabricated tanks, despite the fact that such product has no watertight bottom. While fiberglass septic tank has been made by several manufacturers in various types and dimensions. Its availability is still limited, especially in	Product – short term.

Products and Services		Description	Current Availability	Category
		removable, less emptying frequency (as emptying service is limited during emergency period).	eastern Indonesia. The shipping cost also makes it more expensive than other types of septic tanks.	
	Microfinancing	Should be available for a) households to fund construction or installment of standard septic tanks, and b) informal suppliers to increase their financing capacity to expand their business. Microfinancing should be easy to process and offered with acceptable low rate.	Microfinance facilities are still unavailable in some parts of Indonesia and can still be used to build unsafe toilets and septic tanks.	Service – short term.
VC-2	Desludging vehicles	The requirements: able to pass through narrow roads and difficult roads, less desludging time, and able to carry high loads.	The amount is sufficient for the current level of demand. However, not all of them are roadworthy and well maintained. Some desludging vehicles still use fragile fiberglass tanks and sand pumps.	Product – medium term.
	Emptying and transportation services	Franchising business for desludging services, particularly when the mandatory periodic desludging is implemented. Pit emptying service must have a legal entity, registered, use vehicles with a proper steel tank, employs trained workers, apply SOPs, and install tracking system.	Pit emptying services are still ran informally without any government supervision, so not all services use dedicated vehicles and involve trained workers. There is no coordination with service providers from the government and no restrictions on the procedure for determining service fees.	Service – medium term.
	Financing	Provided by banks or non-banking institutions, with special treatment for sanitation product and service purposes. Example, for pit emptier to purchase standardized desludging vehicle.	It is available without any special treatment	Service – short term.
	Business platform	A virtual marketplace to facilitate the promotions and business transaction of products and services of safely managed sanitation.	There is no such digital platform for safely managed sanitation. So far, in selected cities, a mobile app to support households to request emptying service is available	Service – medium term.
VC-3	Septage treatment plants (IPLT)	IPLT infrastructure will be urgently needed at a time when the government enforces houses to carry out regular desludging or when the mandatory scheduled desludging is introduced. Apart from its capacity to treat septage, an IPLT must be able to produce reusable sludge. The use of mechanical technology is highly recommended to reduce land requirements and improve performance.	Most IPLTs do not have sufficient treatment capacity and performance to meet the real demand and effluent quality standards. Most IPLTs still use simple technology so they often emit unpleasant smell and require a large area of land, even for those with small treatment capacity. Other than that, IPLTs are also not designed to produce reusable treated sludge.	Product – long term.
	Septage treatment services	Treatment services are needed when the government is unable to provide services with required capacity and performance. The septage treatment service is built and operated by the private sector. Private treatment service must use a proper IPLT, involve trained personnel, apply SOPs and safety protocols, and meet the required effluent quality standards. Service fees are determined by considering all operating and maintenance costs as well as investment costs.	The septage treatment service currently is owned and operated by local government institution. Operating costs fully dependent on government annual budget with a rigid utilization mechanism. Treatment service fees are determined by local regulations without considering return on investment and proper maintenance. Even though there are opportunities to privatize treatment service by law, to this date there are no cities and regencies that involve the private sector in providing treatment services, or even just for the operation of IPLT.	Product and service – long term.
	Treated sludge distributions	A treated sludge distributor is expected to improve the quantity and quality of the reusable treated sludge, along with its	Treated sludge production has not yet been converted into a commercial activity that generates significant income for the local	Service – medium term.

Products and Services		Description	Current Availability	Category
		packaging and promotion. The distributor should have an extensive business network with the potential users, both for land enrichment and for construction purposes. With the existence of a distributor, the selling value of treated sludge is expected to increase.	government. In fact, some IPLT still provide treated sludge free of charge. The quantity and quality of the treated sludge still inconsistent and does not always meet the quality needed by the end users.	