The Shit Flow Diagram in Indonesia – cities' instrument towards universal access to sanitation

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Summary (Ringkasan)

Perhatian pemerintah Indonesia terhadap program sanitasi perkotaan mulai meningkat semenjak pemerintah meluncurkan Program Percepatan Pembangunan Sanitasi Permukiman (PPSP) pada akhir tahun 2009. Melalui Peraturan Presiden tahun 2014 no. 185, Presiden Republik Indonesia, Joko Widodo, memberi mandat kepada setiap kota/kabupaten untuk menyusun dokumen Rencana Induk Sistem Penyediaan Air Minum (RISPAM) dan Strategi Sanitasi Kota/Kabupaten (SSK). Dokumen SSK bertujuan untuk memahami kebutuhan pengembangan sanitasi dan sebagai media promosi rencana dari tiap-tiap kota/kabupaten menuju target 100 persen akses sanitasi, yang terdiri dari 85 persen akses layak dan 15 persen akses dasar, sebagaimana tertuang dalam Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2014 - 2019. Shit Flow Diagram (SFD) atau diagram alir limbah tinja pertama kali diterapkan di dua kota, Balikpapan dan Jakarta, melalui kerjasama antara pemerintah setempat dan Bank Dunia (World Bank) sebagai instrumen perencanaan sanitasi perkotaan. Diagram ini telah menarik Badan Perencanaan Pembangunan Nasional (BAPPENAS) dan Kementerian Pekerjaan Umum dan Perumahan Rakyat (KemenPUPR) semenjak pertama kali diperkenalkan dan akan dimanfaatkan secara efektif sebagai salah satu instrumen percepatan sanitasi pada dokumen SSK. Sejak tahun 2017, pemerintah telah meminta tiap kota/kabupaten untuk menambahkan SFD grafik pada dokumen SSK. Jika diasumsikan semua kota/kabupaten mencantumkan grafik SFD pada dokumen SSK, hingga saat ini sudah terdapat lebih dari 100 grafik SFD dari berbagai kota/kabupaten di Indonesia. Jumlah ini bisa jadi akan bertambah, mengingat masih banyak kota/kabupaten yang belum mengumpulkan dokumen SSK.

Introduction

The attention to the city's sanitation program has been increasingly rising since the Government of Indonesia (GoI) introduced the national Accelerated Sanitation Development for Human Settlements Program (PPSP) in late 2009. A report from the USAID – IUWASH in 2016 states that the local government budgets for the sanitation sector have more than doubled in the past couple of years. The GoI, by means of its National Long-Term Development Plan (RPJPN) and National Medium-Term Development Plan (RPJMN), places the target to provide 100 percent access to sanitation preceding the SDG target in 2030 (SDG6). The GoI has a target to increase access to improved sanitation for household and community and a safe faecal sludge management system to 85 percent and the sewerage system to 15 percent

by 2019. The total investment needed to achieve a universal access of sanitation in Indonesia reaches IDR 273.7 trillion (~$18.9 billion)[1].

In December 2014, through the Presidential Regulation 185/2014, Drinking Water Planning (RISPAM) and City/Regency Sanitation Strategy (SSK) were mandated after nearly one year of coordination process between ministries and related institutions (see Figure 1 for the coordination timeline). The President of Indonesia, Joko Widodo, enacted that each city/regency requires to establish a RISPAM and SSK document to accelerate the provision of the water and sanitation access. The provision demands these following six principles, i.e. non-discriminatory, affordable, sustainable, protects the environment, entangles community participation and adheres to an integrated system. The SSK document not only aims at understanding a particular city/regency's sanitation development needs and setting up the implementation plans for the development, but also acts as a medium for promoting a city/regency's plan towards 100 percent access to sanitation. This document is valid for five years starting from the year when it is issued and represents a city/regency's medium-term strategic sanitation plan.

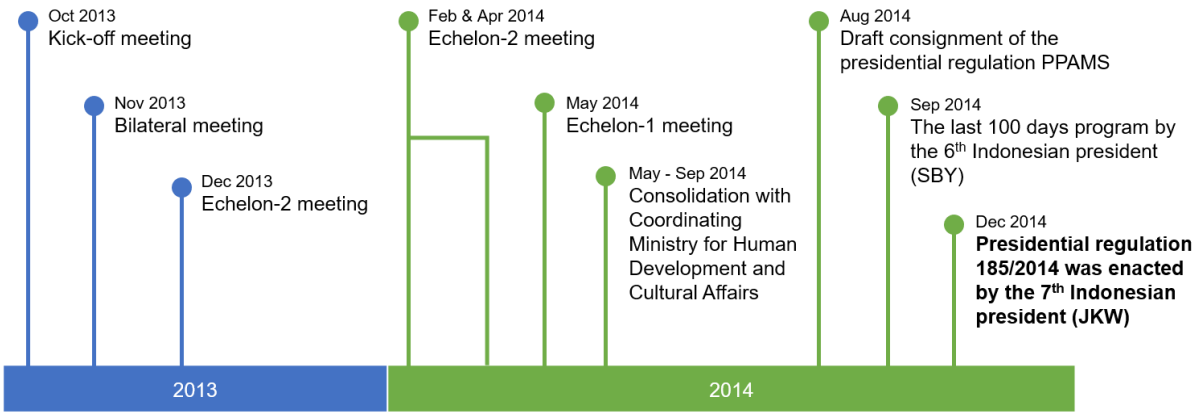


Figure 1. Timeline of Indonesia's presidential regulation 185/2014 for accelerating provision of water and sanitation access (SBY: Susilo Bambang Yudhoyono; JKW: Joko Widodo)

More than 100 SFDs produced in Indonesia

The Sanitation System Diagram (DSS) appeared earlier in Indonesia and served as an instrument to describe the sanitation infrastructures qualitatively. With the growing needs for mapping the condition of the sanitation infrastructure developments, The Shit Flow Diagram (SFD) was introduced and acts as an advanced instrument to visualize the sanitation system in Indonesia quantitatively. The SFD was first implemented in two cities in Indonesia, Balikpapan and Jakarta, in 2014 through the World Bank – Sanitation and Technical Assistance. The tool then helped Balikpapan's city authority to design a city sanitation strategy. Jakarta's city authority also used it accordingly with the report on 'economic losses due to poor

[1] According to the Indonesian Sanitation Portal (www.sanitasi.or.id)

sanitation'. The SFD tool has since proved appealing to the National Development Planning Agency (BAPPENAS) and the Ministry of Public Works and Housing (KemenPUPR).

Since 2017, each city/regency has been requested to incorporate an SFD graphic, as illustrated in the Figure 2, for the respective city/regency to the SSK document. In 2017, there were 134 cities and regencies that submitted this strategic document. According to the Ministry of Public Works, another 46 documents from cities and regencies are coming in 2018. Each city or regency needs to complete an Excel document called 'SFD Calculator' containing all information needed to generate an SFD matrix. It consists of one set of general questions and four sets of technical questions. The information required to complete the document comes from two possible sources: primary sources, i.e. results from the Environmental Health Risk Assessment (EHRA) or secondary sources, i.e. data from the related institutions. The SFD graphic will then be generated from the SFD matrix using the online graphic generator (see Figure 3 for the illustration). If we assume that all cities and regencies embedded an SFD to the SSK document, there have been a total of 180 SFDs produced in Indonesia.

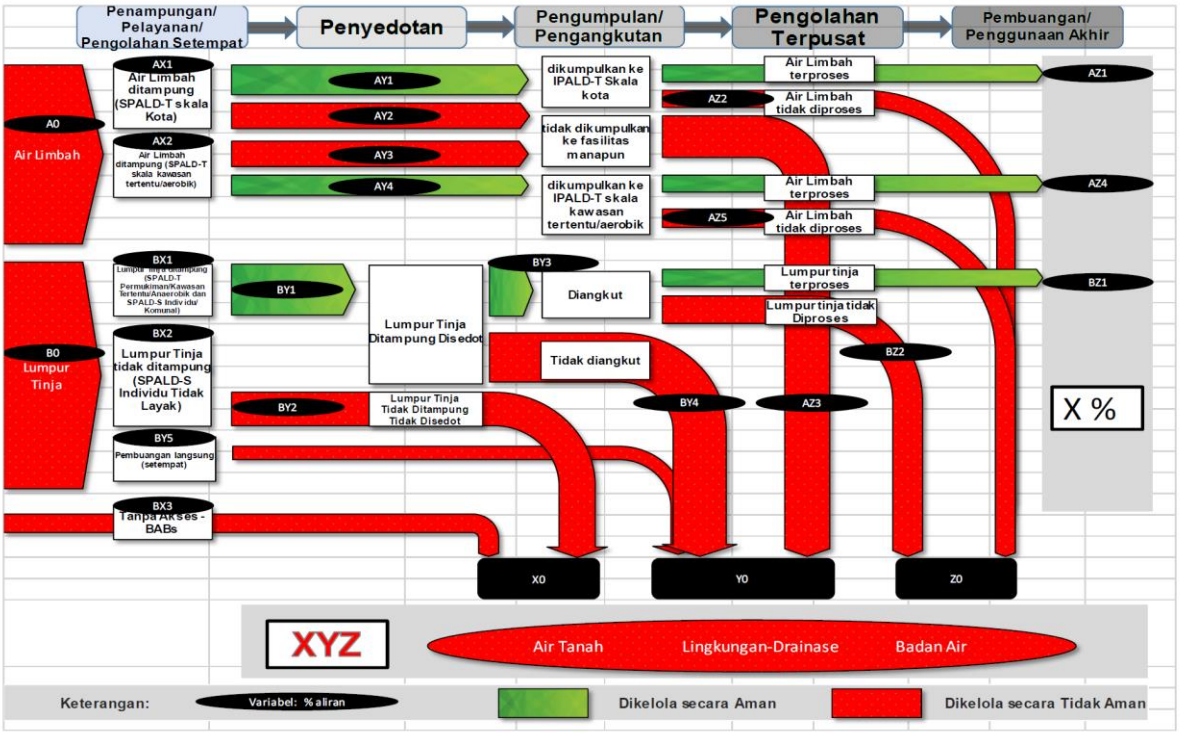


Figure 2. A template of an SFD graphic in Indonesian (Source: SSK Guideline)

SFD in 'Bahasa Indonesia'

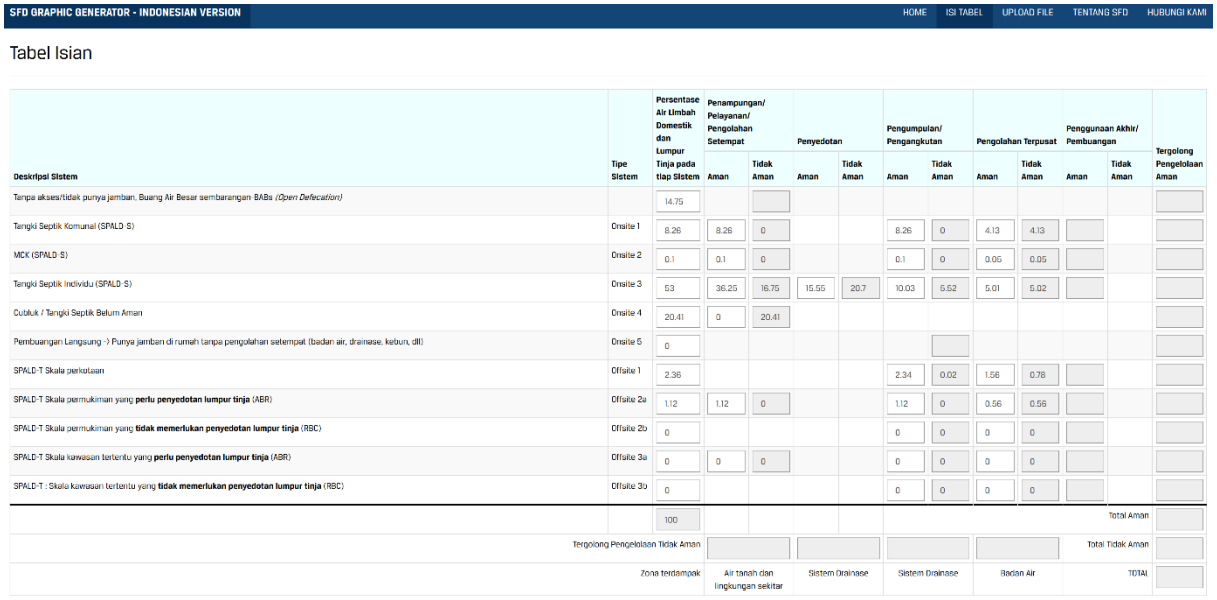
The SFD online graphic generator is available in Indonesian with the support from the World Bank and can be accessed through the National Water and Sanitation Information Services (NAWASIS[2]) Portal (http://portal.nawasis.info/sfd/) managed by the national Water and Sanitation Working Group (Pokja AMPL). The website features two possible methods for generating the graphic: (1) complete the table with all necessary data online, or (2) upload an Excel document to the portal with a username and account provided by the World Bank – enabling city's authorities to fill in the table and generate the graphic by themselves. The portal defines the SFD as a tool to understand and visualize the flow and the fate of the wastewater, blackwater[3] in particular, in a city. The SFD graphic could show whether the wastewater has been managed safely or not – starting from the source, containment, emptying, transport, treatment and disposal. The SFD is not a solution for sanitation problems, yet the graph could help city/regency authorities to visualize the existing sanitation condition as a key point for improving access to sanitation.

Involvement of sanitation facilitators

In 2017, a technical workshop on how to establish an SSK document was conducted by BAPPENAS and KemenPUPR for multi-level water and sanitation working groups as well as city/regency's facilitators who assist local authorities composing the document. The SFD session was included in the workshop aiming to facilitate the participants to learn how to use the tool since it has been adjusted to the condition of sanitation chain and existing types of toilets in Indonesia. The procedures for composing the SFD matrix are explained in the SKK Guideline published by KemenPUPR together with BAPPENAS, the Ministry of Health and the Ministry of Home Affairs. However, the training is significant to understand the use of the graphic generator, such as identifying the sanitation system used for generating the outcome. In this case, KemenPUPR is the responsible institution for the SFD coaching. An important factor is it to have the same understanding of a term or a definition that is being used in the online graphic generator. One of the examples addressed by the World Bank is the different understanding of the on-site safe treatment criteria, i.e. the effluent from the septic tank in relation with groundwater, which differs between global and national standards.

[2] NAWASIS is a web-based information and data centre developed by the GoI aiming at knowledge management in the water and sanitation sector

[3] Blackwater is the mixture of urine, faeces and flush water along with anal cleansing water



SFD GRAPHIC GENERATOR - INDONESIAN VERSION

HOME | ISI TABEL | UPLOAD FILE | TENTANG SFD | HUBUNGI KAMI

Tabel Isian

Deskripsi Sistem	Tipe Sistem	Persentase Air Limbah Domestik dan Lumpur Tinja pada tiap Sistem	Penampungan/ Pelayanan/ Pengolahan Setempat		Penyedotan		Pengumpulan/ Pengangkutan		Pengolahan Terpusat		Penggunaan Akhir/ Pembuangan		Tergolong Pengelolaan Aman
			Aman	Tidak Aman	Aman	Tidak Aman	Aman	Tidak Aman	Aman	Tidak Aman	Aman	Tidak Aman	
Tanpa akses/tidak punya jamban, Buang Air Besar sembarangan: BABs *(Open Defecation)*		14.75											
Tangki Septik Komunal (SPALD-S)	Onsite 1	8.26	8.26	0			8.26	0	4.13	4.13			
MCK (SPALD-S)	Onsite 2	0.1	0.1	0			0.1	0	0.05	0.05			
Tangki Septik Individu (SPALD-S)	Onsite 3	53	36.25	16.75	15.55	20.7	10.03	6.52	5.01	5.02			
Cubluk / Tangki Septik Belum Aman	Onsite 4	20.41	0	20.41									
Pembuangan Langsung -) Punya jamban di rumah tanpa pengolahan setempat (badan air, drainase, kebun, dll)	Onsite 5	0											
SPALD-T Skala perkotaan	Offsite 1	2.36					2.34	0.02	1.56	0.78			
SPALD-T Skala permukiman yang **perlu penyedotan lumpur tinja** (ABR)	Offsite 2a	1.12	1.12	0			1.12	0	0.56	0.56			
SPALD-T Skala permukiman yang **tidak memerlukan penyedotan lumpur tinja** (RBC)	Offsite 2b	0					0	0	0	0			
SPALD-T Skala kawasan tertentu yang **perlu penyedotan lumpur tinja** (ABR)	Offsite 3a	0	0	0			0	0	0	0			
SPALD-T : Skala kawasan tertentu yang **tidak memerlukan penyedotan lumpur tinja** (RBC)	Offsite 3b	0					0	0	0	0			
		100										Total Aman	
												Total Tidak Aman	
			Zona terdampak		Air tanah dan lingkungan sekitar		Sistem Drainase		Sistem Drainase		Badan Air	TOTAL	

Figure 3. SFD graphic generator in Indonesian (Source: http://portal.nawasis.info/sfd)

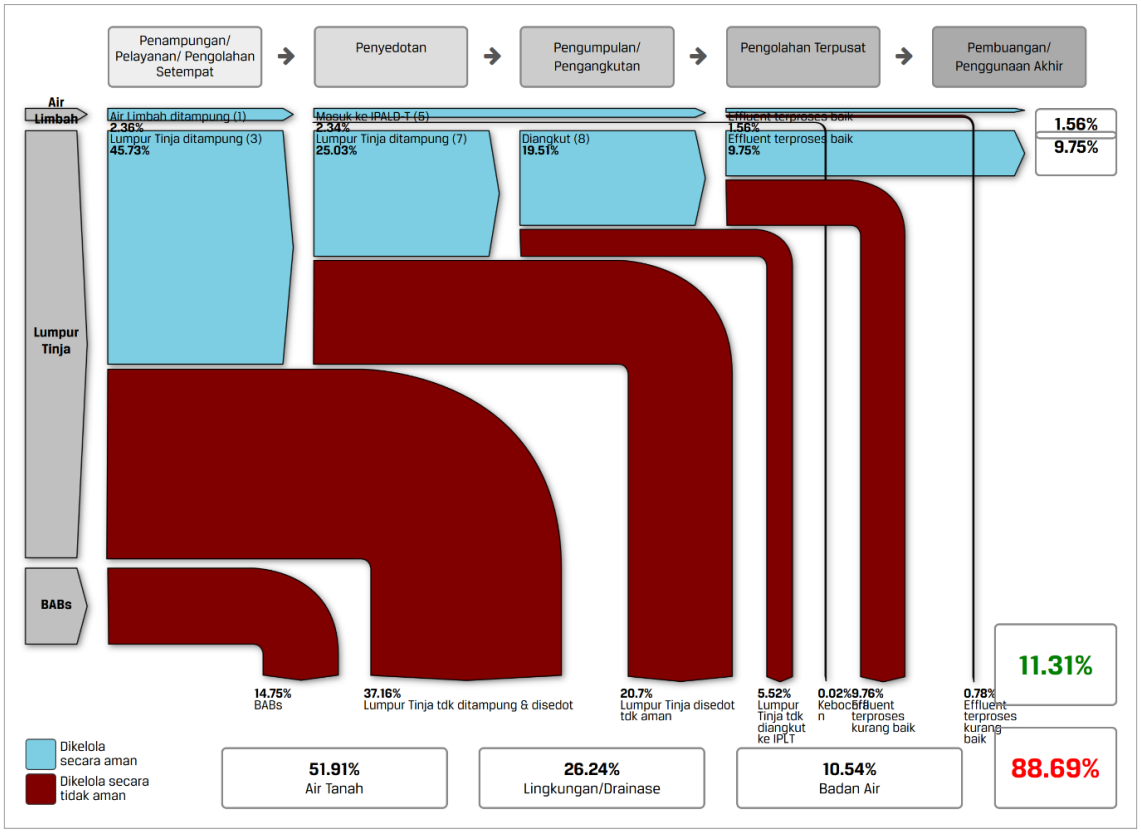


Figure 4. SFD graphic of the city 'Atlantis' generated using Indonesian graphic generator

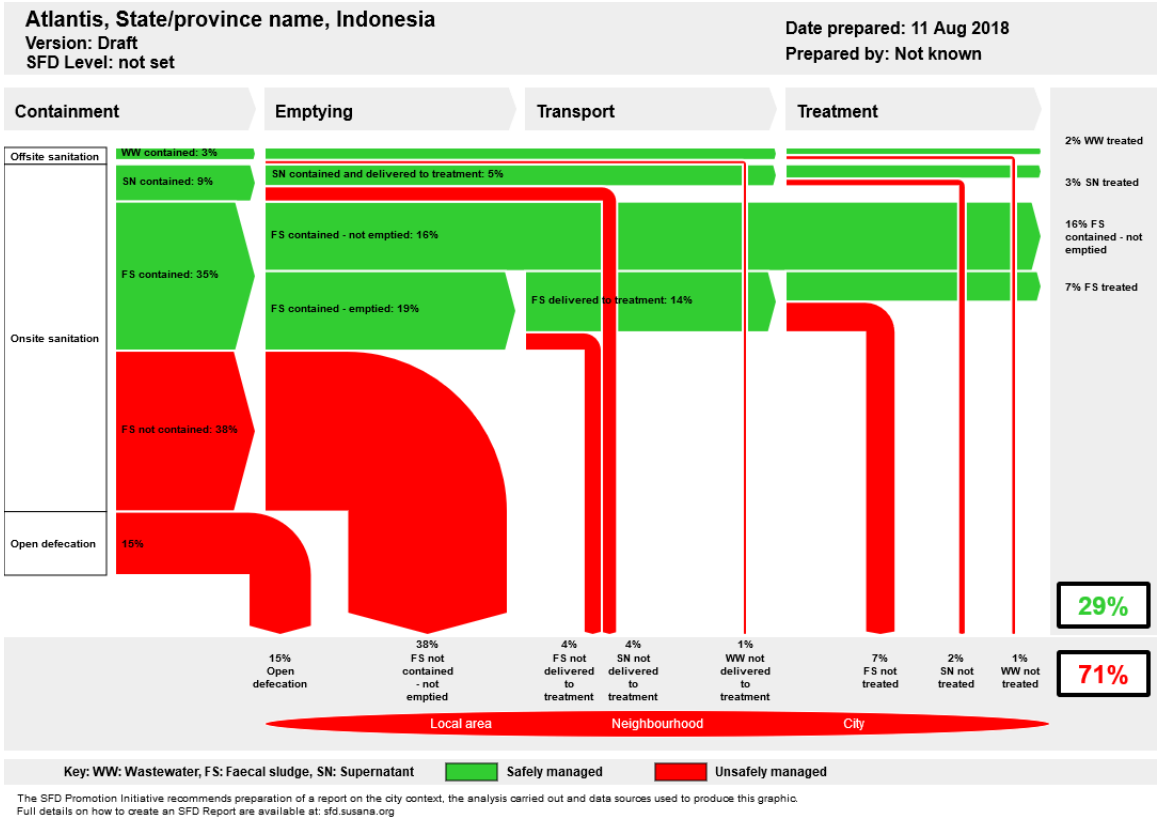


Figure 5. SFD graphic of the city 'Atlantis' generated using SFD-PI online graphic generator

The online generator

Unlike the original version of the SFD online graphic generator, which considers the details of the various types of the containment technology and where the containment technology is connected to, the Indonesian online graphic generator implements a more simplified version of an SFD (see Table 1). The matrix covers the description of sanitation systems in Indonesia and how well each sanitation chain (e.g. containment and onsite treatment, desludging, collection and transport, etc.) performs for each of the system, i.e. the percentage of the safe or unsafe system. Users are required to enter the percentage of the blackwater for each system. Boxes in white shade are to be filled (see Figure 3) with the blackwater percentage, which is safely managed in each sanitation chain, while boxes in dark grey shade will automatically generate numbers. The matrix also informs users about the percentage of the unsafe system affecting several zones, i.e. groundwater, drainage system and water bodies. After all required information has been entered, users would be able to generate the SFD graphic.

Table 1. Comparison of the SFD components in the SFD PI version and Indonesian version

	SFD PI version	Indonesian version
SFD Selection Grid	V-list: type of containments - no onsite container - septic tank - fully lined tank - lined tank with impermeable walls and open bottom - lined pit with semi-permeable walls and open bottom - unlined pit H-list: to where the containment is connected to - to centralised combined / separate sewer - to decentralised combined / separate sewer - to soakpit - to open drain - to water body	NA
SFD Matrix	V-list: selected grids (sanitation systems) H-list: - proportion of the population using the sanitation system - proportion of the wastewater in the sewer system, which is delivered to the centralised / decentralised treatment plants - proportion of the wastewater delivered to the treatment plants, which is treated - proportion of the sanitation system from which FS is emptied - proportion of the emptied FS, which is delivered to the treatment plants - proportion of the FS delivered to the treatment plants, which is treated - proportion of the supernatant in the sewer, which is delivered to the treatment plants - proportion of the supernatant in the sewer delivered to the treatment plants, which is treated	V-list: sanitation systems in Indonesia 1) Onsite sanitation - communal septic tank - integrated communal shower-handwashing-toilet facility - private septic tank - unimproved septic tank (lined pit with semi-permeable walls and open bottom) - no onsite container 2) Offsite sanitation - citywide centralised sewerage system - decentralized system for domestic and non-domestic sector with Anaerobic Baffled Reactor - decentralized system for domestic and non-domestic sector with Rotating Biological Reactor H-list: - proportion of the domestic wastewater and FS in the system - proportion of the FS in the system which is contained safely - proportion of the FS in the containment, which is emptied safely - proportion of the domestic wastewater and FS in the system, which is delivered to the treatment plants safely - proportion of the domestic wastewater and FS delivered to the treatment plants, which is treated safely

Note: V=vertical list; H=horizontal list

In general, sanitation systems in Indonesia are divided into two types: onsite and offsite. Open defecation practice, however, still occurs in some places in Indonesia. The onsite sanitation system consists of a private and a communal septic tank (improved toilet where desludging is needed), an integrated communal shower-handwashing-toilet facility (the toilet discharges directly to the decentralised separate sewer), and an unimproved toilet with a lined tank with impermeable walls and an open bottom (e.g. cubluk[4]). Meanwhile, the offsite system comprises of a citywide centralised sewerage system, a decentralized system for the domestic and non-domestic sector with an Anaerobic Baffled Reactor (ABR), which requires desludging activity, as well as a decentralized system with a Rotating Biological Reactor (RBC).

A dummy SFD graphic from the city of Atlantis with a total population of around 160,000 was created using both the original version of the SFD online graphic generator and the Indonesian graphic generator. The results are shown in Figure 4 and 5. The Indonesian graphic generator does not take into account the faecal sludge (FS) and supernatant (SN), although only blackwater accounts in the system, resulting in the percentage differences of safely and unsafely managed sludge. While the original version of the SFD online graphic generator considers also the FS ratio contained in each containment, the Indonesian version neglects this ratio. In the Indonesian version, the blackwater in the sanitation chain is considered as safely managed, if the effluent is safely treated up to the end of the chain. On the other hand, the original version of the SFD online graphic generator calculates if the FS is contained but not emptied, and it is still considered as safely managed. Thus, it results in a lower percentage of unsafely managed sludge from the city of Atlantis.

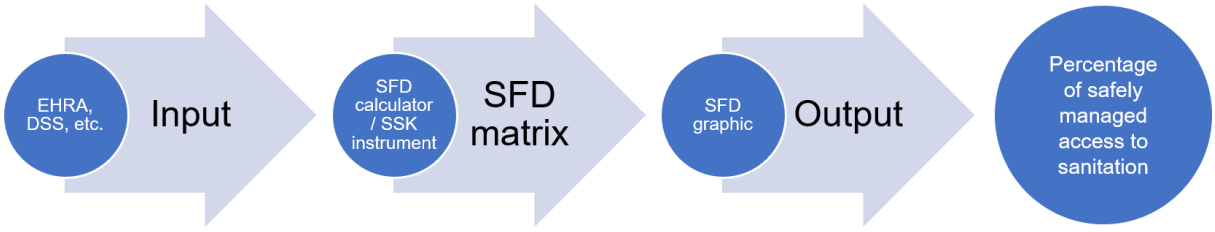


Figure 6. City and regency's instruments towards universal access to sanitation

Future applicability

As reported by the World Bank, the commitment of using SFDs among local governments in Indonesia proves to be ambitious and exciting. If the local governments could maximize the use of the SKK document comprehensively with an SFD as one of city's instruments (see Figure 6), the provision of the sanitation access in Indonesia is unlikely to go off-track. Therefore, the SFD is an encouraging tool for helping the local governments achieving national targets in the upcoming year. With the total number of 490 cities and regencies participating in the PPSP program, more SFD graphics are likely to be produced in the future.

[4] Cubluk is referred as an unimproved septic tank in Indonesia

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