

## Optimizing Faecal Sludge Treatment Plant (FSTP) Management through Implementation of Scheduled Faecal Sludge Serviced (SFSS) (Case Study: Suwung FSTP and Kuta District, Bali)

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### Abstract

Indonesia has achieved 79,53% access to improved and safely managed sanitation in 2020. The government has mandated an improvement in sanitation access to 90% through National Mid-Term Development Plan in line with Sustainable Development Goals (SDGs). The Province of Bali has not managed sanitation safely. One of the government's efforts to achieve safely managed sanitation is implementing a septic tank regular desludging program named the Scheduled Faecal Sludge Service (SFSS) system. This research aims to formulate SFSS implementation strategy by assessing user, financial, and technology aspects. The research methodology used are interview using questionnaires; Interactive Septage Management toolkit; and technology audit method combined with pairwise comparison method. Questionnaires were given to 100 respondents who live in Kuta District and it was found that 87.13% strongly agree with SFSS program, WTP is lower than ATP. Financial analysis show the service rate is Rp. 9.722,-/month. Technology audit result are technoware (72.22%), humanware (86.67%), infoware (90.28%), and orgaware 76.67% and involves 13 key informants. Scenario analysis shows that should SFSS has been implemented in the study area. The results of the Strength-Weakness-Opportunity-Threat (SWOT) analysis show establishing partnerships with the private sector, integrating data management with a centralized system, improving services, and making regulation.

**Keywords:** technology audit, Kuta District, SFSS, pairwise comparisons, SWOT

### Abstrak

Indonesia telah mencapai 79,53% akses sanitasi yang layak dan aman pada tahun 2020. Pemerintah telah mengamanatkan peningkatan akses sanitasi hingga 90% melalui Rencana Pembangunan Jangka Menengah Nasional dan sejalan dengan SDGs. Provinsi Bali belum mengelola sanitasi secara aman. Salah satu upaya pemerintah untuk mewujudkan sanitasi yang terkelola secara aman adalah dengan menerapkan program penyedotan tinja secara berkala yang diberi nama sistem Layanan Lumpur Tinja Terjadwal (LLTT). Penelitian ini bertujuan untuk merumuskan strategi penerapan LLTT dengan menilai aspek pengguna, keuangan, dan teknologi. Metodologi penelitian yang digunakan adalah wawancara dengan menggunakan kuesioner; Toolkit Manajemen Septage Interaktif; dan metode audit teknologi yang dipadukan dengan metode pairwise comparison. Kuesioner diberikan kepada 100 responden yang tinggal di Kecamatan Kuta dan ditemukan 87,13% sangat setuju dengan program SFSS, WTP lebih rendah dari ATP. Analisis keuangan menunjukkan tarif layanan adalah Rp. 9.722,-/bulan. Hasil audit teknologi adalah technoware (72,22%), humanware (86,67%), infoware (90,28%), dan orgaware 76,67% dan melibatkan 13 responden. Analisis skenario menunjukkan bahwa LLTT sudah seharusnya diterapkan di wilayah studi. Hasil analisis SWOT menunjukkan terjalannya kemitraan dengan pihak swasta, integrasi pengelolaan data dengan sistem terpusat, peningkatan pelayanan, dan pembuatan regulasi.

**Kata kunci:** audit teknologi, Kabupaten Kuta, LLTT, pairwise comparison, SWOT

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## **1. Introduction**

One of the mandates in the National Long-Term Plan 2005 – 2025 is the development and provision of drinking water and sanitation which is directed at realizing the fulfillment of the community's basic needs. Likewise with the National Medium-Term Development Plan 2020-2024 which is included in one of the strategic priority projects to accelerate the reduction of maternal mortality and stunting, and access improved and safely sanitation for Domestic Wastewater (90% of households). However, according to data from the 2020 working group, there is still 79.53% coverage of improved sanitation access services (Bappenas, 2021). This is dangerous for the environment and public health because many people still use groundwater as a source of clean water for washing and cooking needs.

The province of Bali, which is famous for its high tourism interest, has reached 95.01% for access to improved sanitation. Where the improved definition is that the community already has a septic tank but has not carried out regular desludging every 3-5 years. This condition can pollute the residents' groundwater and cause losses. Indonesia is estimated to suffer a loss of IDR 56 trillion or \$4.2 billion per year due to poor sanitation quality (World Bank, 2017). The results of the study show that 3% of the population has been served by a centralized system and 97.8% by an on-site system (Abfertiawan et al., 2019). In urban areas, onsite system is still more dominant because it is an economical solution for providing access to sanitation (Murungi and Dijk, 2014). On-site system wastewater management consists of safely storage, collection, transportation, treatment and final product/disposal (Hasan et al., 2019).

The collection system is in septic tank, transportation system is carried out by desludging trucks and treatment system is carried out at the FSTP. Suwung FSTP is currently experiencing under capacity even though the majority of people are still using the onsite system. The results of the study (USAID, 2016) in the cities of Balikpapan and Tabanan showed an increase in the supply of faecal sludge at the FSTP in both locations with the SFSS program. The SFSS program is a service for desludging faeces at on-site system facilities which is carried out on a scheduled basis for all households in a district / city (Darwati, 2018). Some cities such as Malang and Surakarta have benefited from the implementation of the SFSS program, including improving environmental quality, increasing regional income, increasing wastewater services (Hasan et al., 2019) and handling groundwater pollution (Ary, 2018). FSTP readiness is needed to treat faecal sludge which will support the SFSS program.

One method that can be used to see people's perceptions to participate is using the Likert Scale method. According to (Sugiyono, 2018), the Likert scale is used to measure attitudes, opinions, and perceptions of a person or group of people about social phenomena. The method for evaluating FSTP performance is using the pairwise comparison method against FSTP technology, including technoware, humanware, infoware and orgaware. The advantages of this method are using respondents who are experts in their sector, in this case experts in wastewater. The questionnaires used for analysis is consistent respondents because pairwise comparisons consider logical consistency in the research used to determine priorities (Agustien, 2017). The Interactive Septage Management Toolkit is used to consider desludging and transportation facilities and infrastructure as it is designed to help local governments more understand the costs and resources required to develop a comprehensive wastewater management program (IHE Delft, 2020). All components of faecal sludge management are then SWOT analysis on technical, environmental, social, institutional, and financial aspects. SWOT analysis is used because it can provide the possibility to develop strategies that can help overcome weaknesses and threats. This method can also help to match existing resources and capabilities (Silvan Widler, 2020).

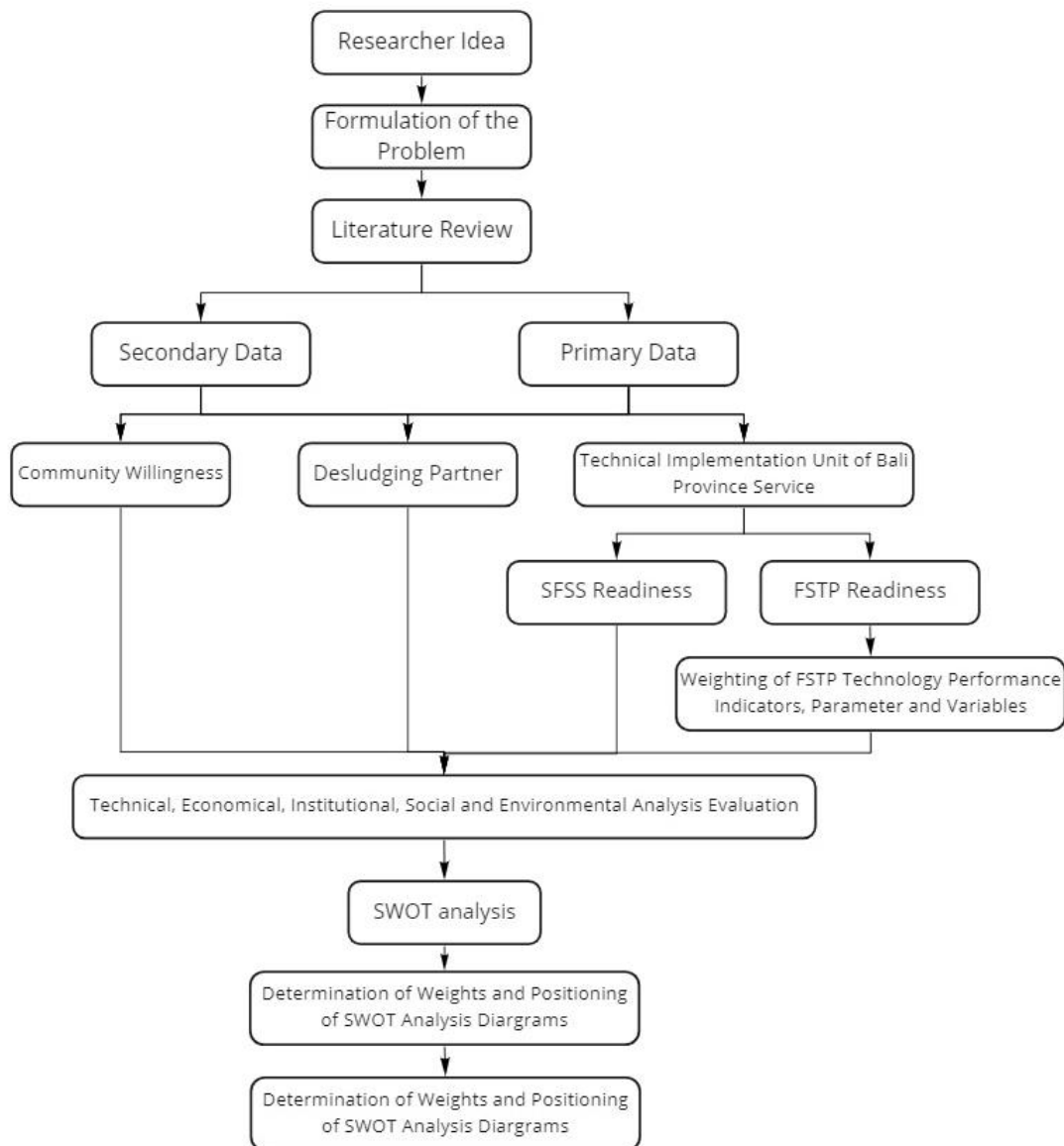
## **2. Research Purposes**

Based on the formulation of the problem above, this research aims; (1) Improving on-site wastewater treatment services, (2) Improving the performance of the management of the Faecal Sludge Treatment Plant by analyzing the feasibility of implementing the Scheduled Faecal Sludge Service on technical, environmental, economic and financial, social and institutional aspects.

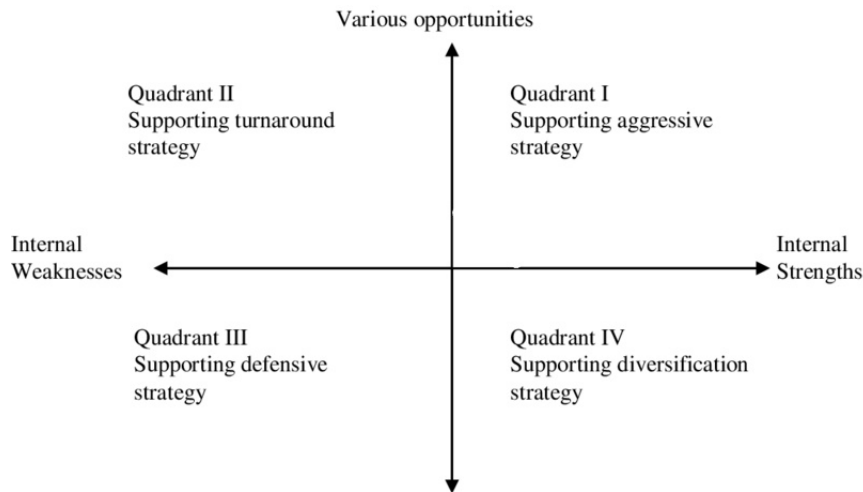
### 3. Methodology

The method of approaching the community's willingness to participate in the SFSS program uses a Likert scale with frequency analysis. The calculation of the number of respondents using the Yamane Formula is 100 people who live in Kuta District. The sampling method used is cluster random sampling. Cluster random sampling is a regional sampling technique used to determine the sample if the object to be studied is very wide (Sugiono, 2012). The technology audit method refers to the Regulation of the Head of the Agency for the Assessment and Application of Technology No. 004 of 2011 concerning Technology Audit Guidelines. Primary data taken include effluent quality, FSTP operational time, design criteria, quality and quantity of human resources, financial condition, cooperation with other parties.

This primary data was taken in April-May 2021. SWOT analysis was used to formulate strategies for implementing SFSS. The sampling method used is purposive sampling and used to weight audit technology variables. The purposive method is a sampling technique with certain considerations (*Percepatan dan Pembangunan Sanitasi Permukiman*, 2011). Roscoe in Hill (1998) in (Putra, 2016) explained that in simple experimental research with tight control, the number of respondents can be done with a sample of 10 to 20 respondents. A total of 13 respondents for pairwise comparison weighting and 17 respondents for SWOT weighting, each consisting of government agencies, academics and experts. **Figure 1** shows a research flow chart and **Figure 2** shows a SWOT analysis diagram.



**Figure 1.** Research flow diagram



**Figure 2.** SWOT analysis diagram

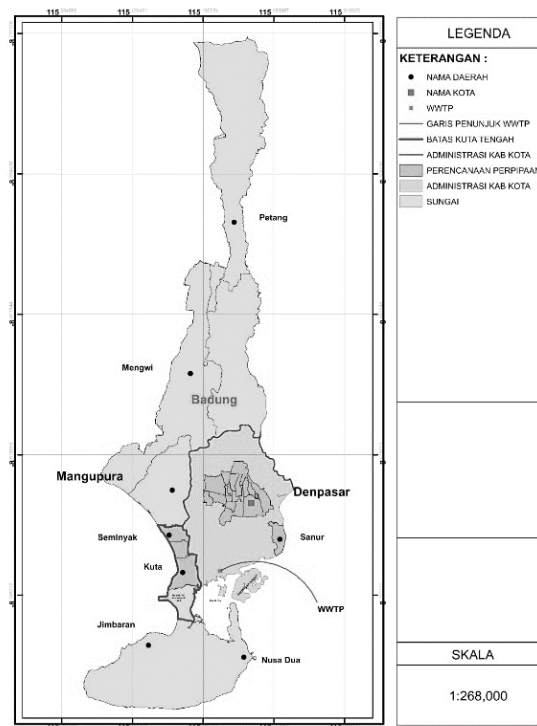
Sumber: Percepatan Pembangunan Sanitasi Permukiman, 2011

The results of the analysis of community perceptions, the readiness of the Bali Province UPTD PAL, and FSTP performance are used to identify the priority strategies carried out to implement SFSS in Kuta District.

#### 4. Study Site Conditions

##### 4.1 Profile of Suwung FSTP

Wastewater Treatment Area Technical Implementation Unit of Bali Province is the manager of Suwung Waste Water Treatment Plant (WWTP) and FSTP. Suwung FSTP was established in 2016 in the DSDP (Denpasar Sewerage Development Project) WWTP Area. The FSTP was built by the Directorate General of Human Settlements in 2016 through the work unit of the Public Works and Public Housing Agency for Water Supply and Sanitation Development in Bali Province. The Suwung FSTP service areas are Denpasar City and Badung Regency which are not served by the DSDP program for centralized system. **Figure 3** and **Table 1** shows the area of Suwung FSTP services.



**Figure 3.** Area of Suwung FSTP service

**Table 1.** Area of Suwung FSTP service

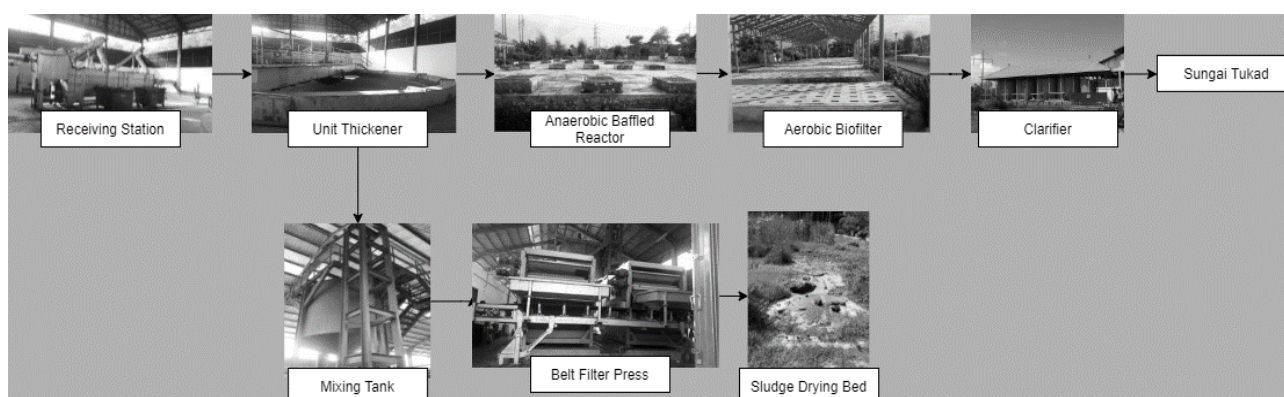
| Regency/City | Area (Km <sup>2</sup> ) | Percentage of Province Area (%) |
|--------------|-------------------------|---------------------------------|
| Badung       | 418,62                  | 7,24                            |
| Denpasar     | 127,78                  | 2,21                            |
| Result       | 546,40                  | 9,45                            |

#### 4.2 Sanitation Aspect

One of the points in the sustainable development goals (SDGs) in the environmental sector is to ensure that the community achieves universal access to water supply and sanitation. Community Based Total Sanitation (CBTS) managed by the Ministry of Health of the Republic of Indonesia in 2017 shows that 0.2% of the population of Denpasar City still has open defecation (OD). Research (Abfertiawan et al., 2019) shows that the Denpasar Septage Flow Diagram focuses on wastewater treatment using an on-site system. The target of access to improved and safely managed sanitation in Bali Province in 2024 is 90% improved sanitation and 21% safely managed sanitation. The achievement rate of Bali Province in 2020 is 89% improved access, while in Badung Regency has reached 95% (Bappenas, 2020).

#### 4.3 Suwung FSTP Processing Unit

Faecal sludge treatment at Suwung FSTP begins with pre-treatment. This stage involves a physical process aimed at removing suspended solids and fat in the effluent. The next stage is primary treatment and secondary treatment. The treatment process at the Suwung FSTP is complete with physical, chemical and biological processing. **Figure 4** shows a flow diagram of the processing at the Suwung FSTP, Bali.

**Figure 4.** Process flow diagram at Suwung FSTP, Bali

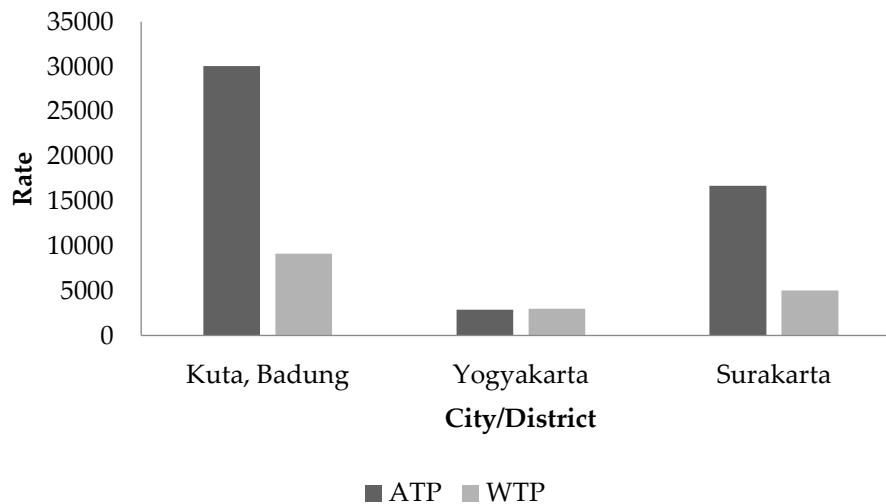
## 5. Results and Discussion

Education, occupation, and gender have a significant influence on the quality of household sanitation facilities owned by respondents (Pambudi and Lolo, 2021). Education is an influential factor in shaping a person's knowledge, attitudes, perceptions, beliefs and assessments of health, so it can be concluded that the higher a person's education level, the more aware and concerned about personal hygiene and the environment (Notoatmodjo, 2003). The characteristics of the people of Kuta District are as shown in **Table 2**. The results of distributing questionnaires to 100 people in Kuta District obtained a percentage of 87.13% who answered strongly agreed with the SFSS program. This percentage illustrates the community's desire to be involved in the SFSS program and public awareness of the importance of wastewater treatment, especially faecal sludge.

**Table 2.** Community characteristics of Kuta District

| Characteristics              | Percentage (%) |
|------------------------------|----------------|
| Gender                       |                |
| Female                       | 42             |
| Male                         | 58             |
| Level of Education           |                |
| Never School                 | 0              |
| Elementary School            | 2              |
| Junior High School           | 7              |
| Senior High School           | 69             |
| Bachelor                     | 22             |
| Work                         |                |
| Civil Servant/Soldier/Police | 20             |
| Private Employee             | 18             |
| Entrepreneur                 | 25             |
| Laborers/Farmers/Fishermen   | 1              |
| Housewife/not working        | 31             |
| Others                       | 5              |

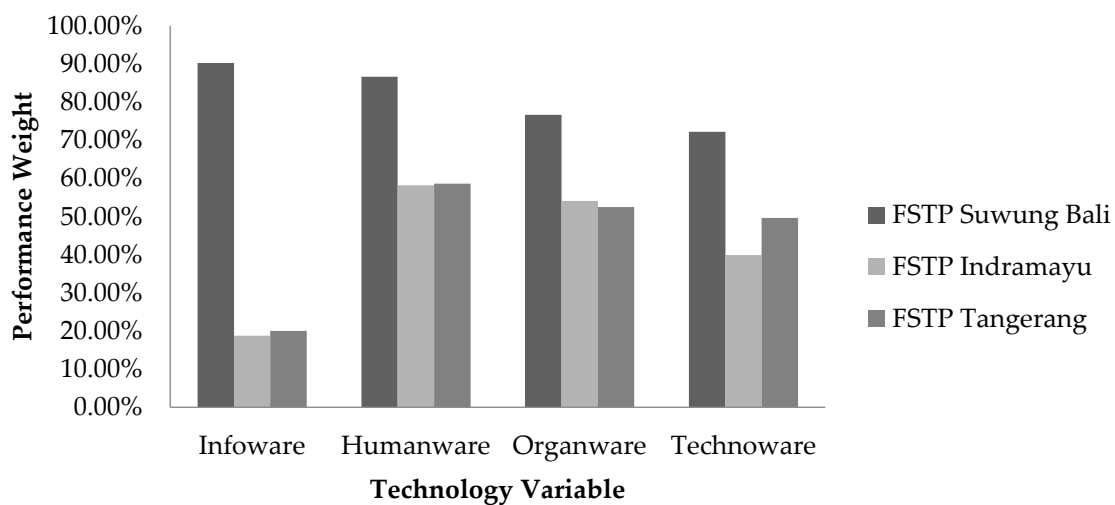
Community ATP is greater than WTP. This condition shows the reluctance of household decision makers to spend money on sanitation services (Seraj, 2008). The strategy that needs to be done is to carry out socialization, education on the importance of faecal sludge management and improve service quality. The government's role in providing an understanding of the importance of faecal sludge management is needed to harmonize the desires and abilities of the community. If the ATP and WTP are of the same size, then the management of faecal sludge in Kuta District can be financially sustainable. The city of Yogyakarta has a lower ATP value than WTP (Prasetyawati et al., 2018). Comparison with other cities such as Surakarta has a greater ATP than WTP (Sulistyo, 2012). Comparison of ATP and WTP in each city can be seen in **Figure 5**.

**Figure 5.** ATP and WTP in various cities/districts

Based on 8 (eight) criteria (USAID, 2016) the application of SFSS in Kuta District, it is known that 2 (two) criteria are ready to be fulfilled. There are 6 (three) criteria that have not met the criteria with the status of not being ready, namely the availability of regulations regarding the desludging of faecal, the availability of the SFSS implementation plan, the availability of transportation facilities and infrastructure, the availability of human resources, the availability of budgets and policies and the availability of city government to

implement the polluter pay principle. Based on these data, it can be seen that the SFSS program cannot be implemented in the near future considering that most of the criteria have not been met. Good preparation is needed to make an area or in this case Kuta District, Badung Regency ready to implement SFSS.

Evaluation of the performance of Suwung FSTP using the Pairwise Comparison method. It has been determined that the variables to be evaluated consist of technoware, orgaware, infoware and humanware. From the calculation of the weights obtained that the highest percentage of performance is 90.28% infoware, 86.67% humanware, 76.67% orgaware, and the last is 72.22% technoware. Thus, the performance of the Suwung FSTP system is 81.26% including in good performance. Each FSTP has a different performance as in the study (Agustien et al., 2018). weights in succession from the largest to the smallest in the Indramayu FSTP are humanware 58.23%, orgaware 54.06%, technoware 39.87% and last infoware 18.72%. In FSTP Tangerang, from the largest to the smallest, humanware 58.60%, orgaware 52.48%, technoware 49.64% and infoware 20.02%. The comparison of the performance weights of the Suwung FSTP, Indramayu FSTP and Tangerang FSTP can be seen in **Figure 6** below.



**Figure 6.** Comparison of weight performance of Suwung FSTP, Indramayu FSTP and Tangerang FSTP

If the SFSS has been implemented to the study area, the variables that will increase include technoware in the installation function parameters because after going through calculations it can increase the supply of faecal sludge to 313 m<sup>3</sup>/day. If non-domestic sources and on-call system are running, the FSTP capacity can be streamlined. It should be noted that the quality of the influent must have characteristics to avoid the accumulation of oil and grease in the processing unit which causes the treatment process to not function properly. This has an impact on the quality of the effluent that does not meet the quality standards.

The organizational parameter variables and the legal basis indicators for the establishment of an FSTP management organization can be improved. The implementation of SFSS requires regulations that support the faecal sludge management system, not only governor regulations but also regional regulations. Parameters of cooperation with indicators of cooperation with the community will increase with cooperation in the SFSS program once every 3 years is carried out with desludging. The financial parameters of the indicators of Availability of Operational and Maintenance Fund Sources can improve performance due to increased community retribution which can accommodate operating and maintenance costs. FSTP performance improvement will increase from 81.46% to 89.79% due to the implementation of the SFSS program.

The development strategy that will be applied to the study area is analyzed based on internal and external factors with technical, social, financial, institutional, and environmental aspects. Strategy analysis using SWOT with a description of each internal and external factors as follows.

### STRENGTH

1. Desludging Truck Needs Are Fulfilled.
2. 97% of the people of Kuta sub-district have private latrines, 73% already use septic tanks.
3. 56% have performed periodic desludging < once every 5 years.
4. WTP is the same as the basic rate.
5. The people of Kuta District agree with the existence of SFSS.
6. Suwung FSTP has good performance.
7. There is already a Management Agency for the SFSS program.
8. The quality of the effluent has met the quality standard.

### WEAKNESS

1. There is no tactical plan for SFSS implementation.
2. Wastewater Treatment Area Technical Implementation Unit does not have a desludging vehicle.
3. ATP > WTP.
4. There is no regulation that requires the desludging of septic tank.
5. The effluent does not meet Minister of Environment and Forestry regulations No. 68 Year 2016.

### THREAT

1. Damage to the processing unit
2. The absence of program socialization can result in low participation.
3. Increasing the supply of faecal sludge can reduce the quality of the effluent.
4. Cooperation with the private sector that provides faecal sludge desludging trucks needs to be improved considering the frequent occurrence of illegal discharges.
5. Data management must be integrated and real time.

### OPPORTUNIES

1. The installed capacity gap with processing is still large.
2. Quite a lot of private desludging trucks.
3. Community levies are able to finance FSTP operation and maintenance, Trucks and Profit.
4. Utilizing the DSDP information system to process SFSS data.
5. Increasing the frequency of desludging can reduce the risk of groundwater contamination.

The equation used is based on a qualitative approach according to Kearns in his research (Agustien, 2017):

$$\text{Strength (X)} = S + (-W) \dots \dots \dots \text{Equation 1}$$

$$\text{Competitive (Y)} = O + (-T) \dots \dots \dots \text{Equation 2}$$

With:

- S = Strength
- W = Weakness
- O = Opportunity
- T = Threat

In this study it was found that:

$$\text{Strength (X)} = 3.704 + (-2.194) = 1.510 \dots \dots \dots \text{Equation 3}$$

$$\text{Competitive (Y)} = 3.620 + (-2.717) = 0.903 \dots \dots \dots \text{Equation 4}$$



## 6. Conclusions and Recommendations

If this SFSS can be implemented, FSTP performance can increase on the technoware variable from 72.22% to 88.89% and orgaware from 76.67% to 93.33%. Based on the results of the analysis of the implementation of SFSS on technical, social, economic, institutional, and environmental aspects, it was found that:

1. Technical Aspect It takes 37 trucks to accommodate the desludging and transportation of faecal sludge from Badung Regency and Denpasar City; Cooperation between SFSS operators and private partners is urgently needed; The desludging period will be every 3 years; Suwung FSTP performance was declared good.
2. Social aspect community of Kuta District strongly agree with the SFSS program and want to participate in the program; The people of Kuta District care about the importance of managing faeces
3. Economic Aspect ATP for the community of Kuta District Rp. 30,500, WTP Rp. 9,110 while the minimum tariff applied is Rp 9,722 to generate profits until the 13th year and then have to increase the management fee; program socialization, education and improvement of services for the management of faeces are needed.
4. Institutional Aspect It is recommended that SFSS managers be implemented by DSDP managers because good human resources and information systems are able to accommodate SFSS data processing needs.
5. Environmental Aspect Ownership of latrines in Kuta District is good, this condition is able to support the implementation of the SFSS program; Suwung FSTP effluent has complied with Bali Governor Regulation No. 16 of 2016; It takes the characteristics of the faecal sludge that enters the FSTP to avoid a decrease in the performance of faecal sludge treatment due to the presence of oil and fat; Monitor the transportation process so as to reduce illegal discharges.

## References

- Abfertiawan, M. S., Bao, P. N., Pahilda, W. R., & Hakim, M. F. (2019). Studi Kondisi Eksisting Sistem Pengelolaan Air Limbah Domestik Setempat di Kota Denpasar. *Jurnal ilmu lingkungan*, 17(3), 443-451.
- Agustien R R. (2017). *Pengembangan Pendekatan Audit Teknologi Untuk Peningkatan Kinerja Instalasi Pengolahan Lumpur Tinja (Studi Kasus: FSTP Bawang Kota Tangerang dan FSTP Pecuk Kabupaten Indramayu)*. Bandung: Institut Teknologi Bandung.
- Agustien, R. R., Soewondo, P., & Sudradjat, A. (2018). Development of audit technology approach for performance improvement of faecal sludge treatment plant (IPLT)(Case study: IPLT Bawang in Tangerang City and IPLT Pecuk in Indramayu District). In *MATEC Web of Conferences* (Vol. 147, p. 04001). EDP Sciences.
- Ary A. (2018). *Evaluasi Implementasi Program Layanan Lumpur Tinja Terjadwal di Kota Surakarta*. FISIP. Universitas Sebelas Maret.
- Bappenas. (2020). *Target Pembangunan Sanitasi Nasional dan Sinkronisasi Target Pembangunan Sanitasi Daerah*. Peningkatan Kapasitas Pokja Provinsi dan Kabupaten Kota. April.
- Bappenas. (2021). *Capaian Akses Sanitasi Layak Indonesia*. National Housing water and sanitation information services.
- Darwati S. (2018). *Optimalisasi Program Layanan Lumpur Tinja Terjadwal*. Seminar Nasional Teknologi.
- IHE Delft. (2020). *Interactive Septage Management Toolkit*. IHE Open Course Ware. <https://ocw.un-ihe.org/>
- Hasan, M. M. Husna, AU, Rahman, MA and Alam, MA (2019). Community faecal sludge management strategy among urban slum people of Khulna city-Bangladesh. *Journal of Science, Technology and Environment Informatics*, 7(01), 489-499.
- Murungi, C., & van Dijk, M. P. (2014). Emptying, transportation and disposal of faecal sludge in informal settlements of Kampala Uganda: the economics of sanitation. *Habitat International*, 42, 69-75.
- Notoatmodjo, S. (2003). *Pengembangan Sumber Daya Manusia*. Edisi Revisi, Cetakan Ketiga, Jakarta: Penerbit PT.Rineka Cipta.
- Pambudi, Y. S., & Lolo, E. U. (2021). Analisis Pengaruh Umur, Pendidikan, Pekerjaan, Penghasilan, dan Jenis Kelamin

Terhadap Kualitas Sarana Sanitasi Dasar Rumah Tinggal. *Jurnal Kesehatan Kusuma Husada*, 103-112.

- Percepatan Pembangunan Sanitasi Permukiman. (2011). *Analisis Lingkungan Internal & Eksternal dalam Perencanaan Strategis Sanitasi*. Bogor.
- Prasetyawati, N. D., Gravitiani, E., & Sunarto, S. (2018). Willingness to Pay dan Ability to Pay Pelayanan Sanitasi di Kota Yogyakarta. *Jurnal Teknologi Kesehatan (Journal of Health Technology)*, 14(2), 71-81.
- Putra, R. R. (2016). *Analisis Faktor Penentu Pengembangan Sistem Pengolahan Air Limbah Terpusat Kota Tangerang (Studi Kasus: Kecamatan Tangerang)*. Bandung: Institut Teknologi Bandung.
- Seraj, K. F. B. (2008). *Willingness to pay for improved sanitation services and its implication on demand responsive approach of BRAC water, sanitation, and hygiene programme*. BRAC.
- Silvan Widler. (2020). *SWOT Analysis. Sustainable Sanitation and Water Management*. Seecon international gmbh.
- Sugiono. (2012). *Penelitian Kuantitatif, Kualitatif dan R & D*. Alfabeta. Bandung.
- Sugiyono. (2018). *Metode Penelitian Kombinasi (Mixed Methods)*, Cetakan ke10, Alfabeta, Bandung.
- Sulistyo E.A.B. (2012). *Analisis Tarif Pengolahan Air Limbah Berdasarkan Ability To Pay (ATP) dan Willingness To Pay (WTP) Studi kasus IPAL Semanggi Kota Surakarta*. Universitas Sebelas Maret. Surakarta.
- USAID. (2016). *Saatnya Sekarang Layanan Lumpur Tinja Terjadwal*.
- World Bank. (2017). *Dunia Setujui Pendanaan Tambahan untuk Mendukung Investasi Infrastruktur di Indonesia*. Worldbank.org