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PUBLIC SERVICE INNOVATION BASED ON THE FECES SUCTION (SENJA) APPLICATION TO SUPPORT SCHEDULED FECAL SERVICES IN SURABAYA CITY

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ABSTRACT
Urban population growth in Indonesia increases pressure on basic services, particularly sanitation, and requires local governments to develop inclusive fecal sludge management systems. Surabaya has achieved 100% Open Defecation Free (ODF) status and proper sanitation access approaching universality, yet previous studies predominantly emphasize physical infrastructure and community-based sanitation programs rather than digital public service innovations that sustain ODF achievements. This study analyzes the Senja (Feces Suction) application as a public service innovation to optimize the Scheduled Fecal Sludge Service (LLTT) in Surabaya City by using Rippetoe and Rogers' innovation characteristics (relative advantage, compatibility, complexity, trialability, and observability). A descriptive qualitative approach is employed through document analysis, observation, and in-depth interviews with officials of the Water Resources and Highways Agency and Senja application users. The findings show that Senja offers clear relative advantages in terms of service speed, transparency, and integration with the Keputih Sludge Treatment Plant, and is largely compatible with community needs, but still faces barriers related to digital literacy, system reliability, and the limited number of registered users. The study concludes that Senja constitutes a local digital innovation that supports the sustainability of fecal sludge services in a city that has achieved ODF status, while underlining the need for continuous improvements in outreach, technical support, and institutional capacity to ensure more inclusive and effective innovation outcomes.

INTRODUCTION

Urbanization in Indonesia has reached 57.5% and is projected to exceed 66% by 2035 (Central Statistics Agency, 2023), creating growing pressure on basic services such as clean water, housing, and sanitation. This demographic shift not only increases the number of urban residents, but also intensifies competition over limited environmental and infrastructure capacity, especially in rapidly growing metropolitan areas. In this context, the ability of local governments to provide equitable and sustainable sanitation services becomes a critical determinant of urban resilience.

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To meet the Sustainable Development Goals (SDGs), Indonesia targets universal access to sanitation and the elimination of open defecation by 2030. Statistics Indonesia (BPS) data from 2023 showed that although 90.8% of households in Indonesia have access to improved drinking water, only 67.4% have access to adequate sanitation, with the gap particularly severe in remote and peri-urban areas. National programs such as Community-Based Total Sanitation (STBM) and the Accelerated Settlement Sanitation Development (PPSP) have been launched to address this disparity, but their effectiveness depends heavily on local implementation capacity and the ability to adapt approaches to diverse regional contexts (Mas'adah, 2021).

STBM itself, regulated by Minister of Health Regulation No. 3 of 2014, emphasizes the policy of family latrines with adequate septic tanks as a prerequisite for healthy sanitation. These programs combine infrastructure development, such as healthy latrines, with education and community behavior change. Open defecation remains a serious public health and environmental threat. Research in the SDGs Newspaper notes that An estimated 32 million Indonesians were still practicing open defecation in 2021, placing Indonesia among the countries with the highest prevalence globally (Yuliana et al., 2024). The practice contributes to groundwater contamination and increases the risk of diarrhea, cholera, hepatitis A, polio, and helminth infection, particularly in densely populated and low-income settlements, thus reinforcing cycles of poverty and vulnerability (Selim dkk., 2024).

At the provincial level, access to proper sanitation in East Java has increased rapidly in recent years. The city of Surabaya has successfully translated national and provincial programs into concrete implementation on the ground, supported by intersectoral coordination and community empowerment schemes. Surabaya consistently ranks very high, approaching 100%, demonstrating near-universal success in achieving proper sanitation access. In contrast, Bangkalan still lags far below the provincial average, with a figure of around 50%, indicating that many households still lack proper toilet facilities (Arieffiani & Ekowanti, 2024).

Tabel 1. Sanitation Index Between Other Cities and Surabaya in 2023

District/City	Proper Sanitation Percentage 2023
Surabaya	97,81 %
Bangkalan	50,30 %
Sampang	82,86 %
Rata-rata Jatim	83,72 %

Source: Central Statistics Agency of East Java, 2023

This situation provides an important basis for examining how Surabaya can serve as a prime case study in strengthening sanitation programs and maintaining Open Defecation-Free (ODF) status through service innovation. As the second-largest metropolitan city after Jakarta, Surabaya is a prime example of rapid urbanization and its attendant sanitation challenges. With a population of over 2.8 million (Surabaya Health Office, 2022), it is estimated that around 7 million people in Indonesia still practice open defecation, although this has decreased significantly compared to the previous decade.

Surabaya, as a densely populated metropolitan city, has implemented strict regulations to end the practice of open defecation. The legal basis for this is stated in Surabaya City Regulation No. 5 of 2014 concerning Waste Management & Sanitation, which clearly states that people are prohibited from disposing of feces carelessly, and the government is obliged to provide good and environmentally friendly domestic waste management services (Kurniawan et al., 2016). As part of implementing this policy, Surabaya adopted the STB approach, which emphasizes collective behavioral change through community empowerment.

The implementation of STBM in Surabaya is based on cross-sectoral consultations involving the Health Office, the Environmental Office, and latrine cadres at the village level. It is facilitated through outreach programs and community advocacy initiatives. The primary goal is to encourage the transition from open defecation to using healthy latrines, while strengthening the community's role in maintaining environmental cleanliness. The program aims to encourage healthy and clean lifestyle changes through a community-based, participatory approach. One of the main pillars of STBM is the

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complete elimination of open defecation, which is then realized through achieving ODF (Open Defecation Free) status (Widyanti, 2018).

ODF status indicates that all residents in an area have stopped practicing open defecation and have access to proper and safe sanitation facilities, a condition where the community is free from open defecation. This approach to healthy and clean lifestyles focuses not only on providing healthy latrines but also includes education programs, advocacy, and monitoring of household sanitation conditions. The progress of Surabaya City's ODF status shows remarkable progress. In 2023 and 2024, all 154 sub-districts, or 100%, were documented as ODF

Thus, Surabaya has successfully transformed its sanitation status from a physical indicator of healthy latrines to a social indicator of defecation behavior. These efforts underpin innovative strategies, such as the Scheduled Fecal Sludge Service (LLTT). Fees for sludge desludging services are also a component of Regional Original Income (PAD). The government can implement this through the Scheduled Fecal Sludge Service (LLTT) Program, a national initiative to comprehensively improve the domestic wastewater management system, with the goal of accelerating the achievement of 100% sanitation access. The presence of LLTT is also driven by the illegal dumping of fecal sludge by sanitation companies, which flows directly into rivers or other waterways. The LLTT program itself is considered a national program, and its implementation is currently underway, specifically in several regencies and cities across Indonesia.

The available service programs contribute to a clean and healthy environment in Surabaya. To optimize the implementation of the Scheduled Septic Tank Service (LLTT) program, the Surabaya City Government launched an application called Senja (Faces Suction) to facilitate the public's online septic tank booking, quickly, securely, and transparently. The Surabaya City Government addressed this challenge by enhancing cross-sector collaboration, including involving regional government agencies, technical institutions, and the community. One breakthrough was the development of a digital service, the Senja application. This application facilitates the public's access to scheduled and efficient septic tank suction services, while also supporting sustainable domestic sanitation management (Yudha & Widiyarta, 2024).

Through the Senja application, residents can order septic tank suction services from home, schedule them according to their needs, and receive fast and safe service directly from the Septic Tank Management Agency (ILPT), which is under the auspices of the Water Resources & Highways Agency (DSDABM). The launch of the Senja application service was motivated by the urgent need to prevent improperly treated septic tank waste, which can threaten environmental quality. The Surabaya government provides scheduled septic tank suction services to make it easier for residents to maintain their septic tanks. The program launched in July 2024, and by mid-July 2024, 99 accounts had registered and 28 septic tank suction requests had been received, with a total volume of less than 100 m^3(Agency, t.t.).

In its development, the Senja Service was developed by the Surabaya City Water Resources & Highways Agency, through integration with the Keputih Sludge Treatment Plant (IPLT) as an environmentally friendly fecal waste processing facility. This application allows the public to sort services according to building category (residential, social, commercial) and ensure sludge suction rates comply with Regional Regulation No. 7 of 2023 concerning Regional Retribution. With a structured system from digital ordering, automatic scheduling, to processing at the IPLT, the Senja Service is the answer to the challenges of fecal management in big cities. This innovation not only facilitates access to sanitation but also emphasizes the Surabaya City Government's commitment to maintaining sustainable environmental cleanliness and health(Putra dkk., 2021).

In this context, the Senja application plays a strategic role in preventing "slippage," or the relapse of community behavior back into open defecation due to full or damaged toilets. Furthermore, even if a community has a sanitary toilet, the lack of regular toilet desludging services is a major cause of groundwater contamination and the spread of environmental diseases such as diarrhea and hepatitis. As stated by Iskandar et al. (2023), "sanitation sustainability is determined not only by the presence of toilets, but also by an efficient and integrated fecal sludge management system."

With its digital application approach and automated scheduling system, the Senja application is not only a public service tool but also an educational instrument that fosters an environmentally conscious sanitation culture. This service reminds the public to empty their toilets every 2–3 years in accordance with WHO standards and Indonesian Minister of Health Regulation No. 3 of 2014 concerning STBM. As the developer of the Senja application, the Water Resources and

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Highways Agency emphasized that the success of sanitation digitalization depends heavily on inclusive application design, easy access for the community, and support from service operators and local governments (Ngxamngxa, 2025).

The Senja application service program is a concrete example of how local innovation can align with the global agenda. By leveraging technology as a tool for outreach, reminders, and service bookings, the app is able to reach a broad audience on a city-wide scale. Surabaya's success demonstrates that community-based approaches don't have to be at odds with technology, but can actually reinforce each other when designed in a participatory and inclusive manner. However, it's crucial to examine how communities actually utilize the app in their daily lives. Do they view the Senja app as a necessity, an obligation, or simply an additional service? This perception will significantly determine the success of digital integration in the sanitation sector.

Existing studies on sanitation in Surabaya and East Java largely focus on the implementation of STBM, the achievement of ODF status, and regulatory enforcement at the local level, while the integration of digital platforms into fecal sludge services remains underexplored. Research on public service innovation in Indonesia has tended to emphasize e-government in sectors such as licensing, taxation, and health, with relatively limited attention to sanitation governance. This creates a research gap regarding how local governments design and implement digital fecal sludge management services, and how these innovations are perceived and utilized by citizens in sustaining ODF outcomes.

Situating this study within the academic discourse on public service innovation, this article applies Rippetoe and Rogers' innovation characteristics relative advantage, compatibility, complexity, trialability, and observability to a sanitation-focused digital service. The novelty of this research lies in examining the Senja application as a local digital innovation that connects ODF sustainability, fecal sludge management, and e-government practices in a large Indonesian city. Therefore, this study aims to analyze how the Senja application functions as a public service innovation to optimize the Scheduled Fecal Sludge Service (LLTT) in Surabaya City and what opportunities and constraints arise from its implementation.

METHOD

This study employs a descriptive qualitative approach conducted at the Surabaya Water Resources and Highways Agency (DSDABM), the Keputih Domestic Wastewater Management Unit (UPT PALD/IPLT), and communities using the Senja application. Informants comprised DSDABM officials (including the agency head), IPLT/UPT PALD service staff, and Senja application users from household, commercial, and social categories. Purposive sampling was applied based on direct involvement in planning, implementing, or utilizing the Senja application, followed by snowball sampling to capture diverse perspectives. Primary data were collected through in-depth interviews, participatory observation, and documentation, while secondary data were sourced from official documents, local regulations, and LLTT program reports. Data validity was established through source triangulation (comparing perspectives from policymakers, technical implementers, and users) and method triangulation (cross-checking interviews, observations, and documents), supported by member checking with key informants. Data analysis followed Miles & Huberman's (1994) interactive model, comprising: (1) data reduction focusing findings on Rippetoe & Rogers' five innovation characteristics, (2) data display in matrices per indicator, (3) drawing conclusions, and (4) verification through cross-source comparison, conducted iteratively throughout the research process.

RESULT AND DISCUSSION

Through the results obtained from observations and interviews in finding out how the innovation of the Feces Suction Application-Based Service (Senja) can support the Scheduled Feces Sludge Service of Surabaya City more optimally, the theory of Rippetoe & Rogers is used, namely in the book "Service Innovation in Public Organizations" written by Dr. Hadi Prabowo, M.M. et al., (2022). This theory consists of five indicators, namely: 1) Relative Advantage, where the optimal level of innovation provides benefits to its recipients; 2) Compatibility, namely how suitable the innovation is to the values, previous experiences and needs of the recipients; 3) Complexity, namely the category of difficulty in understanding and using the innovation; 4) Triability (Trialability) related to measuring the level of

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innovation trials by its recipients; and 5) Observability (Ease of Observation) namely how easily recipients see the results of the innovation. Through the findings of the data obtained by the researcher during the field analysis of the Senja Application Innovation implemented at the Keputih Fecal Sludge Management Installation in Surabaya City, the advantages and disadvantages of the innovation were discovered, thereby knowing whether or not the existing innovation was implemented.

1. Relative Advantage

According to Rippetoe and Rogers, relative advantage refers to the extent to which an innovation is perceived as better than the idea it supersedes in terms of efficiency, quality, or convenience. The findings indicate that Senja provides a clear relative advantage compared to conventional septic tank suction services, particularly through faster response times, transparent tariffs based on distance, building type, and fleet, and direct integration with the Keputih Fecal Sludge Treatment Plant. Before Senja, residents typically had to come to the office or search for contact numbers to request services, and some relied on private providers with unclear prices and uncertain service quality. With Senja, both users and operators benefit from a more structured system, where orders, locations, and schedules are automatically recorded and can reduce repetitive administrative work(Overbye-Thompson & Hamilton, 2025). Besides the benefits for Senja users, septic tank cleaning service employees also benefit from the app, eliminating the need to manually record requests. Order data, locations, and septic tank cleaning schedules are immediately recorded in the system, which can significantly reduce repetitive administrative work. the relative advantage of Senja still depends on access to smartphones and stable internet connections, so at this stage the benefits are felt more strongly by digitally literate groups. This shows that a technically superior service does not automatically guarantee equal access, and complementary support for users with limited digital capacity remains necessary.

2. Compability

In Rippetoe and Rogers' framework, compatibility is the degree to which an innovation fits existing values, experiences, and needs. The Senja application is broadly compatible with the habits of urban residents who are accustomed to using digital platforms and expect quick, practical services, and it also aligns with Surabaya's broader electronic-based governance initiatives. Similar to other local e-government services such as online licensing or tax payments, Senja is more easily accepted by users whose daily activities are already mediated by smartphones and online transactions (Rani & Malau, 2025). At the same time, interviews show that residents with low digital literacy still prefer face-to-face interactions or phone calls with officers, indicating that institutional compatibility with SPBE has not yet fully translated into social compatibility at the community level.

3. Complexity

Rippetoe and Rogers argue that perceived complexity tends to slow down the adoption of an innovation. The study finds that younger users view Senja as simple and helpful because it saves time and is easy to access, whereas older users and those unfamiliar with digital technology perceive the application as complicated. Their difficulties centre on registration procedures and navigating the menu to place an order. This indicates that the same innovation can be experienced as either low or high complexity depending on users' digital literacy and previous exposure to similar applications.

4. Triability

The Senja Application innovation provided by the Surabaya City Water Resources & Highways Agency has been tested and implemented on service recipients such as the community, the city of Surabaya. When launched, the Senja Application already had 99 registered accounts (in general) registered to use the septic tank suction service. The majority of initial users of the Senja Application came from households / individuals, because this application was designed to serve domestic waste needs. However, the Senja Application also continues to accept and serve suction in public places, offices, and even places of worship. In addition, this is also proven until now in 2025 there have been many users who have registered and used this service both from households, social (mosques, Islamic boarding schools, prayer rooms, churches) and commercial (offices, hospitals, minimarkets, stalls).

Tabel 2. Faces Suction (Senja Application) 2025

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Month	Location	Determined		
		Household	Social	Commercial
January	166	132	4	30
February	182	144	4	34
March	201	161	2	38
April	177	140	0	37
May	241	193	4	48
June	191	137	6	43
July	276	202	4	60
August	260	192	1	57
September	267	202	3	62

Source: Department of Water Resources and Highways (DSDABM), 2025

5. Observability

In this convenience indicator, it is the visible results or impacts of the innovation of the Senja City Application of Surabaya. Where in practice in the field and the results of interviews, the Senja innovation provides practical benefits to make it easier for the community to get faster, transparent, and scheduled septic tank services so that home septic tanks do not overflow, easily clogged, and make the home environment cleaner and healthier. or hygienic. For more optimal results, it is still necessary to strengthen socialization so that the community can understand the good impacts and importance of scheduled septic tank suction for health in preventing disease and increasing awareness of more orderly city planning from scheduled and recorded waste management.

CONCLUSION

This study shows that the Senja application has begun to function as a digital public service innovation that supports the implementation of Scheduled Fecal Sludge Services in Surabaya, although its performance is still constrained by limited digital literacy, system reliability, and coverage of users. At the theoretical level, the research contributes by operationalizing Rippetoe and Rogers' innovation characteristics in the context of urban sanitation governance, demonstrating how relative advantage, compatibility, complexity, trialability, and observability interact in a city that has already achieved ODF status (Rippetoe & Rogers (1987) in Prabowo et al., 2022: 42-43). The findings also enrich the literature on public service innovation and e-government by highlighting sanitation as a sector that is often overlooked compared to licensing, health, or taxation services.

From a policy perspective, the results imply that digitalization of fecal sludge services needs to be accompanied by targeted outreach to low-literacy groups, simplification of application design, and strong back-end infrastructure to ensure reliable service delivery. The city government can use the evidence from Senja's implementation to refine regulations, budget allocations, and institutional arrangements so that digital sanitation services become more inclusive and sustainable. Future research may compare Senja with similar initiatives in other cities or employ quantitative approaches to measure user satisfaction and long-term impacts on sanitation behaviour.

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