Private Public Partnership Solutions for Faecal Sludge Management

Can faecal sludge management based on resource recovery be financially sustainable? This is theoretically feasible, but in reality still requires innovations. How can we evaluate solutions and business models for chances of success prior to implementation?

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Introduction

Inadequate urban waste management is a widespread problem, especially in rapidly growing urban environments of low- and middle-income countries. Waste streams, such as municipal solid waste, wastewater and faecal sludge, are often directly discharged into the environment with little or no treatment. The harmful effect on public and environmental health is indisputable, and viable solutions are necessary to improve this situation. Resource recovery of nutrients, water and energy from waste streams is an attractive possible solution because it could generate revenues from the sale of treatment endproducts if there is significant and consistent market demand. Private sector involvement is, therefore, considered necessary because it provides profit driven solutions to urban waste management problems. This is especially the case for faecal sludge management (FSM) for which financially viable business models offer possible solutions and incentives for the involvement of private entities.

Assessing the feasibility of waste-based business models

As part of a three-year research project in collaboration with the International Water Management Institute, the World Health Organisation, the Swiss Tropical and Public Health Institute, and the International Centre for Water Management Services, 21 business models based on resource recovery of water, nutrients and energy from waste streams were evaluated for their viability in four cities: Bangalore, India; Hanoi, Vietnam; Kampala, Uganda; and Lima, Peru <http://www.sandec.ch/rrr>. The multi-criteria assessment evaluated the following:

1. Supply, availability and characteristics of treated waste-streams
2. Market demand for the generated endproducts
3. Financial analysis and logistics of treatment processes
4. Risk assessment of environmental and health impacts
5. Assessment of required treatment technologies
6. Institutional analysis of enabling environment
7. Socio-economic analysis of product acceptance

The project results indicated that, particularly for FSM, such criteria are difficult to assess. This is due to the novelty of the technologies and of the endproducts, many of which have not yet been implemented or put to use, resulting in a lack of the financial data required to assess their economic viability.

As business opportunities and markets for faecal sludge endproducts develop, new industries and market applications are emerging and innovative technology solutions are being tested. Hence, multi-criteria assessments of business models in FSM will have to be adapted and developed to evaluate current and future developments.

Development of reliable methodologies

Prior to the design and implementation of innovative technologies for treatment and resource recovery from faecal sludge, methodologies need to be developed to make reliable estimations that meet the planning needs of highly complex urban areas. Sandec is addressing these research gaps, and based on its research results, aims at producing guidance documents to support decision-making and better planning of urban FSM.

We developed hypotheses for a method to quantify and characterize faecal sludge on a city-wide scale <www.sandec.ch/faq>, which was field-tested with 180 samples taken in Kampala, Uganda, and 80 samples in Hanoi, Vietnam. The results are currently under analysis [1]. We also developed a methodology to assess the market demand and growth potential of faecal sludge resource recovery treatment endproducts <www.sandec.ch/mda>. This was done with engineers and economists, and field tested in Kampala, Uganda. It is currently being tested in Bignona, Senegal; and Son La, Bac Ninh, and Ba Ria in Vietnam.

The goal is to develop methodologies that enable, among other objectives, the selection of the most viable treatment options to

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Photo 1: Faecal sludge being discharged by private emptying and transport service providers at the Lubigi Wastewater and Faecal Sludge Treatment Plant in Kampala, Uganda.

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Photo 2: Dewatered faecal sludge collected from drying beds at the Lubigi Wastewater and Faecal Sludge Treatment Plant in Kampala, Uganda.

provide design criteria and reliable estimates of influent flows. They will fill missing gaps in our analyses, and provide insights into market and business opportunities, which could trigger the development of new and innovative sanitation solutions.

Resource recovery businesses

Examples exist of successful resource recovery businesses based on isolated business models that generate profits at different steps along the sanitation service chain. However, there is currently a lack of successful examples of integrated sanitation business models that cover the entire service chain (i.e., containment, emptying, transport, treatment and resource recovery). An in-depth view of sanitation service business models is found in this edition of Sandec News (Gebauer et al.) on pp. 28–29.

Another hurdle to the implementation of resource recovery based business models is that reliable treatment technologies do not yet exist, or have not yet been transferred from other sectors, such as the wastewater sludge sector. For an example of research that addresses this gap, please refer to the article on pp. 10–11 in this edition of Sandec News (Gold et al.). It addresses technology transfer and scaling up businesses involved in pellet and electricity production from faecal sludge.

Enabling environment

For successful private sector involvement in sanitation services and FSM, businesses must produce revenues. However, ensuring public health through sanitation and FSM is also a public good. Hence, public institutions need to create an enabling environment, which provides the private sector with incentives for investments, while at the same time implementing effective enforcement measures to ensure adherence to regulations [2].

In Kampala, for example, sanitation provision is the mandate of the Kampala Capital City Authority (KCCA), while water provision and wastewater management is the mandate of the National Water and Sewerage Corporation (NWSC). The management of faecal sludge is not the direct responsibility of either of these agencies and this has resulted in the development of a significant private sector for the emptying and transportation of faecal sludge. However, the private sector has no interest in building the associated treatment infrastructure that protects public health through the treatment and safe enduse of faecal sludge. In Kampala, such treatment infrastructure exists and is managed by NWSC. Constructing treatment infrastructure requires large capital investments, which decrease short-term financial viability and, therefore, does not attract the private sector. The result is that businesses often cover only one part of the sanitation service chain, and this does not provide for adequate FSM.

There is a need for private public partnerships that contribute to the development of strategies that meet the needs of sound FSM. One hypothetical example is the implementation of a decentralised treatment infrastructure, which would enable emptying and transportation service providers to decrease fuel consumption, and drive down costs. This could be combined with privately operated collection and transport companies that manage the treatment infrastructure. In this way, revenues from collection and transport, in addition to resource recovery, could offset treatment costs. Providing a regulatory framework that supports such activities and that creates opportunities for profits would be the role of the public sector. If profits can be generated through sustainable FSM with private sector involvement, competition will evolve, which could ultimately contribute to decreasing the costs of emptying services at the household level. This would be particularly beneficial for low-income households, who currently cannot afford such services. It could also reduce the unsafe practices of informal emptying and direct dumping of faecal sludge into the environment.

Conclusion

The most important goal of any sanitation or FSM project is the protection of public and environmental health. Financially sustainable solutions cannot be implemented by the private sector alone. This requires that the public sector provide an enabling environment and a regulatory framework wherein the private sector can generate profit and achieve public health goals. Even if projects are not fully financially sustainable, they are still successful if they achieve public health goals.

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[2] Tilley, E., Strande, L., Lüthi, C., Mosler, H. J., Udert, K. M., Gebauer, H. and Hering, J. G. (2014): Looking Beyond Technology: An Integrated Approach to Water, Sanitation and Hygiene in Low Income Countries, Environmental Science & Technology, *48 (17)*, 9965–9970.

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