

## **DEVELOPMENT OF BUSINESS MODEL FOR IMPROVED FAECAL SLUDGE MANAGEMENT IN DHAKA CITY**

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### **ABSTRACT**

This paper represents development of viable business model for unsewered Dhaka outlining faecal sludge handling and management. In order to create Faecal Sludge (FS) emptying demand, Dhaka Water Supply and Sewerage Authority (DWASA) will have to disconnect all illegal sewer lines from the household to the storm sewerage line by applying DWASA act 1996. DWASA, all private service provider, NGOS, household owner will cooperate in this proposed business model which may be financed by donor agencies or any other institutions interested to fund and the revenue will be earned from customer chain. The application of this business model will be able to save our environment, abate the cost of treatment plant, counterbalance the absence of sewer network, and provide relatively cheaper sanitation facilities to the people of Dhaka City.

Keywords: Business models, law enforcement, disposal, faecal sludge management, environment, low cost

### **INTRODUCTION**

The direct disposal of excreta in open drain or storm sewer without treatment increase the pathogens within the environment and cause diarrhoea disease. The World Health Organization (WHO) estimates that 2.2 million people die annually from diarrhoea diseases and that 10% of the population of the developing world are severely infected with intestinal worms related to improper waste and excreta management (Richard, 2001).

On-Site sanitation system means where the storage are contained within the plot occupied by the dwelling and its immediate surroundings. It may be disposed of on site or removed manually for safe disposal (WHO 2006). In Dhaka city, 80% of the existing sanitation access is met by on-site manual emptying technologies. Faecal sludge management is a demand responsive service that customers request their facility to be emptied. The usual practice is to utilize the services of manual emptier. Although Vacutug services are available in other areas, but many inhabitants in are still not aware of this service. NGOs in Dhaka cities have not been getting wider response from the potential households for emptying services. The majority of household owner with septic tank does not know about the DWASA act 1996, which clarify that connection from household sewer to nearby drain or storm sewer is strictly prohibited. This is the one of the reason that the household owners do not face the overflow of their septic tanks or pits because they directly connect their sewer lines to the nearby drain or storm sewer. This kind of phenomena is a major reason for less demand of this emptying business.

The vacutug is a latrine pit exhauster made for operation in extreme conditions. It is a simple machine, comprising a vacuum tank and a pump/tug assembly. The vacuum tank is specially designed to carry sludge. It is made of different sizes (700 litre, 1000 litre & 2000 litre). The Model: MK-II & MK-IV is self-propelled where engine can propel the vehicle at suitable speed. In suction mode the vacuum pump has a free air capacity of 2,700 L/min and will fill the tank in around two to ten minutes (depending of the thickness of the sludge). It can also pressurize the tank for discharging the wastes at a high level. The vacutug MK-II & MK-IV, MK-V has proved its ability to negotiate tight turns and narrow passages throughout the trial. The vacutug has proved that it was capable of access

to some of the densest urban area where conventional systems are unable to penetrate. The MK-III is big & can be used in neighbourhood having wider road access.

The service is affordable by the urban poor who are looking forward to emptying their latrines. The capital is affordable by entrepreneurs and offers the possibility to develop/strengthen a micro-enterprise. And lastly the operational cost is easily recovered from revenue generated.

## METHODOLOGY

In developing countries urban sanitation access is achieved mostly through on-site sanitation systems. The faecal waste from the on-site sanitation facilities rarely reaches a treatment facility for safe reuse or disposal because the households have an illegal connection of their sewers connected into a nearby drain or storm sewer drain; in general safe management of faecal waste downstream of the household is severely neglected. DWASA will disconnect the all illegal links to the storm sewerage line by applying DWASA act 1996 and it will increase not only FS emptying demand but also provide a facility to treat the faecal wastes in a treatment plant. An extensive awareness programs like the use of social mobilization campaign, mass media, word of mouth, local TV channel, miking, billboard, documentary film etc. will be carried by DWASA. These activities will create the public awareness about the benefits of the paid service in contrast with the danger of disposal into the drain, canal and land, and its hazardous impacts to water, air and the environment in general. By doing this we will be able to have a business regarding the emptying of pits and septic tanks. In order to make the business viable, we need to have a monetary authority. The method of the emptying has shown by the following-

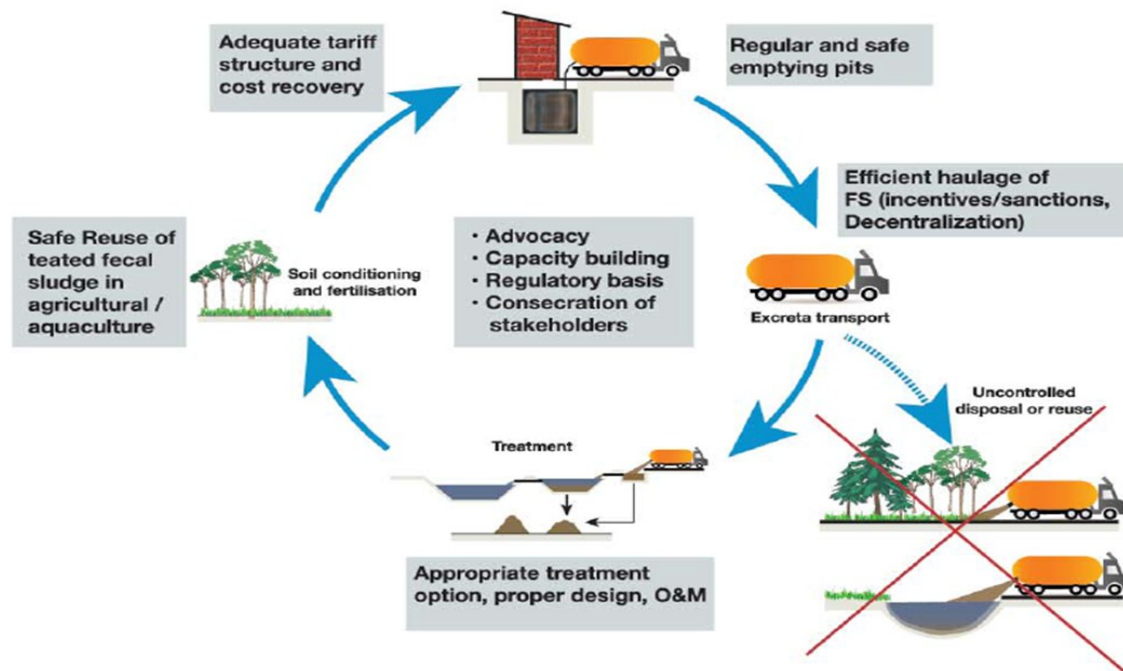


Fig. 1: Operational method of Vacutug

Presently DWASA does not have separate sewer division to look after the emptying service and dumping zone of wastes. So we are proposing a separate sewer division to DWASA for making the business viable.

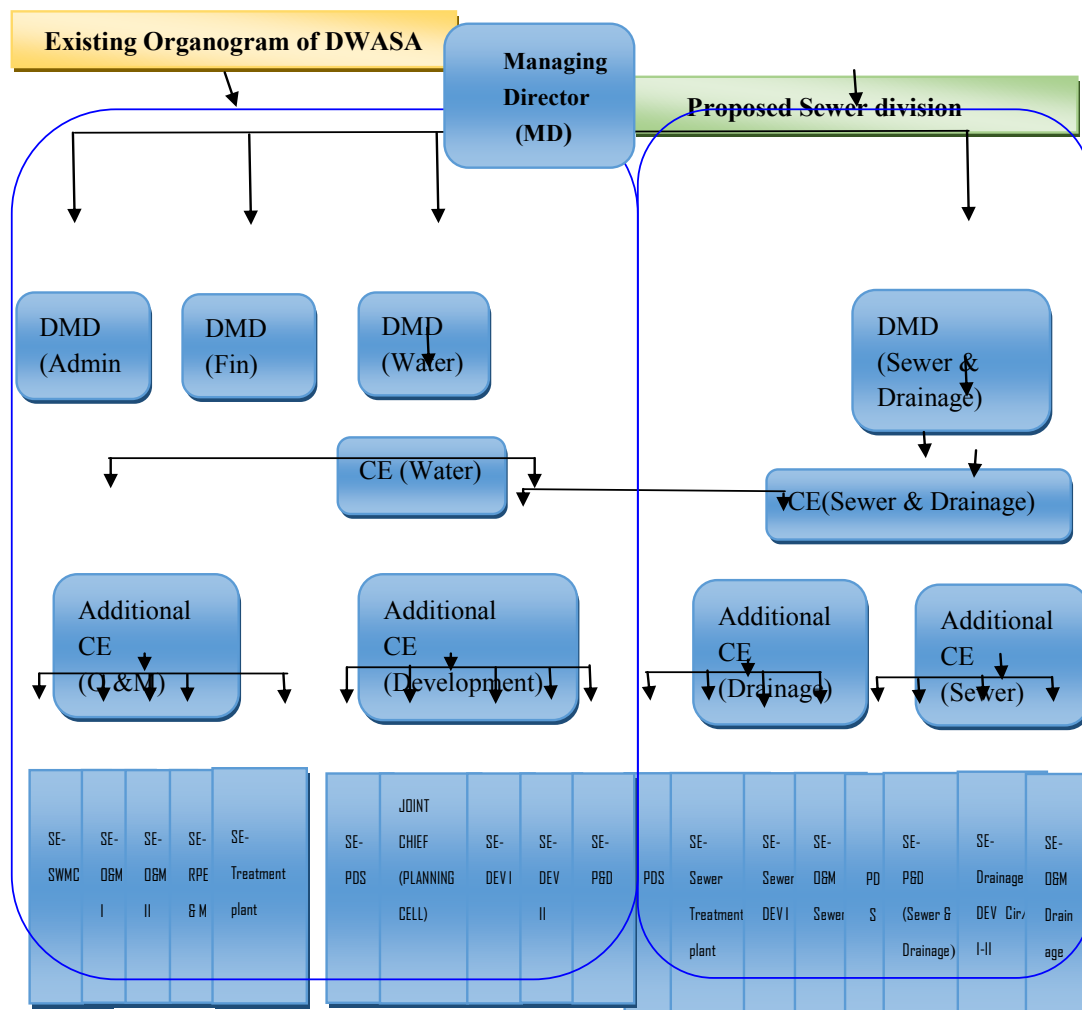


Fig. 2: Proposed New Sewer Division for DWASA

Table. 1: Advantage and disadvantage of Vacutug in general

Advantages	Disadvantages
Removes waste safely for both workers and public health	Slow speed encourages local dumping (Model MK-I & II)
Low odor technology	Capital cost is high
Faster to empty than either manual or sludge gulpher	Accessibility problem
Reduces social stigma on workers	Maintenance cost is potentially high

There are five potential faecal sludge derived product groups were identified: dry sludge as fuel for combustion; biogas from anaerobic digestion of sludge; protein derived from sludge processing to be used as animal feed; dried sludge for use as a component in building materials; and treated sludge as a soil conditioner or organic fertilizer.

**Business Model Option 1**

DWASA will provide de-sludging vehicles (Model: Vacutug MK-VI) to the service provider as per contract agreement with them on hire basis. Large Vacutag vehicle is inaccessible in Slum and narrow street area. So, DWASA will also provide baby vacuum trucks instead of Vacutug as de-sludging vehicle.



Fig 3: Vacutug MK-VI with Baby Trucks

The private service providers deal directly with household and DWASA will monitor the work. The DWASA will ensure the safe disposal of FS to Sewerage treatment plant (STP) or transfer station. All private service providers or NGOs will be the enlisted service provider under DWASA. The tariff for emptying charge will be fixed by household owner and enlisted service provider. The FS inspector will supply the list of enlisted service providers to the each of household owners. The condition of the septic tank or pit will be checked by the inspector on a regular basis. He will inform the household owner to emptying his septic tank and pass him a time frame if septic tank or pit becomes filled up by two third of its volume. If within this time frame, household owner unable to clean his septic tank and if the septic tank sludge spill out, then DWASA will clean the septic tank with his own initiative and cost of emptying will be billed to the household owner with the water bill.

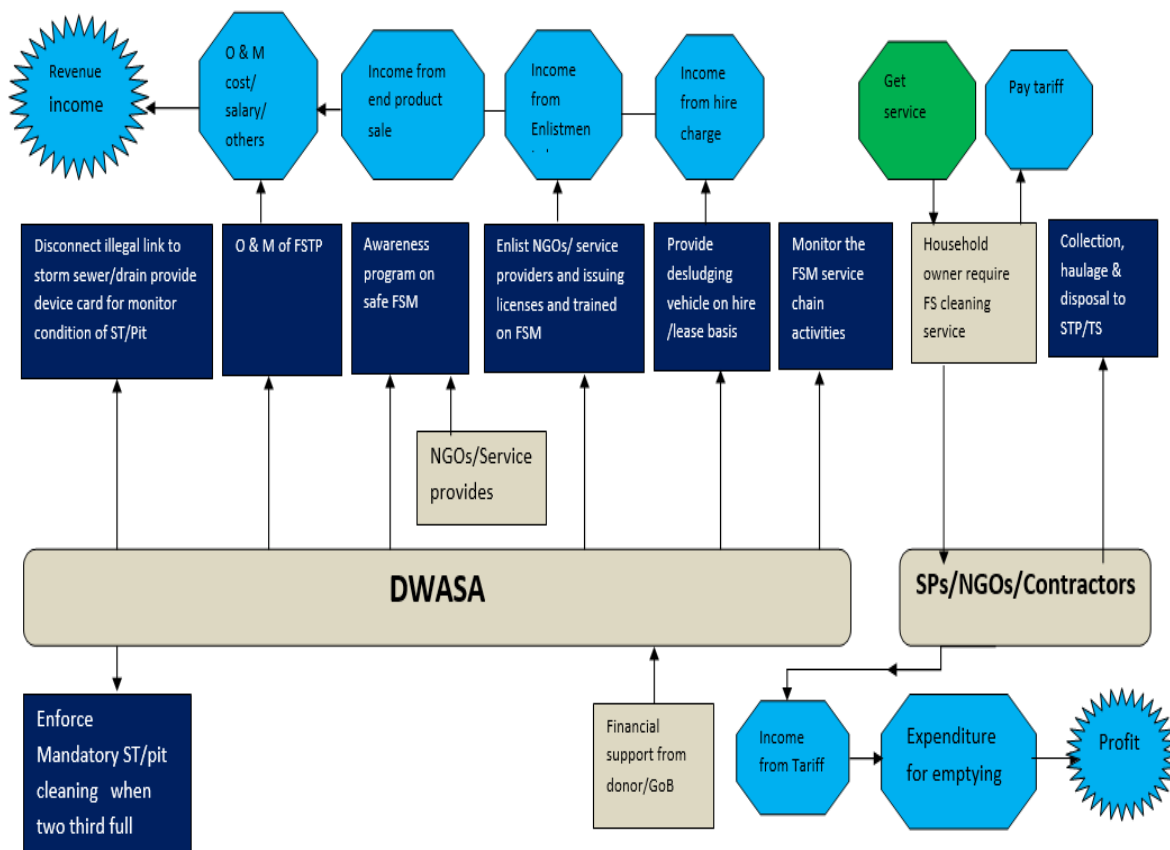


Fig. 4: Business Model Option 1

### Business Model Option 2

The DWASA may engage contractors (private company and NGO) and provide them license on a yearly basis for FS management. One FS yearly contractor will be selected for each sewerage zone on the open bidding system. The contractors will haulage septic tank sludge to a special facility located

STP or transfer station managed and run by DWASA. DWASA will provide de-sludging vehicles (Model: Vacutug MK-VI) to the contractor as per contract agreement with them on hire basis. Linking of latrines directly with the open and/or covered drainage system (storm sewerage) should be disconnected by applying DWASA role 1996 including an awareness program (Option 1 model) to increase the demand of FSM business. The FS inspector will visit the household septic tank/pit on a regular basis. He will inform by written to the household owner for make arrangement for emptying his septic tank when it becomes filled up by two third of its volume. A stipulated time and date will be fixed by household owner and DWASA will take initiative by issuing a work order to the contractor for cleaning his septic tank septic tank or pit. The cost of emptying will be billed to the household owner with the water bill. The contractor will be paid from DWASA revenue as per the contract signed with DWASA. The lessons learn from Dhaka City Corporation's yearly road maintenance contract could be applied.

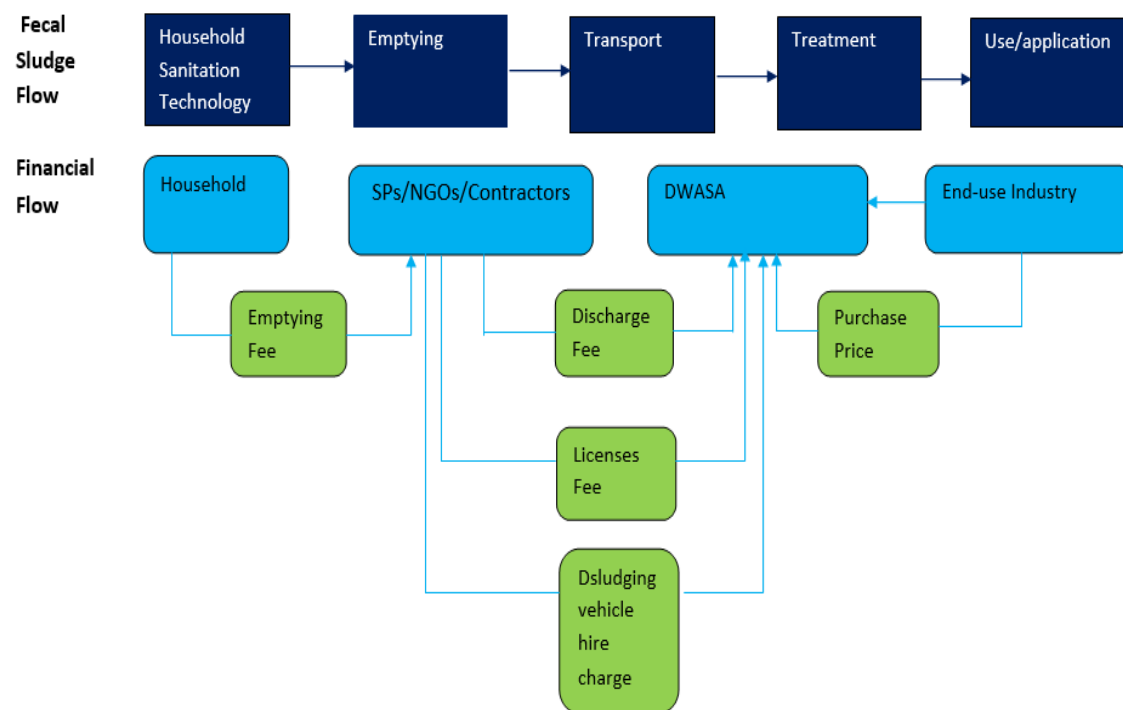


Fig. 5: Business Model Option 2

### MODEL EFFECTS & DISCUSSIONS

For an improved and sustainable faecal sludge management service in DWASA, these two business models are highly recommended for prevention of direct deposition of faecal sludge in the environment. The mechanical emptying process is fast, efficient and minimizes health hazard. The settlement of sludge in lower level septic tank also reduce the cost of purification. Lastly, Business models of Faecal sludge management also creates huge employment sector for the people which needs to be within a closed loop where the collection, transport, treatment and use should be in order to protect environment and health of the people. The sustainable faecal sludge management system needs to be economically viable, socially acceptable, technically & institutionally appropriate in order to make the environment and natural resources in healthy condition.

### CONCLUSIONS

In business model option 1, enlisted service provider & DWASA both are involved in the customer service. Household owner and enlisted service provider will fix the tariff for emptying charge which will be collected by DWASA from service provider. But, in business model option 2, enlisted

contractors (NGOs & private company) will complete the full work of FS management without any work involvement of DWASA according to DWASA's work order. DWASA will take the cost of emptying which will be billed to the household owner with the water bill and the contractor will be paid from DWASA revenue as per the contract signed with DWASA. FSM is an important and significant element of urban sanitation in many poor and rapidly-growing countries beyond the short-term capacity of most. Either as a long term solution or, at least, as a short-run intervention, improved management of faecal sludge is likely to play an important role in managing public and environmental health and the environment more widely for many years to come. While many cities aspire to provide networked sanitation for all but it is too costly to construct a sewerage network in a developing country. In Bangladesh we have a high density of population where it is very difficult to construct a sewerage network and we should save our environment as well. Our current practise is to use combined sewer system which affects our water bodies in a dangerous way. In this paper we have proposed a sewer division to DWASA by this DWASA can monitor the sewer system in an eco-friendly way. Here we have showed the way of collecting the containment to re-use/disposal. By enforcing the law DWASA can create the emptying necessity from the households. Regarding this business there will be a huge employment opportunity for the people of our country .By using the above emptying method we can empty our faecal wastes in a hygienic way as well as can run the emptying business.

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