CASE

Fecal sludge for on-farm use (Bangalore Honey Suckers, India)

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Supporting case for Business Model 15	
Location:	Bangalore, India
Waste input type:	Fecal sludge
Value offer:	Provision of waste removal and collection services, and fecal sludge as organic fertilizer to farmers
Organization type:	Small and medium enterprise (SME), private entity
Status of organization:	Currently in operation
Scale of businesses:	Number of businesses (fecal sludge collection trucks) operating in Bangalore is estimated to be up to 300
Major partners:	Truck and pump system supply and repair sector; municipality

Executive summary

Due to shortcomings in sewage treatment systems and the availability of a large number of cement pit latrines without good maintenance and service planning, an informal sector of micro business ventures named “honey suckers” has emerged to fulfil the market need for on-site sanitation services. “Honey suckers” is the term given to the businesses that pump the waste out of pit-latrines, septic tanks and other types of on-site wastewater treatment plants. These businesses have been successful in exploiting this opportunity for the past few years and Bangalore now has an estimated 300 of such businesses. The primary market is where honey suckers collect fecal sludge from pit latrines for a fee. The sludge is then disposed of either at an approved site (rarely) or more typically it is dumped illegally on open lands or into drains. A secondary market has emerged in which the honey suckers deposit the sludge on farmlands at the farmer’s demand, either in pits or directly on designated sites. There is usually no fee but the farmer may tip the driver. The sludge is used as a fertilizer and in some cases for the water content. The value for household is the clean removal of fecal sludge to ensure a working water closet and a clean property and environment. The value for farmers resides in obtaining nutrient-rich manure for free or for a very low fee. This model works well, because no other fast, reliable, high-quality pit cleaning service is available. The model works best when the cleaning service is easily combined with the dumping service, for which a smart network with farmers is required. The socio-economic and environmental benefits can be significant, with the creation of jobs, reduction of wild sludge dumping and associated health and environmental problems, improved sanitation and living

comfort. However, risks have to be controlled and the informal nature of honey suckers and 'illegal' aspect of the business (i.e. the supply of collected fecal sludge to the farmers) prevents monitoring of the practice.

KEY PERFORMANCE INDICATORS (AS OF 2015)						
Land use:	Limited (car park). On farm for drying and reuse					
Capital investment:	Variable depending on fleet size; cost per truck is USD 24,000 for new trucks					
Labor:	Variable, depending on fleet size, 3 people per truck					
O&M cost:	USD 7,500 year, excluding legal dumping fees					
Output:	20,000 people reached per truck per year (single homes and apartment buildings)					
Potential social and/or enviornmental impact:	3 jobs per truck, possible reduction of open-dumping of fecal sludge[1], improved sanitation and resulting waste build-up reduction					
Financial viability indicators:	Payback period:	Ca. 9 months	IRR:	98%	Gross margin:	81%

Context and background

In India, 46% of the urban population uses a septic tank, a pit or vault latrine. This population that is not connected to the sewerage network relies on different forms of self/hired services to cover their basic needs. The common services combine on-site containment such as latrines or septic tanks, with removal and off-site disposal. In the best cases, the fecal sludge is emptied at a designated site where sludge dewatering and treatment takes place. However, more often the collected fecal sludge is disposed of haphazardly and illegally, like in wetlands, thereby creating health and environmental risks. Opportunities to change this practice lie in the reuse value of the sludge, i.e. in productively utilizing this waste by capturing and using resources such as nutrients, organic matter, energy and water. Fecal sludge thus presents – like farmyard manure – a value in particular to farmers, which has been recognized by on-site sanitation entrepreneurs. Additionally, the drying of fecal sludge on farm, and incorporation in the soil represents an 'outsourcing of fecal sludge treatment' to the farm which can help mitigate the challenge of open-dumping and the related health and environmental risk. However, reuse of fecal sludge or night soil, without taking precautionary measures can pose health risks to workers, farmers and consumers.

Market environment

Many people in urban areas in Bangalore do not have access to sewage systems, or even basic sanitary services. The current sewerage network in Bangalore only serves 37% of the city's population. Moreover 53% of the total generated sewage goes untreated in the environment. Sanitation deficiency is largely prevalent in the conurbation and green belt of Bangalore. In conurbations, only 47% of households have toilets, 19% share toilets and 35% defecate in the open. In the green belt areas, only 26% of the households have toilets while 4% share toilets and 70% defecate in the open. Bangalore, like India in general, has invested majorly in the development of septic tanks, pit latrines and eco-san toilets, however, a sound plan for maintenance and services has been lacking, creating multiple problems. Waste is often disposed of haphazardly, with all the associated health and environmental consequences. A relatively large number of houses and apartment complexes have pit latrines. The existence of these circumstances and the fact that no appropriate pit cleaning management exists has created a strong market opportunity for the evolution of the informal honey sucker businesses. Another market driver is fertilizer demand, which has tended to far exceed fertilizer supply. In areas where urban dwelling is in relatively close proximity to farmland, an opportunity arose for honey sucker businesses to dispose of fecal sludge on farmlands, especially where farmers are asking for it in view

of declining soil fertility. A honey sucker business of average size serves about 20,000 people per year. Bangalore has 1.9 million households, of which 63.4% have no access to the sewage systems, and of those, 46% do have a tank or pit. With an average household size of 4.5 in Bangalore, the total serviced available market (SAM) in number of people is 2.49 million. Thus, with an average fleet of three trucks per smaller honey sucker business, and 20,000 people reached per truck per year, the market penetration (or, share of market – SOM) is 2.4% per honey sucker business. There is thus a large portion of the market that is yet untapped. On the other hand, with urban spread the transport distances and costs to reach farms around the city is increasing. Thus, the business will be most interesting for truck operators in new (unsewered) settlement areas towards the city outskirts than in its centre.

Business model

The business climate for honey sucker operations in Bangalore is different in various city areas. In the Northern part of Bangalore, there has been an intensive, but healthy competition between the honey sucker business ventures. Here, honey suckers have access to farmers and farmland that can be used as composting sites. In the Eastern part of Bangalore, this access to farmers and farmland is missing, which makes transportation distances long and expensive.

Fundamentally, the honey sucker business operates in two markets. The primary market is payment for the collection of fecal sludge from pit latrines or other onsite storage/treatment facilities. The secondary market is the 'sale' of the sludge to farmers[2]. The value for customers in the primary market is clean removal of fecal sludge to ensure a working water closet and a clean property. The value for farmers is the provision of low cost nutrients. This model works well, because no other fast, reliable, high-quality pit cleaning service is available. The model works best when the cleaning service is easily combined with the dumping service, for which a relative proximity to farm land, and a smart network with farmers is required. The socio-economic and environmental benefits can be significant, with job creation, reduction in pathogenic pressure from waste build-up and associated health and environmental problems, thus improved urban sanitation in general. However, the illegal character of the business creates problems with illegal networks, and uncontrolled dumping and land-use which may give rise to possible health risks for farmers and consumers of farm produce. See Figure 192 for the diagrammatic overview of the business model.

Value chain and position

Honey sucker businesses operate in a relatively simple value chain (Figure 193). The business has two different markets that rely on each other. The primary market, and the driving force of the business, is people who need their pit latrines emptied. The secondary market is formed by farmers who wish to make use of the sludge. The business relies on the availability of trucks adapted to the job and specialized equipment, which is available in the country. However, also secondary value chains have been observed where larger farmers dry sludge for resale to fellow farmers. The farm market might be seasonal, depending on the type of crops grown.

Institutional environment

In Bangalore, the Environmental Protection Rules and Acts of 1986 requires honey suckers to dispose of the sludge in designated areas, these being Bangalore Water Supply and Sewerage Board (BWSSB) sewage treatment plants. The reality is that few exist, which means long journeys for the truck operators, high fuel costs and a disposal fee of Rs. 50/kilolitre (0.82 USD/kilolitre). Instead truck operators dispose of the waste into open drains or onto wasteland. In some cases the truck operators have made arrangements with farmers who receive the waste and either use it directly on their fields, thereby making use of the water content, or store it and compost it over a period of time. The

FIGURE 192. HONEY SUCKER BUSINESS MODEL CANVAS

KEY PARTNERS
- Truck and pump systems suppliers and repair services
- Municipality

KEY ACTIVITIES
- Collecting sludge
- Transporting and disposing of sludge
- Marketing (customer generation)

KEY RESOURCES
- Truck(s) (capital)
- Labor, 3 people per truck
- Driver–farmers network
- Household and apartment base
- Loyalty of truck drivers, fortified by right to claim tipping fees

VALUE PROPOSITIONS
- A fast and affordable fecal sludge removal service for citizens, improving the household and city environment
- Free/low-cost 'human manure' for farmers, who will save on costs for fertilizer.

CUSTOMER RELATIONSHIPS
- Personal help at contractual agreements (apartment blocks)
- Personal help (ad-hoc)

CHANNELS
- Telephone marketing
- Trucks, leaflets and banners advertising
- Informal, word of mouth

CUSTOMER SEGMENTS
- Households, apartment blocks and institutions with septic tanks or pits
- Farmers

COST STRUCTURE
- Truck maintenance
- Truck fuel
- Labor wages
- Legal dumping/tipping fees (not always done)

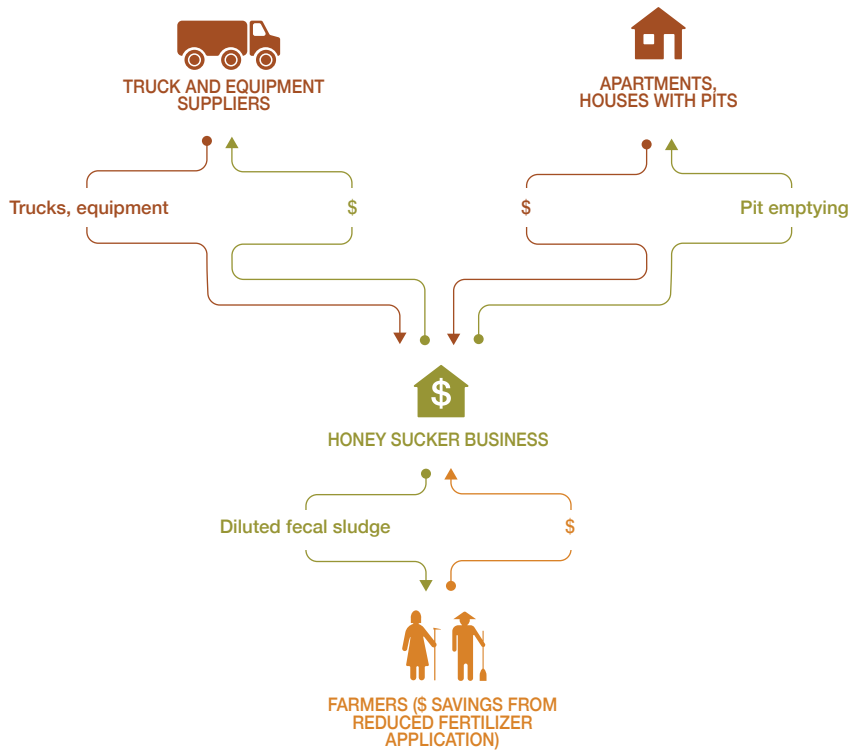
REVENUE STREAMS
- Pit latrine emptying fees
- Informal fees for manure plus possible savings on transport costs and tipping (desludging) fees

SOCIAL & ENVIRONMENTAL COSTS
- Human health risk arising from use of fecal sludge on farms without proper regulation and training in safety options
- Operating ex-legally strengthens illegal networks

SOCIAL & ENVIRONMENTAL BENEFITS
- Improved sanitary situation citizens
- Reduced city-internal fecal waste pressure and related health and environmental problems
- Increased land fertility where fertilizer prices are prohibitively expensive for poor farmers

business of honey suckers supplying collected fecal sludge to farmers suggest that it is a desirable commodity, which acts as a means of effectively and cheaply dealing with the sludge. However this activity is not supported by legislation (although some government officials state that fecal sludge is implied in the Fertilizer Control Order which permits the use of animal dung). There are no effective policies and regulations in place for either pit emptying or reuse on agricultural land. Standards would however be important to reduce the risks to workers, farmers and consumers of farm produce which may be contaminated with pathogens. The urban governance structure in India is highly complex

FIGURE 193. VALUE CHAIN OF HONEY SUCKER BUSINESS



with overlapping as well as weak mandates. The result of institutional complexities combined with a lack of funds is described as 'local governments operate in an implementation muddle', demanding improvisation, flexible interpretation and inviting the bending of rules and corruption.

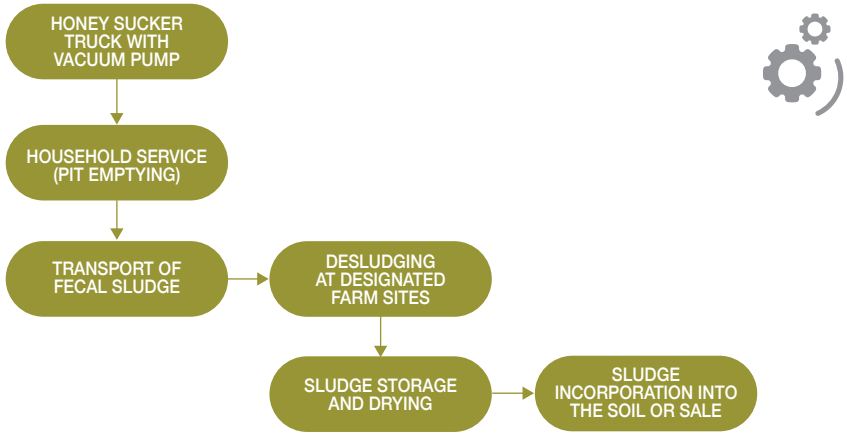
Technology and processes

Honey suckers operate with dedicated trucks with a storage tank, which have a (vacuum) pumping system to suck up the sludge and an opening for desludging of their load. An increasing number of trucks are being manufactured in the country. Besides normal maintenance of the trucks and their equipment, there is little requirement for specialized maintenance services or training. Depending on the age of the sludge in the pit, and its hardness, truck operators might need access to water for sludge dilution and removal. On farm, the sludge might be stored and dried in larger pits (usually over about three months) before it is applied to the crops, e.g., to coconut trees. Wet fecal sludge can also be directly applied to the farm land. This is done either through trenches (for instance, in between banana trees), or on vacant farmland that will be farmed later in the season. Some farmers also sell dried sludge to other farmers (Figure 194).

Funding and financial outlook

An enterprise typically starts with an entrepreneur initiating a honey sucker business until it reaches about three to four trucks. The initial investment requirements for starting a honey sucker business venture are relatively low. It needs only a telephone number, a dedicated and registered truck, and a driver and two assistants per truck. Capital injection is required for establishing a truck fleet. Costs

FIGURE 194. PROCESS DIAGRAM FOR COLLECTION AND REUSE OF FECAL SLUDGE



for one (new) truck are about USD 24,000. Major variable costs are related to truck maintenance and operation, labor wages and fuel for the trucks. These costs accrue to about USD 7,500 per year. Legal dumping fees are an additional cost, but turn into revenue if farms are the target. Because most of the businesses are not registered, considerable costs are incurred avoiding fines, and an opportunity loss is incurred due to business scaling limitations. In the current setting, the only, but profitable, revenue stream is from pit emptying fees, which amounts to a maximum USD 27 per pit emptied. With four services per day, 30 days per month, the revenues accrue to about USD 39,000 per truck per year and profit is estimated at about USD 31,500 per year. Thus, the payback period is nine months, with an IRR of 98% and a gross margin of 81%. Revenues are highest in the monsoon season, when servicing is required more often due to rainfall and overflowing pits. Drivers take tips from farmers for delivering sludge to their farms. However, the larger benefit can be savings on petrol (and desludging fees) if the farm is closer to the pit than the official dumping site. In more conducive legal-institutional settings, revenues could increase based on contractual customer relationships. Also specialized services such as ensured environmentally friendly dumping or guaranteed-time collection could be offered. Moreover, an official and larger customer base would allow businesses to perform more sophisticated services.

Socio-economic, health and environmental impact

Sewers are expensive and water to flush them increasingly rare. This gives on-site sanitation system an important place on the urban sanitation agenda. Due to the booming business of emptying pit latrines and holding tanks with honey sucker trucks, less fecal sludge finds its way into city drains and waterways, and household facilities function better. Disposal to farmlands outside the city offers the advantage of controlled drying and soil application, and improved crop production, but it needs oversight and risk reduction measures. The risks to farmers and potentially consumers are manageable without particular costs as long as the sludge can be well dried, crop restrictions are in place, and farmers wear protective gear (Keraita et al., 2014; WHO 2006). In this case, several social and environmental benefits could be attributed to honey sucker businesses as a valuable component of the sanitation service chain.

Scalability and replicability considerations

Honey sucker businesses thrive in places where sewage service is minimal and where people require affordable, fast and reliable sanitation services (Rao et al., 2016). The business requires a high density

of easily accessible pits. There must be dedicated trucks available, with suction pumps. If the waste is to be provided to farmers, they must be within an economically viable radius (i.e. closer than official dumping sites or alternative illegal dumping sites currently are). While sludge supply is year-round, agricultural demand depends on cropping systems and might be seasonal. Another major restriction to honey sucker business growth in Bangalore is the lack of a supportive legal framework, which also links to the availability of farmers interested in the sludge. Currently businesses operate on a small scale, avoiding official marketing systems such as yellow pages and websites, and avoiding penalties. A legal standing would reduce the cost of acquiring new customers and improve access to finance. In such a situation, honey sucker businesses could follow multiple avenues to expand their operations: use of their specialized knowledge in advisory roles; offering improved services, e.g. time-guarantee arrival and emptying, eco-friendly processes (customers explicitly mention their willingness to pay for guaranteed environmentally safe handling and disposal); production of safe compost and information services to farmers.

Summary assessment – SWOT analysis

Figure 195 presents an overview of the SWOT analysis for the honey sucker business model. Due to shortcomings in the sewage systems, and the availability of a large number of cement pit latrines

FIGURE 195. SWOT ANALYSIS FOR INFORMAL FECAL SLUDGE REUSE IN BANGALORE

	HELPFUL TO ACHIEVING THE OBJECTIVES	HARMFUL TO ACHIEVING THE OBJECTIVES

INTERNAL ORIGIN
ATTRIBUTES OF THE ENTERPRISE
	STRENGTHS
	▪ Low capital investment
	▪ Only affordable, reliable emptying service available for people without sewage systems or with sub-standard ones
	▪ Positive influence on sanitary situation in urban areas
	▪ Virtually unlimited supply
		WEAKNESSES
		▪ No legal standing which creates other weaknesses:
		  ▪ Limited access to affordable finance
		  ▪ Must make additional efforts to avoid penalties
		  ▪ Marketing difficulties including use of economies of scale
		  ▪ No support in view of health protection
		▪ Requires climates with sufficiently long dry periods for sludge drying
		▪ Agricultural demand might be seasonally limited for some crops

EXTERNAL ORIGIN ATTRIBUTES OF THE ENVIRONMENT	**OPPORTUNITIES** ▪ Legalization leading to opportunities to increase scale ▪ Higher health standards and sustainability offer avenues for qualitative service offers ▪ Decreasing land fertility and rising fertilizer prices drive growth of business ▪ Increasing urban populations drive growth of business	**THREATS** ▪ New sewage lines developed in underserved areas destroy honey sucker market ▪ Legalization incurs additional costs for waste disposal, administration

without good maintenance and service planning, an informal sector of micro-business ventures named 'honey suckers' has emerged to fulfil the market need for on-site sanitation services. This model works well, because no other fast, reliable, high-quality pit cleaning service is available in the city. With very limited capital investment requirements and a strong revenue stream from pit-emptying services, this model offers entrepreneurs an opportunity for recouping their investment in a very short time period and with a relatively high gross margin. Although profitable, the honey sucker business is a highly risky investment option as their activities occur in a legally restrictive environment with significant uncertainty. This has implications for business sustainability and any scaling-up opportunities. Legalization of these initiatives may positively influence the honey sucker sector although there is some concern, especially among NGOs, honey suckers and farmers, that legalization and regulation may reduce its viability.

Contributors

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For a photographic journey please see: http://arghyam.org/wp-content/uploads/2013/07/Honeysuckers-S-Vishwanath.pdf and www.flickr.com/photos/sharadaprasad (both accessed November 8, 2017).

See also: www.downtoearth.org.in/coverage/shit-its-profitable-47389 (accessed November 8, 2017).

Case descriptions are based on primary and secondary data provided by case operators, insiders or other stakeholders, and reflect our best knowledge at the time of the assessments 2015/16. As business operations are dynamic data can be subject to change.

Notes

1 While sludge disposal on farmland can reduce wild dumping of fecal sludge, the actual contribution has not been quantified as many farms might be too far away (transport costs) or their demand seasonally limited.

2 These fees are important as they reverse the normal process where drivers pays a tipping fee at a formal treatment pond. Thus, even if the token does not necessarily enter the business' revenue stream, there are savings, and it is a means for creating a trusted relationship with the driver. However, while earlier, farmers were approaching vehicle owners to have the sludge dumped into their fields, there is today much competition among trucks, and drivers are increasingly seeking farmers willing to accept sludge. The situation is different e.g. in Dharwad where larger farmers organize interim sludge storage and after drying auction the material.