Sludge removal enterprises in Indonesia: factors affecting entrepreneurial success

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Abstract

Faecal sludge removal is critical for the long-term functionality of on-site sanitation facilities and sustained sanitation outcomes. Private enterprises are important players in providing sludge removal services in Indonesia and other countries where government does not do so. However, the extent to which sludge removal entrepreneurs can fulfil this role depends on the viability, or success, of their enterprises. This paper investigates factors linked to the success of sludge removal enterprises in Indonesia, including traits of the entrepreneurs, characteristics of the enterprises, and contextual challenges. These factors and levels of success were examined from data collected from structured interviews with 24 sludge removal enterprises across six cities in Indonesia. This research found that higher levels of success were significantly associated with entrepreneurs that had previous work experience of any kind, made higher upfront investments, and did not involve their family members in the management of the enterprise. Participants most frequently identified high costs of capital, high levels of competition, and insufficient time to spend on the enterprise as challenges to success. These findings provide important evidence for how civil society organisations and governments in Indonesia and elsewhere may best provide a conducive enabling environment for enterprise roles in sludge removal.

Introduction

Faecal sludge removal is a critical component in the on-site sanitation chain (Verhagen & Carrasco 2013) in which compacted faecal solids are routinely removed from septic tanks, latrines, or other on-site facilities and transported elsewhere for treatment and disposal or re-use. Sludge must be regularly removed from on-site sanitation facilities to maintain their functionality and help manage health risks (Mitchell *et al.* 2016). Households unable to remove sludge themselves often turn to the state or private enterprises to provide this service.

In developing countries, sludge removal and other sanitation services are commonly provided by small-scale providers operating at local levels (Schaub-Jones 2010). These small-scale service providers are generally beneficial because they can fill service gaps in environments that are physically or financially unattractive to formal utilities (Ahlers *et al.* 2013). With regard to sludge removal, local enterprises are particularly well-suited because dense and unplanned neighbourhoods require flexibility and a variety of equipment to access and empty difficult-to-reach decentralised containment units (Hawkins *et al.* 2013).

However, challenges remain in ensuring these enterprises remain viable as businesses. Irregular or low demand for sanitation services, limited opportunities for acquiring financial

support, and a lack of business and technical skills of entrepreneurs are commonly reported in the literature as negatively impacting the business viability of sanitation enterprises (Gero *et al.* 2014). On the other hand, appropriate regulations of sanitation enterprises, a willingness of entrepreneurs to take risks, and political will, advocacy, and policy are seen to enable success (Gero *et al.* 2014).

Drawing on theories developed in the fields of small-scale business and entrepreneurship, this study adds to the knowledge base of enablers and barriers faced by sanitation enterprises through an investigation of factors that drive the financial success of sludge removal enterprises and challenges that must be overcome in the context of Indonesia. This paper presents new information generated from interviews of sludge removal enterprise representatives across several cities in Indonesia that can be used to encourage more successful entrepreneurship in this critical area.

Sludge removal in Indonesia: contextual background

In Indonesia, private sludge removal enterprises are especially important. Over 60% of the urban population in Indonesia discharges waste to septic tanks (World Bank 2013) which are usually small (0.5 – 1m^3) (Mills 2013) and thus need to be emptied often. They are commonly emptied by private businesses (Giltner *et al.* 2012). Although there is substantial policy interest amongst cities in developing countries in promoting sewerage, faecal sludge management of on-site systems is likely needed as a long-term solution that the private sector may be best equipped to achieve (Blackett *et al.* 2014). To this end, the Directorate General of Human Settlements of the Ministry of Public Works in Indonesia and international partners have recently embarked on efforts to invest in and renovate hundreds of septage treatment facilities around the country to receive faecal sludge from on-site sanitation facilities (Giltner *et al.* 2012). Given the large number of households reliant on on-site sanitation and the investments made in faecal sludge management, sludge removal services will likely continue to play a crucial role in Indonesia over the long-term. In the context of the Sustainable Development Goals (SDGs), this represents a major area in need of attention in order to achieve the aspiration for 'safely managed' sanitation, which includes sludge removal and proper disposal.

However, poor regulatory frameworks and low demand are documented problems for the sludge removal sector in Indonesia. Indonesia has no national guidelines for septage collection or disposal and most local government units are unable to act to improve septage management services (AECOM & Sandec-Eawag 2010), although faecal sludge management is beginning to gain attention in government (ISF-UTS & SNV 2017). Meanwhile, popular demand for investment in wastewater management services has been low despite rising usage of septic tanks in urban areas (World Bank 2013). Householders in Indonesia generally only request desludging when the tanks begin to fail which reduces efficiencies in sludge removal transport and leads to fluctuating demand (ISF-UTS & SNV 2017). The result is that sludge removal businesses are often only marginally viable, but still attract numerous entrepreneurs (Giltner *et al.* 2012). It is possible that sludge removal entrepreneurs enter the market in Indonesia easily due to the weak regulatory environment, but struggle to make substantial profits due to limited investments and low demand.

Challenges aside, small-scale enterprises that provide sanitation products and services, including faecal sludge removal, are on the rise in Indonesia (Murta & Willetts 2014). Their

successful operations could make a critical contribution to achieving SDG 6.2 on sanitation. Yet, evidence of factors that affect the business success of these entrepreneurs is scant.

Factors that affect entrepreneurial success

The characteristics of successful enterprises and the traits or "personality" of entrepreneurs that dispose them to pursue new business ventures is a focal point of research. Numerous studies have sought to identify characteristics that distinguish entrepreneurs from non-entrepreneurs and some have listed as many as 42 identifiable entrepreneurial characteristics (Cromie 2000). Among these are demographic characteristics related to age, gender, educational background, and previous work experience (Kolvereid 1996; Sinha 1996; Mazzarol *et al.* 1999; Reynolds *et al.* 2000; Fellnhofer *et al.* 2016). Characteristics of the enterprise, such as its number of employees, age, and length of business operations, and their links to success have also been identified (Storey 1994; McMahon 2001; Shirokova *et al.* 2016).

Researchers have also contended that personality traits are especially important determinants of entrepreneurial behaviour (Cromie 2000). Risk-taking propensity, innovativeness, need for achievement, need for independence, and proactiveness have emerged from the literature as some of the most commonly mentioned traits that form an entrepreneurial personality (Ernst 2012). Empirical evidence has suggested that a high tolerance for risk, a preference for independence, and a proactive personality are significantly associated with intentions to become an entrepreneur (Crant 1996; Douglas & Shepherd 2002). Meanwhile, innovativeness and a need for achievement have long been accepted in the field of business entrepreneurship as core to entrepreneurial activity (McClelland 1961; Ernst 2012).

Contextual variables originating in the environment in which the enterprise operates are also influential on levels of success. Types of influential variables are different from context to context, but in the case of small and medium-sized enterprises in Indonesia, marketing, technology, access to capital, legality, and government policy are significantly linked to financial success (Indarti & Langenberg 2004). Marketing here refers to access to markets and level and stability of customer demand while technology refers to availability, functionality, and innovation of technologies used by the enterprise, access to capital refers to availability of financial capital and credit schemes for starting a business, and legality refers to government regulations and legislation (Indarti & Langenberg 2004). Culture, in particular the collective values and beliefs society holds that approve or encourage entrepreneurship, also influences entrepreneurial activity (Freytag & Thurik 2007).

Methodology

Data collection for this study was performed through structured interviews of representatives from 24 sludge removal enterprises based across four cities and one regency (an area at the same administrative level as a city but geographically larger) in Indonesia: Bandung (West Java), Solo (Central Java), Yogyakarta (Central Java), Kediri (East Java), and Nganjuk (East Java). Population data on the sites are listed in Table 1. The enterprises were identified beforehand as those engaged with the World Bank Water and Sanitation Program.

Table 1. Total population and population density of study sites

	Total population	Population density (people/km^2)
Bandung	2,575,478	14,283
Solo	505,461	10,853
Yogyakarta	404,003	11,958
Kediri	276,051	4,235
Nganjuk	1,045,598	831

Total population data based on 2014 estimates (Indonesia Ministry of Health, 2014); Population density data based on 2010 census (Badan Pusat Statistik, 2010)

A structured questionnaire that addressed traits of the owner or manager, characteristics of the enterprise, and contextual factors was the primary instrument used for the interviews. Questions on traits of the entrepreneur, characteristics of the enterprise, and contextual variables in Indonesia were developed by drawing on the literature described in the background section of this paper. Most questions were closed-ended with pre-coded answers. However, both quantitative and qualitative questions were used to assess five key entrepreneurial traits (Ernst 2012): proactiveness, need for independence, need for achievement, innovativeness, and risk taking propensity. Participants were asked to assess contextual challenges, pre-categorised as marketing, financial, human resources, government and regulation, or operational related using a rating scale.

Following a pilot of the research tools, complete data collection was performed from October to November of 2014. The questionnaires were administered in Bahasa during face-to-face interviews, and responses were later translated into English.

Various means were used to evaluate and score the responses. Whether or not an entrepreneur demonstrated a particular entrepreneurial trait (e.g. innovativeness) was determined by scoring and qualitatively judging responses to relevant questions. Levels of success were assessed through five criteria: 1. How long it took the enterprise to become profitable after establishment, 2. Whether or not the enterprise had been profitable or not in the past two years, 3. The monetary value of assets accumulated per year since establishment of the enterprise, 4. The monthly net revenue of the enterprise over the past year, and 5. Whether or not the enterprise manager/owner had a positive outlook on the future success of the business. Each criterion was quantitatively scored using a scoring rubric. Enterprises were classified as being unsuccessful, having some success, or being successful based on the total score. The minimum total score needed to be designated as having some success or being successful was based on the expert opinion of the authors. Inter-rater reliability was tested and confirmed for the four researchers undertaking this analysis. The Fisher-Freeman-Halton Exact test was used to determine if traits of the entrepreneur and characteristics of the enterprise were significantly associated with the enterprise's level of success.

Ethical clearance was sought and granted from the University of Technology Sydney Human Research Ethics Committee.

Limitations

The fieldwork to undertake this research faced challenges in achieving a gender balance amongst respondents, due to the limited presence of female-led enterprises. In addition, at times respondents were hesitant to provide detailed responses due to the insecurity and

uncertainty associated with their business context. This risk was mitigated to the extent possible by use of informed consent, privacy confidentiality procedures.

The Fisher-Freeman-Halton Exact test was chosen because it is suitable for small sample sizes and contingency tables larger than 2X2, but there are some limitations to consider. First, while the test can identify significant associations between variables and entrepreneurial success, it does not measure the magnitude of that difference (i.e. it does not tell how much of a difference the variable makes for success). The total number of sludge removal operators in Indonesia is not known, but we believe this study represents a small sample size so caution needs to be taken with generalizations. The test slightly loses power when the total number of subjects with/without a particular characteristic is not fixed, as is the case in this study, which causes it to be conservative and less likely to identify a significant association (McDonald 2014). Finally, certain confounding factors may not have been possible to account for in the assessment of associations between variables and success.

The framework for considering contextual challenges were developed by the researchers and are not necessarily exhaustive or inclusive of other challenges perceived by the participating entrepreneurs. However, the list of challenges that is presented is wide-ranging and focuses on areas identified by the literature as being particularly relevant for the Indonesian context. Likewise, market characteristics of the cities where the enterprises were based and data on sludge disposal were outside the scope of this study although they also can be influential on the success of the enterprises.

Results

In this section we present the p-values associated with traits of entrepreneurs and characteristics of enterprises against levels of success, as well as the most frequently reported contextual challenges. Overall, six sludge removal enterprises had high success (25%), eleven had some success (46%), and seven were unsuccessful (29%). The majority of the enterprises were informal (n=15; 63%). Most enterprises serviced both institutional and individual household customers (n=21, 88%) while the others serviced only individual household (n=3, 12%).

Traits of entrepreneurs

Table 2 shows the number of entrepreneurs that demonstrated each assessed personal trait against the level of success of their sludge removal enterprise, and the corresponding p-value indicating the strength of association between each trait and level of success.

Table 2. Sludge removal entrepreneur traits and level of success

		Unsuccessful	Some success	Successful	p-value
Age (n=24)	20 – 35	0	1	3	0.18
	36 – 45	5	8	2	
	46 – 65	2	2	1	
Education level attained (n=24)	Less than high school	3	2	1	0.64
	High school	3	5	4	
	Tertiary education	1	4	1	
Holding a ‘side job’ (n=24)	Yes	2	5	5	0.17

	No	5	6	1	
Time spent on sludge removal enterprise each day (n=23)	0 – 7 hours	1	1	2	0.88
	8 – 14 hours	2	3	1	
	Over 14 hours	3	7	3	
Holding previous work experience (n=24)	Yes	2	8	6	0.02*
	No	5	3	0	
Length of previous work experience (n=14)	0 – 5 years	1	2	0	0.61
	6 – 10 years	0	2	4	
	Over 10 years	0	4	1	
Propensity to take risk (n=24)	Yes	6	10	5	1.0
	No	1	1	1	
Innovativeness (n=24)	Yes	3	5	1	0.56
	No	4	6	5	
Need for achievement (n=24)	Yes	4	9	4	0.53
	No	3	2	2	
Need for independence (n=24)	Yes	2	3	5	0.07
	No	5	8	1	
Proactiveness (n=24)	Yes	5	9	5	0.84
	No	2	2	1	

* indicates $p < 0.05$

This study has found a significant association between level of success and whether the entrepreneur had previous work experience. Entrepreneurs with any kind of previous job experience, which included private sector and other self-employed work, were more successful than those without experience. However, the length of this experience did not make a significant difference.

We found no significant association between level of success and age of the entrepreneur, level of education, whether or not the entrepreneur held a ‘side job’, or number of hours per day the entrepreneur spent working for the sludge removal business. The ages of the entrepreneurs ranged from 22 to 59 while levels of education attainment ranged from an elementary school level to obtaining a Bachelor’s degree. Types of side jobs varied widely and included digging wells, managing shops, and farming amongst others. A majority (n=13, 57%) of the responding participants spent more than 14 hours per day working for the sludge removal business, but were no more successful than those who worked fewer hours.

None of the studied entrepreneurial personality traits were significantly associated with levels of business success. A propensity to take risk was the most common trait among the studied entrepreneurs (n=21, 88%), followed by proactiveness (n=19, 79%), a need for achievement (n=17, 71%), a need for independence (n=10, 42%), and innovativeness (n=9, 38%).

Characteristics of enterprises

Table 3 shows the number of enterprises that have each assessed characteristic against their level of success, and the corresponding p-value indicating the level of association between each characteristic and level of success.

Table 3. Sludge removal enterprise characteristics and level of success

		Unsuccessful	Some success	Successful	p-value
Years of operation (n=24)	0 – 10 years	1	6	5	0.13
	11 – 20 years	4	4	1	
	Over 20 years	2	1	0	

Setting of operations (n=24)	Rural	0	0	1	0.5
	Suburban	4	7	2	
	Urban	3	4	3	
Number of present full-time employees (n=24)	0	5	3	0	0.11
	1 – 2	1	4	3	
	More than 2	1	4	3	
Number of present part-time employees (n=24)	0	4	7	6	0.1
	1 – 2	2	0	0	
	More than 2	1	4	0	
Enterprise engaged in new product or service development (n=24)	Yes	2	5	1	0.55
	No	5	6	5	
Initial investment at start-up of enterprise (n=23)	0 – 50,000,000 IDR (0 – 3,825 USD)	5	6	0	0.02*
	50,000,001 – 100,000,000 IDR (3,825 – 7,650 USD)	1	2	2	
	More than 100,000,000 IDR (7,650 USD)	0	3	4	
Enterprise has association membership (n=24)	Yes	0	4	2	0.2
	No	7	7	4	
Family involved in management of enterprise (n=24)	Yes	5	9	1	0.03*
	No	2	2	5	

* indicates $p < 0.05$

We found significant associations between level of success and the initial investment made at the start-up of the sludge removal enterprise and whether family members were involved in the management or operation of the enterprise. Reported initial investments ranged from 500,000 IDR (38.25 USD) to 165,000,000 IDR (12,623 USD). All sludge removal enterprises included in this study that were successful reported making an initial investment of at least 56,000,000 IDR (4,284 USD). Most participants (n=14, 58%) funded their initial capital expenses using personal savings, but some also borrowed from family (n=9, 38%), took out a loan (n=8, 33%), or took investments from friends or colleagues (n=3, 13%)

The majority of enterprises (n=15, 63%) reportedly included family members of the entrepreneur in its management or operation. Eight of these stated that family involvement was a positive influence, five said it was negative influence, and two cited both positive and negative effects. However, our study found that enterprises that did not involve family members in management or operation were significantly more successful. Amongst those that did involve family members, participants reported benefits of financial support and other assistance from family, providing a source of income for family members, easier communication and trust, and the opportunity to share knowledge and expertise with family. Reported challenges included management of money, management of time, difficulty in communicating, and increased pressure to succeed.

There was no significant association between level of success and the number of years of operation, setting of operations, number of employees, whether the enterprise engaged in new product or service development, and whether the enterprise was a member of an association. Years of operation ranged from one at the time of study to 33. Only one enterprise (4%) operated in a rural area (but had high success), while the others operated in

sub-urban (n=13, 54%) or urban areas (n=10, 42%). There was no significant association between the number of part-time or full-time employees (other than the owner/manager entrepreneur) staffed by an enterprise and its level of success, but each enterprise that had high success had at least one full-time employee while none had part-time employees. The majority (n=16, 67%) of enterprises had not engaged in development of a new product or service, but were no less successful than those that did. Six (25%) sludge removal enterprises had association membership, but were not significantly more successful.

Contextual variables

Questions on challenges faced by the entrepreneurs were coded into five categories: the market, financial, human resources, government and regulation, and operational. Table 4 show the proportion of sludge removal entrepreneurs that responded that the stated contextual problem was, on a scale of 1 – 4 with 1 being a low challenge and 4 being a big challenge, a 3 or a 4.

Table 4. Contextual challenges for sludge removal entrepreneurs

Category	Challenge	Number of entrepreneurs reporting this is a 'big challenge' (n=24)
Market	High level of competition (too many similar businesses)	19 (79%)
Market	Market saturation	17 (71%)
Market	Not enough sales to sustain the business or low demand	16 (67%)
Market	Lack of access to information	13 (54%)
Market	Lack of social or business networks	12 (50%)
Market	Lack of business partnership	11 (46%)
Market	Unfavourable location	10 (42%)
Financial	Lack of access to finance for customers	13 (54%)
Financial	High interest rate for bank loans	12 (50%)
Financial	Not enough alternative sources of finance other than the bank	11 (46%)
Financial	Unable to meet bank requirements for loans	10 (42%)
Financial	Unofficial retributions/taxes	10 (42%)
Financial	Not enough access to banking services	9 (38%)
Financial	Official taxes	9 (38%)
Financial	Too many instalment customers late on payments	6 (25%)
Human resources	Not enough time	18 (75%)
Human resources	Not enough marketing skills	14 (58%)
Human resources	Hard to find good staff with the right skills	12 (50%)
Human resources	Not enough business knowledge and skills	11 (46%)
Human resources	Not enough technical knowledge and skills	11 (46%)
Human resources	Lack of access to continuing training opportunities and/or mentoring	10 (42%)
Government & regulation	Unclear or lack of government legislation	15 (63%)
Government & regulation	Lack of support from government	14 (58%)
Operational	High cost of materials and equipment	21 (88%)
Operational	High fixed expenses	14 (58%)

Table 4 shows that, out of the 25 prompted contextual challenges, the five with the highest proportion of entrepreneurs scoring it as a 'big challenge' were high cost of materials and equipment, high level of competition, not enough time, market saturation, and not enough sales to sustain business/low demand.

Sludge removal entrepreneurs were also asked, "Thinking about your local community, what level of status do you think your business has?" Participants were prompted to answer 'high', 'somewhat high', 'somewhat low', or 'low'. 12 out of 24 (50%) participants responded that their sludge removal business had 'somewhat high' or 'high' status.

Discussion

Few traits of entrepreneurs or characteristics of the sludge removal enterprises were found to significantly associate with level of success, but the responses indicate that the ability to invest in the business may be one of the most important factors for success amongst the participants. Firstly, level of success was positively associated with increasing initial investment in the enterprise ($p=0.02$). Entrepreneurs who had previous work experience made significantly higher initial investments ($p=0.008$), possibly because they learned the importance of investing at start-up or had more money from previous work opportunities, which likely contributed to their higher levels of success ($p=0.02$). Also, participants most frequently named the cost of equipment and materials as a big challenge which further suggests that having sufficient capital is important for success. This makes sense in the context of sludge removal which can be done with basic tools like shovels, buckets, carts, and bicycles, but is far more efficiently done with machinery and trucks. These findings align with those of Chowdry & Kone (2012) who, in a study of faecal sludge management businesses in ten cities across Africa and Asia, found that profitability was significantly associated with the ability of entrepreneurs to invest in multiple trucks, but affording the high upfront costs of trucks was a major challenge for them.

Only half or fewer of the participants felt that high interest rates for bank loans, insufficient alternative sources of financing, or an inability to become eligible for a bank loan were a big challenge. This contrasts with the Chowdry & Kone (2012) study that found that acquiring bank loan was highly challenging for the faecal sludge management entrepreneurs that they examined. Yet, despite the apparent substantial need for capital and only mixed views at worst of whether obtaining a bank loan was a big challenge, only one-third of the Indonesian entrepreneurs obtained a bank loan as a source of financing. This suggests that there are other barriers, aside from accessibility to banks, to taking out loans for sludge removal entrepreneurs in this study.

Enterprises that involved family members of the entrepreneur in the management or operation of the business had significantly less success than those that did not ($p=0.03$), despite more prevalent feelings that family involvement was a positive influence. Challenges of involving family members reported by entrepreneurs often related to financial matters, so it is possible that meeting familial obligations and commitments related to spending detracts from the solvency of the business. However, in a relatively collectivist society like Indonesia, entrepreneurs may feel comforted and derive other "soft" benefits, such as emotional support or family bonding experiences, from involving family members which would help

explain why the majority of participants included family members in the enterprise and reported it as a positive influence. For unsuccessful enterprises, financial support from family members may have contributed to preventing the collapse of the enterprise.

Our findings support some of the existing literature on sludge removal in Indonesia that states that sludge removal businesses are often only marginally viable, but still attract numerous entrepreneurs. Challenges related to supply and demand featured prominently in the participants' responses. Despite low demand being frequently reported as another big challenge, a high level of competition and market saturation in the sludge removal sector were still among the most frequently reported challenges. Further, although people working in faecal sludge management are often reported to face social stigma in the developing world (Bongi & Morel 2005; Eales 2005; Cordova & Knuth 2007), the proportion of participants stating that their business had at least 'somewhat high' status and the number of enterprises that have been operating for over 10 years suggest that social stigma is not a major deterrent from entering and staying in this market in the studied context. This supports the proposition that the sludge removal market in this context is easy to enter, but a difficult one in which to succeed.

Another one of the most prominent challenges reported by the participants was not having enough time to commit to the sludge removal enterprise. This is a surprising result when one considers that 57% (n=13) of participants reported that they spent more than 14 hours each day on the enterprise, and time spent on the enterprise was weakly associated with success ($p=0.88$). A belief that "hard work" is a key to success is common in the field of entrepreneurship. However, our research does not support the proposition that committing more time to the enterprises would lead to increased success in this context. This may be a point worth making when developing interventions to support sludge removal enterprises in Indonesia so that entrepreneurs do not unduly burden themselves.

While the five investigated entrepreneurial traits were found to be present in varying degrees amongst the participating entrepreneurs, none of them associated significantly with success. These traits have emerged from largely Western contexts and it is possible that they do not translate well to the Indonesian sludge removal context. This could be due to the informal and unregulated nature of the sludge removal sector or how enterprises are viewed and valued in the studied settings.

On the other hand, it is important to note that even though we did not find a significant relationship between certain traits and entrepreneurial success in this study, this does not necessarily mean a relationship does not exist. The small sample size and statistical test used in this study makes it difficult to identify a relationship as statistically significant, thus traits or characteristics that were not found to be statistically significant in this study should not be dismissed as unimportant. Likewise, traits and characteristics found to be significantly associated with entrepreneurial success in this study should be examined in-depth case by case to understand the nature of their relationship.

Conclusions

This study has investigated numerous factors linked to entrepreneurial success in the context of sludge removal enterprises in Indonesia, and associated challenges faced by entrepreneurs. Our findings reinforce arguments made in the sludge removal literature that

an ability to source capital is linked to success. Linked to this is the finding that this type of business requires a significant outlay in equipment at the outset which can represent a barrier to proliferation of such enterprises. We did not find significant evidence that commonly cited entrepreneurial traits – propensity to take risk, innovativeness, need for achievement, need for independence, and proactiveness – were linked with successful sludge removal entrepreneurs. However, there is reason to believe that the Indonesian cultural context had significant influence over entrepreneurial behaviour, for instance through the involvement of family in the enterprise. These findings suggest that addressing financial mechanisms and cultural particularities may be more effective at improving the success of sludge removal enterprises than focusing on developing an entrepreneurial mindset (based in Western values) in this context.

More empirical research is needed to understand barriers and motivators to taking out loans in this context.. It may not be enough to only make banking loans more available if sludge removal entrepreneurs choose not take advantage of them or are unaware of them. Governments may be in a position to connect entrepreneurs to financial services based on an improved understanding of why they are not currently being used, or may be able to support with loans for relevant equipment to start-up businesses. A deeper qualitative investigation as to why sludge removal entrepreneurs in Indonesia do or do not pursue bank loans to assist with funding all-important start-up investments would help inform interventions for providing financial support.

Further research is also needed on cultural norms that affect how entrepreneurs engage with sludge removal businesses in Indonesia. Many sludge removal entrepreneurs will likely continue to maintain collectivist values and support or training for these entrepreneurs, which typically draw on theory developed in highly individualist countries when implemented by external development agencies, should take this into account. Qualitative research on the expected role of family members in contributing to a family business can inform government and civil society organisations in developing entrepreneurial theories of change for sludge removal entrepreneurs that fit the Indonesian context.

Lastly, over and above these proposed implications and ways forward, there is still a question of how sludge removal service delivery would be affected if the business success of sludge removal enterprises were improved. Improved financial success of sludge removal enterprises would not necessarily result in expanded coverage for poor households that need these services the most, or improved demand from households which appears a key constraint. Already the findings indicate challenges of low demand and high competition, suggesting that alternative strategies, by government or civil society, are needed in the domain of behaviour change communication concerning appropriate management of septic tanks to secure environmental benefits. A holistic approach to addressing the overall challenge of improving sanitation service delivery is therefore required to genuinely support the SDG aspiration of ‘safely managed’ sanitation.

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