

RI-USAID PARTNERSHIP

Market Analysis / Study of the Micro-flush Biofill Toilet installation in Ghana

Final Report

October, 2020

Submitted by:



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EXECUTIVE SUMMARY

This report assesses the factors mitigating against the rapid deployment and / or scaling up of the micro-flush biodigester technology in Ghana and is expected to contribute to ongoing work towards achieving the Sustainable Development Goal 6 of universal access to safely managed sanitation services.

Introduced into sanitation market in Ghana by Ing. Kweku Akuam Anno of Biological Filters and Composters Ltd (BIOFILCOM), the bio-digester technology addresses most of the challenges with sanitation provision especially in low income communities in peri urban and urban areas- off-grid, low space required, sustainable, environmentally friendly, relatively low cost, odour- and fly-free toilet facility.

Despite the several advantages of the bio digester technology, uptake has been lower than expected. Data on the total number of facilities constructed isn't available but estimates from projects implemented by the World Bank/Ministry for Sanitation and Water Resources, Vitens Evides International/Ghana Water Company Limited, Rotary International, UNICEF and Global Communities suggests that some thousands of bio digester toilet facilities have been constructed to date. The need for improved sanitation facilities is huge in Ghana – Ghana Statistical Services' Multiple Indicator Cluster Survey (MICS) 2017 shows that 22% of Ghanaians still practice open defecation and only 15% of households have their own toilet. The need is dire for public places /institutions such as markets, schools, clinics, tourist sites and security posts. It is estimated that 36% of primary schools and 29% of pre-primary schools having either no sanitation facility or an unimproved facility on site. The huge demand for improved sanitation facilities presents an opportunity for scaling up the use of micro flush biodigester toilet facilities.

Ghana's sanitation market faces a range of challenges to expanding promising technologies such as the biodigester toilets. The barriers to scaling biodigester toilets are related to policies, regulation, capacity, financing, high cost of inputs including labour and supporting infrastructure for efficient distribution of products.

Informed by a rigorous analysis of primary and secondary data from key informant interviews, household interviews and field observations, a number of

recommendations have been identified to be implemented by the Ghana Government, Development Partners/implementers and artisans/contractors, and outlined in the main report to scale up the use of micro flush bio digesters in Ghana. The recommendations have been grouped into three broad priority areas:

- Activating Demand – address issues with affordability, awareness, availability and acceptability of the product by consumers in order to create effective demand. This will require:
 - investment by the Ghana Government and the private sector (artisans, contractors etc.) in pursuing price reductions of the product through innovation and iterations;
 - leveraging existing networks including social and mass media to create awareness;
 - encouraging the private sector to expand their operations into other geographies and pursue a more rigorous branding and visibility programs;
 - pursuing innovations and iterations and investing in providing incentives for referrals from loyal customers who have used product over time.
- Strengthening Supply Chains – addressing issues with easy access to the product and after sales service including repair. This will require:
 - encouraging artisans/contractors etc. to expand their operational footprint into other geographies, pursue price reduction and provide other products and services given the fact that sanitation (including supply of micro flush bio digester toilets) is not often viable as a full time livelihood activity;
 - investing in developing capacity of local artisans/contractors not only to install toilets but to acquire critical skills in sales and managing sanitation enterprises;
 - a shift from the usual selection of masons and plumbers for training as latrine artisans to developing skill capacity of existing entrepreneurs who already have businesses related to sanitation

(e.g., construction, hard ware sales etc.) and who can then add construction of the toilets to their product portfolio as a complementary business line, leveraging their existing assets and capabilities;

- investing in technical assistance for product development and partial guarantee of ready market under an output based arrangement. This will enable easy access to capital for skilled entrepreneurs to deliver micro flush toilets;
- Enhancing the Enabling Environment – addressing issues with lack of supporting policy and regulatory framework that creates demand for sanitation, and weak supporting infrastructure for distribution. This will require:
 - enforcing existing legislation that requires households and institutions to have toilets on their premises. This is critical in stimulating demand for appropriate sanitation technologies including the micro flush bio digester toilets;
 - developing a comprehensive national basic sanitation strategy and financing plan that builds upon existing sanitation policies and plans and is backed by a sector wide approach for implementation. This will ensure a gradual departure from the usual “projectised” approaches to sanitation promotion (implemented over 3-5 year periods) to a more comprehensive national program aimed at developing the sanitation market with flexibility in timing and funding even after donors exit or projects end;
 - developing and implementing a robust monitoring, evaluation and learning framework that tracks and reports on trends and growth of the sanitation market (including uptake of bio digester toilets and other technologies) and generates credible information on the underlying reasons for successes and failures;
 - evaluating options for the provision of subsidies and targeting methods in order not to distort market conditions and dampen willingness to pay for customers that are not eligible to receive subsidies;

- Rotary International has a remarkable role to play in achieving increased uptake and use of the micro flush biodigester toilets. It is therefore recommended the Rotary International leverages its country-wide network of members to:
 - Creating and maintain an accurate database including timelines on its interventions in creating demand for micro flush bio digester toilets (using subsidies, micro credit etc.) and training toilet artisans, makers and expert trainers across several regions in Ghana;
 - Encouraging Rotary Clubs to adopt communities and local government authorities i.e. District Assemblies within their areas of operation where they can partner with trained artisans, makers and expert trainers to invest in a long term programme for building the market for micro flush bio digester toilets.
 - Working in partnership with the local private sector i.e. locally well-established business so they can engage and train toilet makers rather than directly selecting and training toilet makers who are unable to create the required demand for their skills;;
 - Strengthening engagement with local government authorities i.e. District Assemblies and exploring the possibility of using a competitive process in selecting District Assemblies for subsequent sanitation interventions. To participate, District Assemblies can be made to commit to invest match funding/other resources into any upcoming programmes which can be leveraged to achieve higher impact;
 - Convene an engagement session with the Ghana Government (specifically Ministries of Sanitation and Water Resources and Education) and major development partners including USAID to share lessons from ongoing programmes that have provided micro flush toilets to several households and some educational institutions in selected regions in Ghana;

1 INTRODUCTION

This report describes the context, objectives, methodology, conclusions and recommendations on the “Market Analysis of the Micro-flush Biofill Toilet Installation in Ghana” commissioned by the Rotary International - USAID. The study is expected to focus on establishing the factors mitigating against the rapid deployment and adoption of the Micro-flush Biofill Toilet technology and provide recommendation for scaling up as well as influencing policy decisions with regards to the technological options for latrines acceptable and approved for use in Ghana.

The report covers desk study on the development, promotion and marketing of the micro flush toilet, initial consultations completed and draft interview guide for structured and semi structured interviews. The report is being submitted as the final deliverable under the terms of reference associated with the contract.

1.1 Context

Access to safely managed sanitation is critical to achieving improved health outcomes. Sanitation has become a growing problem in Ghana and this is reflected in periodic outbreaks of cholera and the fact that Ghana has the second-highest open defecation rate among African countries¹. Although sector policy and legal framework assigns responsibility for investing in household toilets to private individuals/residents, private investment has been limited. Only 15% of the population use improved, unshared toilet facilities, while 23% do not have access to any sanitation facility². The sanitation-focused Sustainable Development Goal (SDG) Goal 6 is among the most off-track SDGs for Ghana.

Given the obvious huge gap and need for improved household toilets, it had been expected the development of the micro-flush toilet which is based on the bio digester technology would enjoy massive deployment and patronage. This is however not the case, and so this study is intended to establish the barriers and propose recommendations for scaling up the technology as a means to improving uptake of household toilets. According to the study’s terms of

¹ Daily Guide. 2015. ‘Ghana ranked 2nd in open defecation.’ *Daily Guide*, 19 November 2015. <http://www.ghanaweb.com/GhanaHomePage/NewsArchive/Ghana-ranked-2nd-in-open-defecation-394893>

² United Nations Children’s Fund (UNICEF). 2015. ‘Basic Sanitation.’ Really Simple Stats: The UNICEF Ghana internal statistical bulletin, Issue 3, March 2015. [https://www.unicef.org/ghana/REALLY_SIMPLE_STATS_-_Issue_3\(1\).pdf](https://www.unicef.org/ghana/REALLY_SIMPLE_STATS_-_Issue_3(1).pdf)

reference (ToR), the research questions is “why the micro-flush toilet with all its advantages appears not to be aggressively promoted for wider implementation in the sanitation sector to contribute towards bridging the gap in toilet installation at both the household and institutional level?”.

1.2 Objectives

The study seeks to investigate and establish factors mitigating against the rapid deployment and scaling up of the micro-flush technology and to propose recommendations to improve its uptake in Ghana. The specific objectives were as follows:

- To study the market barriers and opportunities facing or available to micro flush small and medium-sized enterprises (SMEs);
- To engage the developer (designer) of the technology, public institutions, private organizations and individual experts in the sanitation sector in discussions to determine the appropriate next steps needed to advance its wider implementation in the sector; and
- To engage current users to determine their perception and/or judgement regarding the performance and suitability of the Micro-flush toilet facility

1.3 Key Activities Completed

In order to complete the study and develop our recommendations, the consultant’s team carried out the following activities:

- Completed a desk research to understand the current policy framework for household and institutional sanitation in Ghana. Key documents reviewed included policies, articles, and reports on sanitation to determine what lessons could be transferrable across sectors:
- [Ghana’s Medium Term National Development Policy Framework](#) (2018-2021) – linked to the UN Sustainable Development Goals, the policy document describes Ghana’s overall national development targets and key strategies for achieving those targets across multiple sectors including sanitation. The plan identifies the following as propriety actions for enhancing access to improved environmental sanitation services “expand disability- and gender friendly sanitation facilities; develop innovative financing mechanisms and scale up investments in the sanitation sector; promote private sector participation in the provision of sanitation services; establish a National Sanitation Fund; promote a National Total Sanitation

- Campaign; improve institutional capacity and coordination; review, gazette and enforce MMDA bye-laws on sanitation; develop and implement strategies to end open defecation”. The proposed policy measures could potentially contribute to scaling up the use of micro flush bio-digester toilets;
- [Ghana’s National Water Policy](#) – describes the current policy for the entire water sector in Ghana which includes focal areas on hygiene education and sanitation under both the urban water and community water and sanitation sub sections. The policy assigns responsibility for sanitation services delivery to District Assemblies with oversight responsibility to be provided by the Ministry of Local Government, Rural Development and Environment (as it then was).
 - [Ghana's Revised Environmental Sanitation Policy](#) describes the policy framework for sanitation services delivery in Ghana including defining approved sanitation technologies and assigns District Assemblies with responsibility for regulating technologies for domestic toilets by legislation and application of their respective building codes, arranging for the provision of public facilities in central business districts, major commercial and light industrial areas, local markets and public transport terminals (lorry/bus stations), and promoting the construction and use of household toilets, including the conversion of pan latrines to approved types. Responsibility for construction household toilets is assigned to households/individuals/residents.
 - [Ghana’s National Community Water and Sanitation Strategy, 2014](#) – lays out the framework for implementing water supply and water related sanitation projects in Ghana and defines the minimum standard or functional specification for toilets as follows:

The sanitation facility should:

 - Be free from flies and odour;
 - Facilitate the safe disposal of human excreta (avoid contact with human and water bodies/ facilities);
 - Be structurally stable, so that it does not collapse when in use

The micro flush bio digester toilet meets these basic minimum specifications.
 - [Ghana’s Water Sector Strategic Development Plan, 2012](#) – outlines the investment and policy requirements for achieving basic sanitation access for all in Ghana by 2025, and assigns responsibility to CWSA to facilitate

implementation of a rural sanitation programme that is aligned with the National Rural Sanitation Model and Scaling Up Strategy, National Environmental Sanitation Strategy and Action Plan (outdated), National Household Handwashing with Soap Strategy and National Household Water Treatment and Safe Storage Strategy. District Assemblies have been assigned responsibility for directly implementing sanitation services, and in some instances, in partnership with the private sector.

- Ghana's National Rural Sanitation Model and Scaling Up Strategy (RSMS) - developed in 2012 as a district-led strategy to guide the delivery of basic sanitation services in rural areas of Ghana, the RSMS was designed around five (5) pillars, demand, supply, capacity building, monitoring and evaluation and enabling environment. It consists of an implementation strategy, a district handbook and a scale-up plan. It assigns District Assemblies with responsibility for achieving improved sanitation by creating demand through strategies such as Community Led Total Sanitation, de-emphasises the use of subsidies and providing incentives for the private sector to deliver appropriate household and institutional sanitation facilities;
- Reviewed the Biodigester Construction and Installation Manual including a draft report on its development process completed by the Ministry for Sanitation and Water Resources under the Greater Accra Metropolitan Area (GAMA) Sanitation and Water Project. The manual is informed by a review of installations by six (6) service providers in six (6) metropolitan/municipal assemblies (MMAs). In all, samples were collected from 39 facilities comprising 23 full flush and 16 micro flush toilets facilities. The report concludes that technically the Bio-digesters installed at the household level works well when installed properly and used according to prescribed standards related to number of users, and that installations in areas with low water table and providing adequate space for the drain field system and/or soak pits are working well. The report further concluded that full flush systems had a better effluent quality than micro flush due to dilution from the volume of water used in flushing. The Biodigester Toilet Construction and Installation Manual has since been completed and officially launched by the Ministry for Sanitation and Water Resources;
- Selected reports from the Ghana Statistical Service including the Ghana Living Standards Survey, Multiple Indicator Cluster Survey, Ghana

Demographic and Health Survey and Ghana Housing Survey. These reports provided valuable information on trends in access to basic sanitation across Ghana;

- Data from the WHO/UNICEF/JMP platform was also reviewed to establish trends in need and access to basic sanitation in Ghana consistent with targets in the Millennium Development Goals and Sustainable Development Goals;
- Selected reports on the World Bank funded Greater Accra Metropolitan Area (GAMA) Sanitation and Water Project, African Development Bank funded Greater Accra Sustainable Sanitation and Livelihoods Improvement Project (GAS-SLIP), Netherlands Government funded Catalyzing WASH from Possible to Profitable (P2P) Project were reviewed to obtain additional insights on ongoing sanitation interventions that could be leveraged to scale up the use of micro flush toilets;
- We conducted in-depth interviews representing a cross-section of water sector stakeholders, including the GoG, development agencies, non-governmental organizations (NGOs), selected District Assemblies and private sector entities (trained artisans and contractors) to get their perspective on barriers and recommendations for scaling up the use of micro flush toilets.
- In addition, the study team conducted household interviews including field observations in one community each in three districts (Adentan/Ashaiman Municipality, Sunyani West Municipality and Tamale Metropolis) and three regions (Greater Accra, Bono and Northern regions) in Ghana. Interviews were also held with a sample of educational institutions in each district. A total of 10 households (5 users and 5 non users) and 6 institutions (3 users and 3 non users) were interviewed in each district;
- We analysed data obtained using both qualitative (triangulation and collation of findings) and quantitative (analysing drafted a set of recommendations for scaling up the use of micro flush bio digester toilets that captures measures to be implemented at the following levels within Ghana's sanitation market as follows:
 - Activating Demand
 - Stimulating Supply Chains
 - Enhancing the Enabling Environment

2 STATE OF THE SANITATION MARKET

2.1 Market Landscape for Toilets in Ghana

Ghana performs poorly with respect to sanitation, with only 15 percent of the population using improved, unshared toilet facilities, while 23 percent do not have access to any sanitation facility (UNICEF, 2015). Because of lack of basic sanitation, most residents rely on the use of public toilets and or are forced to practice open defecation. The number of Ghanaians with access to toilets shoots to 73 percent when the use of shared or public toilets is considered. In fact, public toilets represent the single largest form of sanitation service for Ghanaians. According to the WHO Perspectives Bulletin, 2015, this is more than twice the level of shared toilet usage in urban Sub-Saharan Africa (33%).

The vast majority of urban residents rely on shared sanitation facilities that can be either compound toilets (shared by a few households) or public toilets (usually fee-paying and accessible to all). The success of shared sanitation in Ghana has been attributed to several factors, but notably the planning of living settlements³. The Ghana Statistical Services' 2014 Ghana Living Standards Survey reports that 60% of Ghanaians live in compound houses rather than self-contained apartments. The proportion of urban households that live in compound houses (68.1%) is higher than rural households (51.3%). Compound houses consist of several households built around a common open area or yard that share utilities like water, electricity and sanitation. In rural areas, compound houses have traditionally hosted multi-generational families, but the structure persists in urban and peri urban communities, where it is a practical housing type for migrants and tenants. The majority of compound residents depend on shared sanitation.

The WHO-UNICEF JMP estimates that only 20% of urban residents have individual improved facilities. Open defecation is practiced by 7% of urban dwellers. Most toilet facilities (including individual toilets) are onsite technologies. Sewered facilities serve a small fraction of urban residents. Only three main cities have a sewerage network: Accra, Tema and Kumasi. In Accra, there are only 1,100 connections. Tema reports about 23,000 official connections to the sewer system.

³ <https://www.who.int/bulletin/volumes/93/7/14-144980/en/#R3>

Extrapolating from case study data and recent published reports, the household market opportunity in a country like Ghana would represent a market of USD 50-80million per year in a conservative forecast. Adhering to the target for improved sanitation set in the country plans market opportunity for household sanitation would drastically increase to around USD 150-200million⁴.

An Excreta Flow Diagram (SFD) was developed in 2015 to estimate the volume of safely treated excreta in the country. The study indicates that up to 90% of the waste produced is not safely managed. There have been some attempts at re-use of faecal sludge to produce compost and fuel briquettes, but these have been relatively small-scale⁵.

2.2 Barriers to household toilet ownership in Ghana

Jenkins et al.(2007) 's sanitation studies in Ghana and Benin identified *increased convenience, improved social status and prestige* as important motivating factors for investments in household sanitation. Scott et al.'s (2007) study in Ghana found that *sensory issues of smell, disgust and fear of diseases* were driving hygiene behaviours and motivations for improved sanitation. Several studies in Ghana also point towards economic factors as key barriers to private sanitation investment, including *high costs of construction and lack of capital for investment*⁶. The cost of improved sanitation services is forbiddingly high for the majority of households in Ghana. The cost of developing the cheapest and most basic sanitation service would represent 66% of annual household income for households in the poorest quintile, and 29% of annual household income for households in the middle-income quintile (UNICEF, undated)⁷.

Studies by Awunyo-Akaba et al. (2007) also concluded that *history of settlement and land ownership issues* are highly correlated with people's willingness and ability to invest in household sanitation across all communities. The status of being a stranger i.e. migrant in the area left some populations without rights over the land they occupied and with low incentives to invest in sanitation. Increasing

⁴ Aqua for all (2019) Ready for Funding: Innovative sanitation businesses. https://aquaforall.org/wp-content/uploads/2014/12/Ready-for-Funding_Innovative-Sanitation-Businesses.pdf

⁵ <https://www.unicef.org/ghana/media/2291/file/Budget%20Brief%20-%20Water,%20Sanitation%20and%20Hygiene.pdf> . UNICEF WASH Budget In Brief.

⁶ Awunyo-Akaba (2016) Sanitation Investments In Ghana: An Ethnographic Investigation Of The Role Of Tenure Security, Land Ownership And Livelihoods.

⁷ UNICEF WASH Budget Brief-Ghana (undated)

migrant population and the high demand for housing in the face of limited available space has resulted in general unwillingness and inability to establish private sanitation facilities in the communities.

Lack of support and guidelines to MMDAs to develop improved and sustainable sanitation services. Despite a National Environmental Sanitation Policy and a Strategy that set ambitious targets for the country, the support structure to Metropolitan, Municipal and District Assemblies (MMDAs) for planning sanitation services is quasi non-existent outside donor projects. As guidelines do not specify requirements for liquid waste sanitation, most MMDAs focus on solid waste services.

Lack of investment by central government funds in household and institutional sanitation. As per the Sustainable Development Goals (SDGs), the development of sustainable sanitation services requires investments beyond basic sanitation (or the containment of human excreta) and in market segments where the private sector is not likely to be attracted due to poor financial viability. However, funding for investments in sanitation by the Government of Ghana has been extremely low as compared to investments in health and education. In 2012, it was estimated that the total expenditure on water, sanitation and hygiene as a proportion of Ghana's gross domestic product (GDP) was 0.5% as compared to 5.2% and 6.8% for health and education respectively⁸.

Enforcement of environmental sanitation regulations is weak. Despite strict environmental laws, many landlords are reluctant to invest in toilet facilities for their tenants, while tenants are reluctant to see their rent go up because of additional toilet facilities. This is a major disincentive for constructing household and institutional toilets.

Major barriers to entry for sanitation start-ups in Ghana are the *lack of start-up capital; lack of access to affordable banking services* (particularly the cost of borrowing); *inadequate public infrastructure*; and the *high cost of creating partnerships with the public sector*⁹. Ghana's central bank interest rate was estimated at 22.5% in 2017 while micro finance institutions had interest rates ranging from 16% to 36% per annum. Access roads for the transportation of

⁸ https://www.who.int/water_sanitation_health/glaas/2014/ghana-22-oct.pdf

⁹ <https://es.ircwash.org/sites/default/files/09-2017-barriers-and-opportunities-for-sanitation-smes-in-ghana.pdf>

goods and services are generally poor¹⁰ which affects access to required inputs and delivering products to customers. Start up companies have challenges with company registration procedures along with cost and delays, lack of “fair” competition especially with large scale competitors and delayed payments for government contracts¹¹.

2.3 Market Opportunities for Sanitation

There are several emerging opportunities that could stimulate access to improved sanitation and build a more robust sanitation market.

- The Ghana Government “One House One Toilet” programme suggests an increased interest and prioritization of investments in providing basic sanitation for households, a potential that could be leveraged to scale up micro flush toilets;
- The World Bank funded GAMA Sanitation and Water Project and the African Development Bank funded Greater Accra Sustainable Sanitation and Livelihoods Improvement Project (GAS-SLIP) are providing funding subsidies for construction of household toilets, an opportunity that can be leveraged for scaling up household sanitation;
- The Ghana Government through the Ministry of Sanitation and Water Resources, UNICEF and the Embassy of the Kingdom of the Netherlands have launched an innovative and affordable loan scheme for people living in urban areas to build their own household toilet. The new Sanitation Fund – of which ARP-Apex Bank is the contracted Funds Manager for 2019 – has been established to address the challenges of basic sanitation in urban communities. The Sanitation Fund is currently being rolled out in three major Assembly areas across Ghana: Ashaiman, Ho and Tamale. UNICEF is also building the capacity of Rural Community Banks (RCB) and Metropolitan, Municipal and District Assemblies to ensure the smooth implementation of the sanitation fund. The Fund Manager, APEX Bank, has established the fund by selecting and scoping the Rural Community Banks. They will then receive and disburse funds quarterly to

¹⁰ Road condition mix in Ghana as at 2016 was Good -39%, Fair – 32% and Poor – 29%

¹¹ <https://es.ircwash.org/sites/default/files/09-2017-barriers-and-opportunities-for-sanitation-smes-in-ghana.pdf>.

the rural community banks which will in turn disburse loans to businesses and households. The Rural Community Banks will also be responsible for loan recovery and refunds. A similar facility is being rolled out by Fidelity Bank and SNV Netherlands Development Organisation under the Netherlands Government funded Catalyzing WASH from Possible to Profitable (P2P) Project.

- The Ghana Government as at January 2020 was commissioning a review of water and sanitation policies and plans. Although timelines for completing these policies reviews are yet to be finalized, they offer a tremendous opportunity for advancing solutions for scaling up the use of appropriate toilet technologies such as the micro flush bio-digester toilet technology.
- Opportunities to support sanitation SMEs in Ghana include innovative finance; training and business development support; reinforcement of representative associations (through the Environmental Service Providers Association) and reinforcing the policy and regulatory environment (e.g. rolling out of Expanded Sanitary Inspections, Compliance Management And Enforcement (ESICOME) For Premises Inspection Application (ESICApps) in selected Metropolitan and Municipal Assemblies under the Greater Accra Metropolitan Area Sanitation and Water Project.

2.4 Development of the Microflush Biodigester Technology

The introduction of micro flush bio-digester toilets in Ghana is reported to have started at about the year 2002 by a Ghanaian entrepreneur and mechanical engineer Mr. Kwaku Akuam Anno of K. Anno Engineering Limited, launched by the Ghana Institution of Engineers (GHIE) in 2008 and is currently marketed by Biofilcom Limited.

History of the development of the Biofil toilet technology

The development of the Biofil toilet technology started with the desire to correct a failed septic tank used by Mr. Kweku Anno. The tank frequently spilled due to groundwater infiltration into the tank. It had to be frequently desludged. This was usually associated with odour. His area of residence (Dzorwulu) was situated in a low lying area of Accra with a very high water table. In the bid to remedy the situation, he began to circulate the effluent in the septic tank by pumping. Initially this helped reduce the odour but not the amount of wastewater. In addition, it became very expensive with the continuous pumping. He further went on to develop a box with a porous filter made from coarse aggregate to separate the solid from the liquid as he likened the odour generation in the septic tank to having soaked clothes overnight in water as against wet clothes which were squeezed and also left overnight. This box after separating the solids from the effluent from the septic tank demonstrated a reduction in the odour. With time, earthworms began growing on the solids by crawling from the neighbouring soil into the box, thereby reducing the volumes of solids within a short time. A continuous study of this box revealed a steady state where there was considerable reduction of odour upon addition of fresh faecal matter. He further realized the earthworms needed something more to remain in the box, thus, he started introducing humus and other kitchen waste. In addition, anytime the box was submerged, the earthworms would disappear. To resolve this, he created an upper haven with straw where they could migrate. The outcome of this design made him install the same setup on their residential building at Dzorwulu by cutting off the pipe connecting the septic tank. He attached the box to the building at the point where the pipe connecting the toilet seat exited the building; to prevent turbulent mixing of the faeces and flush water before entering the box. He further went on to install a number for family and friends to use, and in a farmhouse of a colleague. Positive feedback from all these initial users, gave him the idea to try to commercialize the product. In the initial years, it was very difficult getting people to use the product. New users were apparently begged to have the installation at no cost to them. The performance of the invention got many people interested through recommendation by users. There were interests from other international partners. In a bid to protect the product, Mr. Kweku Anno launched the BTT with the Ghana Institute of Engineers (GHIE) in 2008. At the launch, the AngloGold Ashanti Iduaprim Mines had similar problems with their staff quarters septic tanks and invited him for a feasibility assessment. A contract for installation of the products for some 120 staff quarters got the team busy for almost two years. In this period, the product was perfected to its current design to meet commercialization standards. The aftermath of this project was marketing of the products through exhibitions and recommendations by word of mouth from users. In between this time in 2009, Stephen Mecca found Mr. Kweku Anno and used the Biofil Toilets on one of his initiated projects in Pokuase in Ghana under the auspices of the Global Aid Sanitation Project (GSAP). He later got the Bill and Melinda Gates Foundation (BMGF) to visit BIOFILCOM out of which the BMGF started engaging directly with BIOFILCOM and Mr. Kweku Anno leading to a grant award with the BMGF to help the company scale-up to other markets.

Source: Owusu, Peter A. (2017)¹²

¹² Owusu (2017) Optimizing Vermitechnology for the Treatment of Blackwater: A Case of the Biofil Toilet Technology. Unpublished PhD Dissertation. <https://saniup.org/wp-content/uploads/2018/01/PhD-thesis.pdf>

¹² ibid

Previously, other appropriate toilet options such as the Aqua Privy (bomber latrines), Ventilated Improved Pit (VIP), Kumasi Ventilated Improved Pit (KVIP), Enviro Loo, Water Closet (WC), Ecosan and Elevated Compost Latrine (ECL) had been developed and used with mixed results especially when it comes to uptake and use by poor in both urban and rural areas. Issues such as pricing/cost, limited space/land for the technology, odour, convenient use/user preferences, frequent desludging and lack of routes for desludging affected uptake and use of these technologies.

The micro flush or full flush bio-digester technology is the latest among the increasing mix of appropriate sanitation technology solutions. Several thousands of units have been installed across several parts of Ghana mainly in households and schools, and are typically used in areas where septic tanks and other pit latrines are not feasible due to high water table and limited space. The technology does not require desludging by cesspit emptier and most recently used by new developers¹³.

The Micro flush Biofil Standalone toilet is an all-in-one unit that offers an onsite micro flush seat and digester in which the user simply presses a foot peddle to release the waste into a digester housed directly beneath the seat. The unit utilizes the water from each handwashing (approximately 500ml) to flush the toilet for the next user. This unit is ideal for areas with no access to water, this includes construction sites, resettlement communities and low income communities with no access to water.

The Micro flush Biofil Standalone consists of a super-structure, a micro flush seat, a hand wash basin and digester. The Biofil Toilet System has the following features:

- A filtration system rapidly separates solids from the liquids;
- Trapped solids are rapidly “eaten” by a diverse group of micro and macro organisms;
- The dark, humid, aerobic environment enables macro-organisms to flourish and procreate while being protected from natural predators,

¹³ ibid

- The rapid separation and aerobic decomposition achieved by organisms deliberately introduced into the Biofil digester means that no odour emits from the digester,
- Small footprint, only 1.65 m² is required for installation of a standard digester;
- A standard bio digester had the following dimensions – length of 1800mm, width of 600mm and depth of 600mm;
- The number of users for a standard bio digester should be 10 persons; multiple digesters or bigger digesters are expected to be provided where users exceed 10 persons¹⁴;

2.5 Promotional Strategy by Biofillcom Limited

The bio-digester toilet technology was primarily marketed by Biofillcom Limited, and although there are no available statistics on uptake of this technology solution, it is reported that several thousands of units have been constructed across several areas in Ghana¹⁵. Biofillcom Limited adopted a centralized approach to the production and marketing of the bio digester toilets because a critical input into the structure is concrete and this required a centralized production point to ensure standards and quality are not compromised. As at 2014, Biofillcom Limited reported that it had installed roughly five thousand systems. The majority had been built in concrete. The up-scaling of the production in the present design in concrete has been difficult and very costly because of the long lead time of the components due to labour intensive production as well as the curing and drying time needed for the concrete components¹⁶.

2.6 Promotional Strategy by Global Sustainable Aid Project (GSAP)

With support from the Bill and Melinda Gates Foundation, the Global (previously Ghana) Sustainable Aid Project (GSAP) and the S-Lab at Providence College led by Prof. Stephen Mecca, also developed a variant of the micro flush toilet which has all the features and attributes of the micro flush bio digester toilet. The only difference is that GSAP uses locally sourced raw material for

¹⁴ Ministry for Sanitation and Water Resources (2020) Biodigester Toilet Construction and Installation Manual. GAMA Sanitation and Water Project with support from the World Bank.

¹⁵ ibid

¹⁶ <https://www.biofilcom.net/about-us/> accessed on October 30, 2020

constructing the bio digester. Local artisans are also trained to construct the toilets. The toilets are sold for about USD \$300 for a household pour-flush model with almost USD\$200 being material cost and the remaining USD\$100 being labour cost/income for the trained artisans.

As a promotional strategy, GSAP trained local artisans/toilet makers to install the bio digesters. Trainees received both theoretical and practical hands on field training in toilet construction. Upon completion of the training program, the trainees receive an Apprentice level Certificate from GSAP. They are then ready to sell, build and deploy their first toilets in the community. There is a three-level structure to GSAP Certification – Apprentice, Artisan, Master. When the Apprentice has successfully completed 3 toilets, they receive their Artisan Certification; when they complete at least 10 toilets over a 12 month period, they receive Master status, allowing them to do field training of new toilet makers/apprentices¹⁷. New apprentices are given a tool set (~\$100) and resources to advance purchase of materials for their first two toilets (~2 x \$200). A grant/loan of \$500 gets their enterprise up and running. Households are expected to pay and acquire the toilets. Where feasible, local Micro Finance Institutions are encouraged to provide soft loans to households to enable them pay for the construction of the toilet. Results of this approach has been mixed. While the approach has been successful in constructing some toilets, low income, time lag in mobilizing payments and attractive alternatives livelihoods for newly trained apprentices compels them to abandon the programme.

2.7 Promotional Strategy by Rotary International

Rotary Clubs in Ashanti, Brong Ahafo and Northern region had adopted the GSAP model as their promotional strategy for achieving improved sanitation, incorporating the use of micro flush bio digester toilets into their programming. Completed in 2012-2014, their approaches involved the following:

- Informed local government authorities about proposed intervention in sanitation;
- Engagement with community leadership about their proposed intervention in sanitation;

¹⁷ 2017 Global Sustainable Aid Project

- Together with community leadership, prospective candidates were identified to be trained as toilet apprentices/makers;
- Prospective toilet makers were trained and given the required tools to construct bio digesters;
- Extensive community sensitization was carried out;
- Interested households were encouraged to dig pit and erect their own superstructures;
- Rotary Club provided subsidies that covered the cost of the bio digester, roofing material and door;
- In Obuasi and Techiman, a micro finance program is reported to have been implemented that provided loans to households to cover the cost of constructing bio digesters. Structured across a 3-12 month repayment period, loan repayments were to be made into a fund for on lending to new customers. While this strategy appeared to have been successful in Obuasi (an estimated 6000 people are reported to have received loans for WASH including micro flush toilets construction, farming, and other individual and group business loans¹⁸) it was not successful in Techiman, possibly due to low patronage and high interest rate on the loan;

The approach applied by the various Rotary Clubs had generated mixed results. Through their programs, several households were able to construct micro flush bio digester toilets. While the Rotary Club in Tamale reported having constructed about 120 micro flush toilets including schools, the Rotary Club in Sunyani reported about 200 toilets constructed.

The challenges with this approach were as follows:

- delays in construction as it took beneficiary households several months to complete super structure even after the bio digesters had been installed.

¹⁸ This is according to Information provided by Kwame Annor of Stegenor Micro Finance Ltd . Actual data on number of beneficiaries who took loans for micro flush toilets was not available. It was reported that a total of \$41,400 representing 23% of the total loan portfolio was administered to customers that were interested in micro flush toilets.

- high cost of building materials was a barrier for most beneficiary households because they could not afford them.
- limited engagement with local government authorities also affected uptake and use of latrines. Although the objective was to minimize political interference in Rotary's work, if adequately harnessed, District Assemblies could have been in a position to apply the technology for their own sanitation interventions;

2.8 Promotion and Marketing of the Microflush Biodigester Technology by Other Service Providers

The use of bio-digesters was given a boost by the World Bank funded Greater Accra Metropolitan Area (GAMA) Sanitation and Water Project implemented in selected Metropolitan and Municipal Assemblies within the Greater Accra Region.

Under the project, about 26,000 household toilets using both the full flush and micro flush bio-digesters are reported to have been constructed. The project's success is mainly attributed to an output-based aid (OBA) program that improved affordability of the bio digester toilet for households in crowded low-income areas of the Greater Accra Metropolitan Area (GAMA), and encouraged households to invest in improved household toilets. OBA was provided as a subsidy to reduce the up-front cost for toilets and stimulate demand, which in turn made it more attractive for the private sector to enter this market and pre finance construction of household toilets.

Currently micro flush and full flush bio digester toilets are predominantly used in low-income communities within GAMA. A number of variants including Biofil, Samalex, Eco-safe, Comsans, Eco-cycle, Skyfox, among others have evolved over the years. Other variants have also been developed by local artisans.

Other projects that have contributed to increased use of the technology are interventions implemented by Global Communities through its USAID funded WASH-UP project implemented in three slum communities in Accra and two slum communities in Sekondi-Takoradi.

2.9 Pricing of the Micro flush Bio-digester Technology

Pricing of the micro flush toilet varies on the sanitation market. The cost per unit is reported to be in the order of US\$500-1,000 (depending on whether a room or structure is already constructed), or GHS 3000-5,000 at 2019 exchange rates. Under the GAMA Sanitation and Water Project, prices were standardized at about US\$1000 or GHS4000 (using 2016 exchange rates) for a standalone bio digester toilet. The cost of a slab based biodigester alone is estimated at about GHS2000 while a concrete based biodigester costs about GHS1500. The high cost of appropriate toilet facilities relative to the low incomes and savings of the poor segment of the population (typically living on \$1-2/day) is a major obstacle to uptake of toilet facilities.

3 STUDY FINDINGS

This section outlines and discusses key findings from the primary and secondary data obtained by the consultant.

3.1 Market Barriers

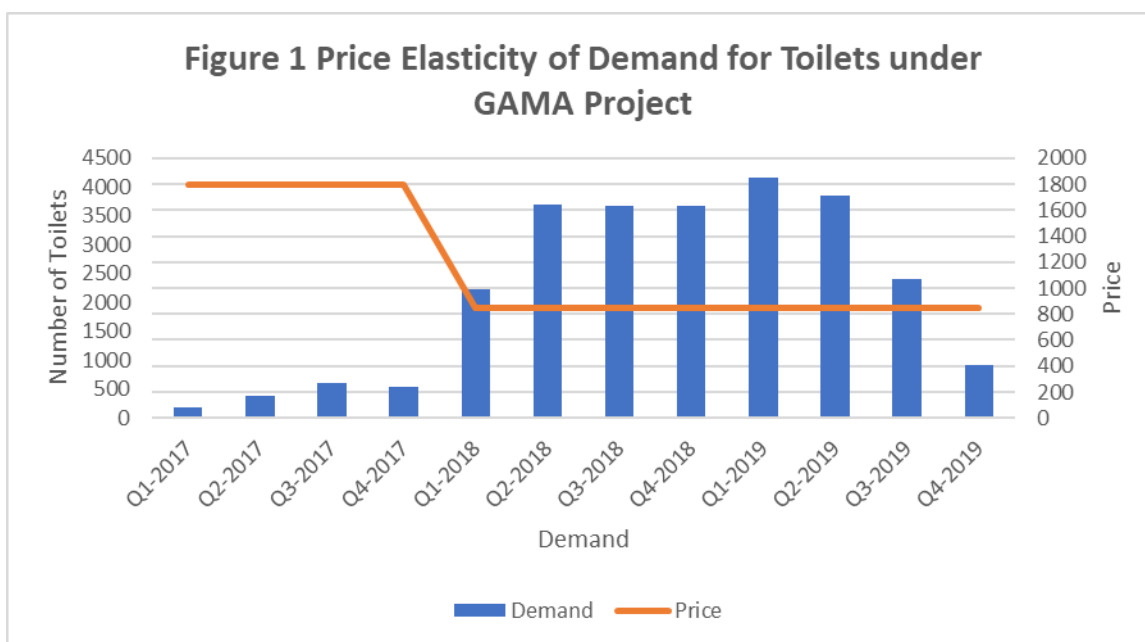
- All stakeholder institutions interviewed at the national and regional levels were familiar with the biodigester technology. Despite the high level of awareness, only Global Communities, Rotary International and the Ministry for Sanitation and Water Resources (under GAMA and GASSLIP projects) had incorporated the technology into their programming as at the time of the study. This was because most actors perceived the technology to be very expensive, most suitable for urban areas (which was outside their current programming) and very challenging to be deployed for the rural sanitation market;
- At the district level, only staff of the Environmental Health and Sanitation Unit of the Tamale Metropolitan Assembly were not familiar with the technology and so hadn't included it in their ongoing sanitation programme. This is probably because the Assembly was not actively engaged when the technology was being rolled out in selected communities within the metropolis. Their counterparts at the Adentan and Sunyani West Municipal Assemblies were familiar with the technology because it was part of ongoing sanitation projects by MSWR

(GAMA Sanitation and Water Project) and Rotary International in their respective municipalities;

- Construction of the micro flush biodigester toilets was being done by local trained artisans and contractors. While data on the total number of artisans trained isn't available, several hundreds of local artisans are reported to have been trained by Ing. Annor/Biofillcom Ltd, Steven Mecca and Rotary International. Rotary International is reported to have trained over 100 artisans (contact details of about 30 was made available to the study team) artisans as part of the sanitation programme across several regions in Ghana. Under the GAMA Sanitation and Water Project, about 20 local contractors have been engaged to construct micro and full flush bio-digester toilets for households and institutions with about two (2) contractors providing micro flush toilets;
- Consistent with data from the Ghana Statistical Service, most respondents for the key informant interviews across all levels including artisans were of the opinion that water closet (WC) and ventilated improved pits (VIP) were most visible, preferred and predominantly used household toilets as compared to the micro flush toilets. For institutional toilets, WC and KVIP were the most predominantly used technologies. Respondents were of the opinion that these technologies had been proven to be effective by users over the years, and this accounts for the strong preference. Respondents attributed the poor uptake of the micro flush toilets to lack of awareness of the technology, insufficient evidence on the long term viability of the technology, lack of liquidity or savings due to seasonal and unstable incomes which makes it difficult for consumers to make required upfront payments, consumer/user preference for existing technologies and unwillingness to try new technologies, perception of bio digesters as relatively "small" to contain large quantities of faecal matter as compared to other technologies, and inadequate skill capability of existing artisans in the construction of micro flush or full flush bio-digester technologies which has resulted to complaints from some existing users;
- Despite the high number of trained artisans, all trained artisans and contractors interviewed were of the opinion that the majority of their trained colleagues/counterparts had abandoned the trade. In Northern Ghana for instance, Michael Anyekase was the only skilled artisan

practicing the trade. In the Bono region/Sunyani Municipality and its environs, Mr. Seth Jiam was the only skilled artisan practicing the trade. Reasons for the low participation of skilled artisans are the lack of a critical mass of customers to make their trade profitable – Samuel Gyabaah of Samalex for instance indicated that without subsidy from the GAMA Sanitation and Water Project that significantly boosted demand for micro flush toilets (up to about 200 toilets a month), patronage would have been extremely low (about 3 to 5 toilets a month). Other reasons included limited cost effective mechanisms of creating demand (mass media, law enforcement and house to house visits), inadequate access to credit, poor transport infrastructure and settlement pattern which makes it difficult to deliver on orders/requests to consumers/customers;

- The cost of the micro flush toilet bio digester technology was a major barrier to increased uptake (see Section 2.7 for cost estimates). The high cost is attributed to cost of labour and other production inputs especially imported cement. Most respondents were of the opinion that the current level of uptake had been driven by a high level of subsidies or short term hardware supply by donors which are likely to be unsustainable in the long term. Under the GAMA Sanitation and Water Project, up to 70% subsidy was applied based on the unit cost of the proposed technologies (mostly micro or full flush bio digester toilets) and the assessed willingness and ability to pay by project beneficiaries. Under the Rotary International project, beneficiaries were given a bio digester, door and roofing material for free;
- Demand for the micro flush biodigester toilet is price sensitive and elastic. Using available data from the GAMA Sanitation and Water Project, it was established that a 50% reduction in the subsidized price of bio digesters and standalone biodigester toilets from an average GHS1800 to GHS850 led to an astronomical increase in demand for household toilets as shown in Figure 1 below.



Source: GAMA Sanitation and Water Project, 2020

3.2 Market Opportunities

- Respondents were of the opinion that beyond the market opportunities outlined under Section 2.3 of this report, a major opportunity for scaling up the use of micro flush toilets was the proposed review of the National Rural Sanitation Model and Scaling Up Strategy commissioned by the Ministry of Sanitation and Water Resources in partnership with UNICEF. Among the several issues to be considered during the review is the role for targeted subsidies or whether the current strategy that is anchored around a “no subsidy approach” should remain. Given the perceived high cost of the micro flush bio digester technology and other alternatives, this review might offer an opportunity to better design subsidies and targeting methods so they can nudge targeted households purchasing toilets without damping willingness to pay for those customers to whom subsidy is not offered.
- Kumasi Rotary club in partnership with Stegenor Microfinance Ltd had implemented a micro credit programme in Obuasi that provided loans to households that were interested in acquiring micro flush bio digester toilets. Structured across a 3-12 month repayment period, about \$41,400 was made available to households to acquire toilets. Loan repayments is made into a fund for on lending to new customers. A similar intervention

was implemented in Techiman but is reported to have had low patronage from customers.

3.3 Household User Perspectives

This section of the report presents highlights on the perspectives of users and non-users of the micro flush toilet technology:

- A total of 30 households were interviewed across three (3) regions and three (3) districts and three (3) communities - Adentan, Fiapre and Kpakpagyili.
 - Household sizes ranged from 1 to 15 persons with 70% of respondents having three (3) to six (9) members;
 - An estimated 76.7% of respondents lived in multi-household compound houses. The total number of residents in a house was up to 30 persons with the majority ranging between 10 and 20 persons;
 - A total of 46.3% lived with children under 5 years with 6.7% reported having had diarrhoea in the past two weeks prior to the interview.
 - The majority of residents could be classified as being within the middle income socio economic segment - 100% had electricity, 76% used wood and charcoal for cooking, 67% owned a working bicycle, 33% owned a working motorcycle; 3% owned a car; 97% owned working mobile telephones, 80% had a working television set, 47% had a working refrigerator, 50% had bank accounts, 20% and 17% were farmers and traders respectively while 10% had no occupation.
- 40% of respondents acquired their micro flush toilets within the last 6 months while 33.3% acquired it over the last two years. None of respondents had cracks in the pedestals of their micro flush toilets and overflowing or leaking septic tanks/pits. All respondents with micro flush toilets had their pits covered and cover slab completely sealed;
- A total of 33.3% of respondents with micro flush toilets had their pipes or plumbing damaged. About 13.3% of respondents discharged treated

waste into an open sewer/drain while 86.7% discharged their waste into the ground;

- Number of persons using the micro flush toilets per house was up to 15 persons with the majority of households having 5 to 6 persons using the facility;
- A total of 60% of respondents who were users were encouraged by their respective Municipal or Metropolitan Assembly to acquire the toilet facility which underscores the critical role of District Assemblies in creating demand for toilets. Friends, neighbours, WSMTs, artisans and children were the least influencers;
- Overall, the micro flush bio digester toilets had strong approval ratings from households interviewed as shown in Table 1. That notwithstanding, users had some concerns about aesthetics, durability and safety which need to be addressed.

Table 1 User Perspectives on Micro Flush Toilets

User Perspective (Statement)	1 - I do not agree with this at all	2 - I disagree	3 - Maybe, I am not so sure	4 - I agree, but not completely	5 - I completely agree with this
Micro-flush bio digester toilet disposes off toilet safely			6.7%	46.7%	46.7%
Micro-flush bio digester toilet looks clean and impressive in appearance			6.7%	26.7%	66.7%
Micro-flush bio digester toilet is free from flies				26.7%	73.3%
Micro-flush bio digester toilet does not emit bad odour				20%	80%
Micro-flush bio digester toilet does not use too much water		6.7%	6.7%	20%	66.7%
Micro-flush bio digester toilet can be used in both rainy and dry season				20%	80%
Micro-flush bio digester toilet does not emit faecal matter into the environment				33.3%	66.7%
Micro-flush bio digester toilet is user friendly				40%	60%
Micro-flush bio digester toilet is built to last			6.7%	40%	53.3%

- A total of 86.7% of users spent up to GHS1100 to acquire their micro flush bio digester toilet as shown in Table 2.

Table 2 Money Spent to acquire the micro flush bio digester toilet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Up to 600 cedis	5	16.7	33.3	33.3
	601 - 1100 cedis	8	26.7	53.3	86.7
	1101 - 2000 cedis	2	6.7	13.3	100.0
	Total	15	50.0	100.0	
Missing	System	15	50.0		
Total		30	100.0		

- A total of 80% of respondents were of the opinion that the amount they paid was affordable as compared to what they would have paid for other alternative technologies.
- All respondents had received subsidies for the construction of their toilets either from Rotary International (provided bio digester, door and roofing material while beneficiary digs pit with depth of about 3 feet and constructs the super structure) and GAMA Sanitation and Water Project (provided 70% of full cost as subsidy);
- It took users of micro flush toilets between 21 to 60 days (33%) and over 60days (40%) to mobilise their required contribution to obtain the facility. The majority of users (86.7%) raised funding from their personal savings. A total of 80% of users were satisfied with the time it took for the toilet to be installed and 93% reported receiving orientation on the use of the toilet.

Table 3 Satisfaction with the orientation on the micro flush bio digester toilet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	43.3	86.7	86.7
	No	1	3.3	6.7	93.3
	Don't know	1	3.3	6.7	100.0
	Total	15	50.0	100.0	
Missing	System	15	50.0		
Total		30	100.0		

- A total of 60% of users knew who to contact if they had problems with their toilet facilities. The remaining 40% didn't know who to contact. An estimated 66.7% would definitely recommend the micro flush bio digester toilet, if they saw someone using some other toilet facility while 33.3% would probably do so. Overall user ratings of the micro flush toilet is presented in Table 4.

Table 4 Overall Satisfaction with the technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Satisfied but there are minor issues	4	13.3	26.7	26.7
	Extremely satisfied and happy with all aspects	11	36.7	73.3	100.0
	Total	15	50.0	100.0	
Missing	System	15	50.0		
Total		30	100.0		

- Artisans reported the following as the key questions clients of micro flush toilets usually asked about the product immediately construction is completed - "How long will it take for the digester to get full?" "How many years will this digester last or require replacement?" "Is the toilet facility not going to emit bad odour?" These are obvious worries of customers that artisans/product developers would need to address to be sure these worries do not materialize in order to create and sustain demand for the technology;
- All non-users interviewed were familiar with the micro flush bio digester technology. The District Assembly and ongoing donor funded projects were the most referred source of information about the technology.
- An estimated 93% of non-users were interested in acquiring the toilet facility. The top ranked reasons were environmental friendliness (less odour and discharge of effluent) and portability (less space/land required) as shown in Table 5. The preferred price point was up to GHS600 for all interested non users.

Table 5 Top Ranked Reason for Preference

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Convenient	1	3.3	7.1	7.1
	Affordable	1	3.3	7.1	14.3
	Durable	2	6.7	14.3	28.6
	Environmentally friendly	4	13.3	28.6	57.1
	User friendly	1	3.3	7.1	64.3
	Portable (uses less space/land)	3	10.0	21.4	85.7
	Others	2	6.7	14.3	100.0
	Total	14	46.7	100.0	
Missing	System	16	53.3		
Total		30	100.0		

3.4 Institutional User Perspectives

This section presents highlights on the perspectives of institutional users and non-users of the micro flush toilet technology:

- A total of 16 educational institutions were interviewed across three (3) regions and three (3) districts and three (3) communities – Ashaiman, Sunyani and Tamale.
 - Both primary and secondary schools were interviewed;
 - Schools had enrolment ranging from 85 to 1046 pupils/students;
 - All schools had a water facility on premises. About 56% of schools interviews (all within Greater Accra) had piped connections;
 - At least two schools selected in each region/district had micro flush bio digester toilets. Other schools used KVIP and WC toilets. About 43% of schools with micro flush toilets had been using the facility for over 2 years.
 - All the micro flush toilet facilities were constructed with funding support from donors (UNICEF, Vitens International and Rotary

International). Information on the cost of constructing the facilities was not available.

- All respondents said decisions on the type of technology and cost of facilities were taken at their respective District Directorates of Education and information passed on the participating schools and so they are unable to influence the decision on the type of technology. Furthermore, recent directives from the Ghana Education Service that abolished payment of levies is making it difficult for the schools raise funding to manage existing sanitation facilities and undertake new projects;
- Overall, the micro flush bio digester toilets had positive approval ratings from schools that were using the facility as shown in Table 6. That notwithstanding, users had some concerns about aesthetics, quality, durability and safety which need to be addressed.

Table 6 Institutional User Perspectives on Micro Flush Toilets

User Perspective (Statement)	1 - I do not agree with this at all	2 - I disagree	3 - Maybe, I am not so sure	4 - I agree, but not completely	5 - I completely agree with this
Micro-flush bio digester toilet disposes off toilet safely			28.6%	57.1%	14.3%
Micro-flush bio digester toilet looks clean and impressive in appearance			28.6%	42.9%	28.6%
Micro-flush bio digester toilet is free from flies				42.9%	57.1%
Micro-flush bio digester toilet does not emit bad odour			14.3%	28.6%	57.1%
Micro-flush bio digester toilet does not use too much water			14.3%	14.3%	71.4%
Micro-flush bio digester toilet can be used in both rainy and dry season				20%	80%
Micro-flush bio digester toilet does not emit faecal matter into the environment			14.3%	42.9%	42.9%
Micro-flush bio digester toilet is user friendly			14.3%	85.7%	
Micro-flush bio digester toilet is built to last			28.6%	42.9%	28.6%
Micro flush bio digester toilet is the best quality among all options available			14.3%	71.4%	14.3%

- Overall, the micro flush bio digester toilets had positive approval ratings from schools that were using the facility as shown in Table 6. That notwithstanding, users had some concerns about aesthetics, quality, durability and safety which need to be addressed.

4 CONCLUSIONS AND RECOMMENDATIONS

Despite the high level of user satisfaction with the micro flush bio digester toilets, demand for the product is most visible in urban/peri urban areas, excludes many households from accessing the technology (especially those at the bottom of the pyramid) and has been driven by donor funded projects which are highly subsidised and unsustainable in the longer term, and awareness among consumers is high only in districts/communities where donor funded projects are being implemented. In this section, the study team offers recommendations needed for achieving increased uptake and scale. The recommendations were developed based on insights generated from a review of relevant literature and interviews with selected institutions and households (users and non-users). Three critical factors are highlighted, with recommendations outlined for each factor.

- Activating Demand
- Strengthening Supply Chains
- Enhancing the Enabling Environment

4.1 Activating Demand

To create adequate demand for the micro flush bio digester toilet which is critical for scale, it is recommended that artisans/contractors and implementers (i.e. NGOs and District Assemblies) should pursue the 4As framework originally developed in 2012 and spearheaded by C. K. Prahalad¹⁹. The 4As refer to:

- **Affordability** – that target groups are financially capable of buying the product, and that financing opportunities are attractive. Pricing of the micro flush toilet remains expensive to its target consumers (lower socio economic segment living in multi-household housing units that is willing

¹⁹ Prahalad, C. K. (2012) Bottom of the Pyramid as a Source of Breakthrough Innovations. Journal of Product Innovation Management.

to pay up to GHS600 for a toilet facility) and will require strategies from government and artisans/contractors/developers that either reduce the cost of the product through increased innovation, learning and iteration or by leveraging savings/assets/resources from households for construction;

- ***Awareness*** – that target groups are aware of the product and its attributes. The micro flush bio digester has strong awareness within participating districts of donor funded project almost driven entirely by such projects, and will require increased awareness through a combined effort of government and artisans/contractors/developers in other geographies in order to create sufficient demand for the product. Beyond awareness creation, branding of completed facilities with names and contact details of artisans/contractors/developers (as it pertains with roofing material suppliers) should be rigorously pursued to create awareness and encourage referrals;
- ***Availability*** – that target groups have actual access to the product. The micro flush bio digester toilet is currently available in segments of the market where sufficient awareness has been created and subsidies provided to leverage household savings/contributions. If the product can be scaled up, artisans/contractors/suppliers should be able to create awareness and invest in creating networks that allow their products to be readily available and delivered to consumers. Artisans can be encouraged to leverage trusted networks such as the District Assemblies (and sub structures) to make their products available to consumers;
- ***Acceptability*** – that target groups have no objections to adoption and using the product, and that the product connects strongly with their perceptions, customs and behaviours. Evidence from this study suggest that consumers are concerned about longevity and capacity of bio digesters to accumulate faeces over time (as compared to alternatives such as KVIP and VIP latrines), and if the product can be successfully scaled up, these concerns need to be adequately addressed. This can be addressed through innovations and iterations and investing in providing incentives for referrals from loyal customers who have used product over time (e.g. by providing commission payments via mobile money, free merchandise or vouchers etc.) so they can spread awareness and recommend the product to other customers.

4.2 Strengthening Supply Chains

To strengthen the supply chains and ensure easy access to the product and after sales service including repair, the following measures are recommended:

- artisans/contractors/suppliers should be encouraged to expand their operational footprint into other geographies, pursue price reduction through innovation and iteration, and provide other products and services given the fact that sanitation (including supply of micro flush bio digester toilets) is not often viable as a full time livelihood activity;
- government and sanitation intervention implementers (Development Partners) should invest in developing capacity of local artisans/contractors not only to install toilets but to acquire critical skills in sales and managing sanitation enterprises. Selection of artisans/contractors to be trained to meet demand for the toilets should go beyond the usual selection of masons/plumbers and focus on training existing entrepreneurs who already have businesses related to sanitation (e.g., construction, hard ware sales etc.) and who can then add construction of the toilets to their product portfolio as a complementary business line, leveraging their existing assets and capabilities;
- To enable easy access to capital for skilled entrepreneurs to deliver micro flush toilets, government and sanitation intervention implementers should explore investing in technical assistance for product development and partial guarantee

4.3 Enhancing the Enabling Environment

To achieve an enabling environment that stimulates demand for and supply of micro flush bio digester toilets, the following measures are recommended:

- the Ghana Government should enforce existing legislation that requires households and institutions to have toilets on their premises. This is critical in stimulating demand for appropriate sanitation technologies including the micro flush bio digester toilets;
- the Ghana Government along with key stakeholders including District Assemblies and Development Partners should develop a comprehensive national basic sanitation strategy and financing plan that builds upon

existing sanitation policies and plans and is backed by a sector wide approach for implementation. This will ensure a gradual departure from the usual “projectised” approaches to sanitation promotion (implemented over 3-5 year periods) to a more comprehensive national program aimed at developing the sanitation market with flexibility in timing and funding even after donors exit or projects end. The plan should also have a robust monitoring, evaluation and learning framework to track and report on results and generate the underlying reasons for successes and failures;

- targeted subsidies has a critical role to play in stimulating demand for micro flush bio digester toilets especially among low income households. It is therefore recommended that the Ghana Government and Development Partners to evaluate options for the provision of subsidies and targeting methods in order not to distort market conditions and dampen willingness to pay for customers that are not eligible to receive subsidies.

4.4 Role for Rotary International

Rotary International has a remarkable role to play in scaling up the use of micro flush biodigester toilets by pursuing the following:

- Creating and maintain an accurate database including timelines on its interventions in creating demand for micro flush bio digester toilets (using subsidies, micro credit etc.) and training toilet artisans, makers and expert trainers across several regions in Ghana. This will provide the required evidence to inform policy advocacy in sanitation promotion in Ghana;
- Encouraging Rotary Clubs to adopt communities and local government authorities (District Assemblies) within their areas of operation where they can partner with trained artisans, makers and expert trainers to invest in a long term programme for building the market for micro flush bio digester toilets.
- Rotary’s promotional model of building the market to micro flush bio digester toilets through trained toilet makers is remarkable but will require working through locally well-established business so they can engage and train toilet makers. This will create an

institutional memory and ensure investments in training local toilet makers last beyond the intervention by Rotary Clubs;

- Rotary Clubs also need to strengthen their engagement with local government authorities i.e. District Assemblies. Despite the huge political risk in working with District Assemblies, they have a critical role to play in building the market for toilets. Rotary Clubs could explore the possibility of using a competitive selection process and get District Assemblies to commit to invest match funding/other resources in any future sanitation intervention. This will provide a critical resource that can be leveraged in building the market for micro-flush toilets;
- Convene an engagement session with the Ghana Government (specifically Ministries of Sanitation and Water Resources and Education) and major development partners including USAID to share lessons from ongoing programmes that have provided micro flush toilets to several households and some educational institutions in selected regions in Ghana;

APPENDIX 1 LIST OF RESPONDENTS INTERVIEWED

1. Peter Owusu Antwi, Chief Operating Officer, Biofilcom Ltd.
2. Anthony Owusu, Director – EHSD, Ministry of Sanitation and Water Resources
3. Michael Akumfi Ameyaw, Municipal Environmental Health Officer, Adentan Municipal Assembly
4. Edward Opoku, Household Toilet Team Leader, Adentan Municipal Assembly
5. K. Asare Bediako, Municipal Environmental Health Officer, Sunyani West Municipal Assembly
6. Daniel Antwi, Municipal Environmental Health Officer, Sunyani West Municipal Assembly
7. Adam Wahab, Metropolitan Environmental Health Officer, Tamale Metropolitan Assembly
8. Kwadjo Gyasi, GAMA Sanitation and Water Project, Ministry of Sanitation and Water Resources
9. Gabriel Engmann, GAMA Sanitation and Water Project, Ministry of Sanitation and Water Resources
10. Jesse Danku, Head of Programmes, WaterAid Ghana
11. Atta Arhin, WASH Technical Coordinator, World Vision
12. Theodora Adomako Adjei, Extension Services Coordinator, Community Water and Sanitation Agency
13. Janet Arthur, WASH Policy Officer, Netherlands Embassy
14. Loretta Roberts, Sanitation Specialist, UNICEF
15. Augustine Adams, Program Manager, Global Communities
16. Felix Amofa, Sanitation Specialist, Global Communities
17. Patrick Apoya, CEO Skyfox Limited
18. Samuel Gyabah, CEO Samalex Solutions
19. Michael Asare, Engineer, TREND Group
20. Michael Anyekase, Local Artisan

21. Walter Hughes, Rotary International
22. Salifu Adams, Rotary Club – Tamale
23. Frank Debrah, Rotary Club – Sunyani

APPENDIX 2 QUESTIONNAIRES FOR DATA COLLECTION

MARKET STUDY OF THE MICRO-FLUSH TOILET IN GHANA

KEY INFORMANT INTERVIEW QUESTIONNAIRE

Consent Form

The Rotary Ghana Water and Sanitation Project Host Committee with funding from the Rotary Foundation under the Rotary International (RI) – United States Agency for International Development (USAID) Water and Sanitation Project has commissioned a Market Assessment of the Micro-Flush Toilets in Ghana.

The study will assess factors mitigating against the rapid deployment and scaling up of the Micro-flush bio-digester toilet technology in Ghana and provide recommendations for achieving increased uptake especially among residents in low income areas.

This interview will provide valuable input into building the evidence base and framework for actionable recommendations. The questions that would be asked will focus on your thoughts and experience in Ghana sanitation market and the bio-digester toilet technology.

You have been selected by chance for this interview. Your participation is voluntary. All your responses will be confidential. You can choose not to answer any questions, and you can stop the interview at any time. There are no disadvantages to deciding not to participate or not to answer certain questions. However, your cooperation is greatly appreciated.

This interview will take about 30 minutes.

Would you like to ask me anything else about this interview?

Yes _____ No _____

Do you agree to participate in this interview?

Yes _____ No _____

GENERAL INFORMATION

NAME OF INTERVIEWEE:

POSITION:

INSTITUTION:

DATE:

General:

1. What household toilet technologies are you familiar with?
2. What institutional toilet technologies are you familiar with?
3. Are you familiar with the micro flush bio-digester technology?
4. How have you used the micro flush bio-digester technology in your work?

Market Analysis/Pricing:

5. What is the market share (current users) of micro flush bio-digester technology (households, institutions)?
6. Who are the main service providers for this technology?
7. Are the current service providers adequate given the demand?
8. Which alternative technologies are available on the market?
9. Who are the providers of these alternative technologies?
10. Which technology is most preferred? Why – provide demand and supply factors?
11. What is the unit cost of the micro flush bio-digester toilet?
12. What is the price of existing alternatives to the micro flush bio-digester toilet?

Willingness/ability to pay:

13. What segment of the market (socio economic segment) uses micro flush bio-digester technology?

14. What proportion of the market is currently served with the micro flush bio-digester technology?
15. What price did consumers pay for the micro flush bio-digester toilet?
16. Was the price of the micro flush bio-digester toilet subsidised? And by who?
17. How were consumers able to finance construction of the micro flush bio-digester toilet?
18. Do you see any gaps in access to finance for installation/construction for users?
19. What could be done to address the gaps?

User Experience

20. What has been users' satisfaction with the time it takes to complete installation of the micro flush bio-digester toilet?
21. What has been users' satisfaction with the durability of the micro flush bio-digester toilet?
22. What has been users' satisfaction with the convenience of using the micro flush bio-digester toilet?
23. What has been users' satisfaction with the aesthetics/beauty of the micro flush bio-digester toilet?
24. What has been users' satisfaction with odour (if any) from the micro flush bio-digester toilet?

Production

25. Where do producers/providers source inputs?
26. Are inputs readily available?
27. Are inputs readily accessible?
28. Are inputs available in the preferred quality?
29. Are inputs appropriately priced?

30. How does access to inputs for the micro flush bio-digester toilet compare with other technologies?
31. Do you see any gaps in access to inputs?
32. What could be done to address the gaps?

Enabling Environment

33. What do you see as the greatest needs in terms of the policy to boost sales and use of micro flush bio-digester toilet?
34. What do you see as the greatest needs in terms of the regulatory environment to boost sales and use of micro flush bio-digester toilet?
35. What do you see as the greatest needs in terms of standardization to boost sales and use of micro flush bio-digester toilet?

MARKET STUDY OF THE MICRO-FLUSH TOILET IN GHANA

HOUSEHOLD/USERS/NON USERS QUESTIONNAIRE

Consent Form

The Rotary Ghana Water and Sanitation Project Host Committee with funding from the Rotary Foundation under the Rotary International (RI) – United States Agency for International Development (USAID) Water and Sanitation Project has commissioned a Market Assessment of the Micro-Flush Toilets in Ghana.

The study will assess factors mitigating against the rapid deployment and scaling up of the Micro-flush bio-digester toilet technology in Ghana and provide recommendations for achieving increased uptake especially among residents in low income areas.

This interview will provide valuable input into building the evidence base and framework for actionable recommendations. The questions that would be asked will focus on your access/use of basic sanitation facilities.

You have been selected by chance for this interview. Your participation is voluntary. All your responses will be confidential. You can choose not to answer any questions, and you can stop the interview at any time. There are no disadvantages to deciding not to participate or not to answer certain questions. However, your cooperation is greatly appreciated.

This interview will take about 20 minutes.

Would you like to ask me anything else about this interview?

Yes _____ No _____

Do you agree to participate in this interview?

Yes _____ No _____

GENERAL INFORMATION

NAME:

COMMUNITY:

REGION:

DISTRICT:

DATE:

Household Characteristics

1. How many people live in your **household**? Household means the number of people living under this roof, including you.

2. [Direct Observation] Does the respondent live in a multi-household compound?

Yes	No	Declined to state	Don't know

3. What is the total number of people living in this **compound** including yourself?

4. How many children under the age of 5 live in your **household**?

5. Has one or more of these children under the age of 5 had diarrhoea in the past two weeks?

Diarrhoea means having three or more loose or liquid stools within 24 hours.

Yes	No	Not Applicable	Declined to state	Don't know

6. [If yes to 5] How many of the children under 5 in your household have had diarrhoea in the past two weeks?

None	1%-25%	26%-50%	51%-75%	76%-100%

7. What type of fuel does your household mainly use for **cooking**?

Charcoal		Natural gas	
Wood		Biogas	
Straw/Shrubs/Grass		Kerosene	

Electricity (electric stove)		Coal / Lignite	
Liquefied Petroleum Gas (LPG)		Animal dung	
No food cooked in household		Agricultural crop residue	
Don't know		Decline to state	

8. Does any member of your household own: A working bicycle?

Yes	No	Declined to state	Don't know

9. Does any member of your household own: A working motorbike?

Yes	No	Declined to state	Don't know

10. Does your household have: A Working Car?

Yes	No	Declined to state	Don't know

11. Does any member of your household own: A working Mobile Telephone?

Yes	No	Declined to state	Don't know

12. Does your household have: A working radio?

Yes	No	Declined to state	Don't know

13. Does your household have: A Working Television?

Yes	No	Declined to state	Don't know

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14. Does your household have: A working refrigerator?

Yes	No	Declined to state	Don't know

15. Is there one or more able-bodied adults in the household capable of performing physical labour?

Yes	No	Declined to state	Don't know

16. What is the primary occupation of the highest-earning member of your **household** (including yourself)?

No occupation		government employee/civil servant	
farming		driver	
raising livestock to sell		craftsman (carpenter- metal worker- electrician- etc.)	
labor or construction		Banking- finance	
selling agricultural products		owns a food stall or restaurant	
selling other goods		selling food	
teaching		Owns a business that is not a farm or restaurant	
office worker		Pastor or other religious position	
secretary		Not applicable	
Decline to state		Don't know	

17. Does any member of this household have a bank account?

Yes	No	Declined to state	Don't know

18. Do you or someone living in this household own this dwelling? If "no", then ask: do you rent this dwelling from someone not living in this household?

Own		Don't know	
Rent		Decline to state	
Neither own nor rent			

19. Does this house have electricity?

Yes	No	Declined to state	Don't know

Participant Profile

20. [Direct Observation] Is the participant male or female?

Male	Female

21. How old are you?

Below 18 years	
18- 24 years	
25- 30 years	
31-35 years	
36-40 years	
41-45 years	
46-50 years	
Above 50 years	

22. [Do not read answers out loud] Some people prefer to defecate in the bush or the open, some prefer to defecate in a latrine, and some prefer other places. **What are the places that adult men and women in this household defecate? (mark all that apply)** Probe to ask "Is there any other place?" until they finish

Bush	Latrine	In water body	Declined to state	Don't know

23. [Do not read answers out loud] Some people prefer to defecate in the bush or the open, some prefer to defecate in a latrine, and some prefer other places. **Where are the places that boys and girls over the age of 5 in this household go to defecate (mark all that apply)** Probe to ask "Is there any other place?" until they finish

Bush	Latrine	In water body	Declined to state	Don't know

24. [Direct Observation] According to the answers of the two previous questions, does anyone in this household defecate in a latrine?

Yes	No	Not Applicable	Declined to state	Don't know

If the answer is NO, move to Question 41

25. If the answer to Question 25 is YES, can you show me the toilet facility that you use?

Yes	No	Sends someone to show the facility	Declined to state	Don't know

26. [Direct Observation] Take GPS coordinates of primary sanitation facility

27. [Direct Observation] Is the sanitation-facility on-plot (yard or dwelling)?

Yes, in own dwelling	Yes, in own yard	No, off plot	Not observed

28. [Direct Observation] What type of toilet facility is it? [If “flush” or “pour-flush” and you cannot tell where the waste goes, probe] Where does it flush to?*

Flush/pour flush to piped sewer system		Ventilated improved pit latrine (VIP)	
Flush/pour flush to piped septic tank		Pit latrine with slab	
Flush/pour flush to pit latrine		Pit latrine without slab/open pit	
Flush/pour flush to elsewhere		Composting toilet	
Flush/pour flush to unknown place/not sure/don't know		Hanging toilet/hanging latrine	

29. [Photo] Take a photo of the sanitation facility (ask for permission first)

30. [Direct Observation] Is the sanitation facility in working order?

In working order	Not in working order
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31. **Only if not in working order**, [Direct Observation] why is the sanitation facility not functioning as intended?

Facility is unreliable		Facility is flooded	
Facility is unhygienic		No water	
Facility is poorly constructed		Locked	
Pit full			

32. [Direct Observation] Is the inside of the sanitation facility soiled with faeces?

Yes	No

33. [Direct Observation] Is there evidence of faeces on the ground within 10 meters of the sanitation facility?

Yes	No

34. [Direct Observation] Is there an unpleasant or offensive smell within the sanitation facility which could discourage use of the facility?

Yes	No

35. Only answer if you responded to using a micro flush facility. [Direct Observation] Is there evidence of cracking or damage to the toilet pedestal?

Yes	No

36. Only answer if you responded to using a micro flush facility. [Direct Observation] Is there any damage to the pipes or plumbing?

Yes	No

37. Only answer if you responded to using a micro flush facility. [Direct Observation] Is the pit uncovered?

Yes	No

38. Only answer if you responded to using a micro flush facility. [Direct Observation] Is the cover slab incompletely sealed?

Yes	No

39. Only answer if you responded to using a micro flush facility. [Direct Observation] Is there evidence that the pit or septic tank is full, overflowing or allowing wastes to leak onto the ground?

Yes	No

40. Only answer if you responded to using a micro flush facility. [Direct Observation] Are excreta discharged directly to the ground or to an open sewer or drain/gutter?

Directly to the ground	To an open sewer or gutter

41. Where do you usually go to toilet?

On premises	Outside premises	Declined to state	Don't know

42. Does anyone else in this household use this same toilet?

Yes	No	Declined to state	Don't know

43. If yes, how many members of your household use this same toilet?

44. What type of toilet facility do you use?

V I P	K V I P	B i o d i g	W C	A q u a p r	O p e n d e f e c a t i	D e c l i n e d	D o n ' t k
-------------	------------------	--------------------------------	--------	--------------------------------	--	--------------------------------------	--------------------------------

		e s t e r		i v y	o n	t o s t a t e	n o w

45. Do other members of your household use this same facility

Yes	No	Declined to state	Don't know

46. Are there ever times during the dry season when you are unable to use the toilet you normally use?

Yes	No	Declined to state	Don't know

47. Are there ever times during the rainy season when you are unable to use the toilet you normally use?

Yes	No	Declined to state	Don't know

USER EXPERIENCE (only users of biodigester toilets)

48. When did you/your family acquire this toilet facility?

Within the last 6 months	
Within the last 1 year	
More than a year ago or so	
More than 2 years ago	
Not sure	

49. When you first decided to acquire this toilet, who encouraged you to do so? Please tell me Yes or No, as I read out from my list (refer to Table below).
50. You mentioned..... Encouraged you to get a toilet. Whose role was the most important? TOP RANK ONLY

	Encourage	Top Rank
Members of the WSMT ²⁰ recommended that we get a toilet		
Husband recommended that we get a toilet		
Children recommended that get a toilet		
Friends / Neighbours recommended that we get a toilet		
District Assembly official recommended we get a toilet		
Donor project (e.g. GAMA)		
Since my friends / neighbours were acquiring similar toilets		
Artisan/Vendor approached us and recommended that we get a toilet		
Others		

51. I am now going to read out some statements regarding the micro flush toilet. I want to know how much you agree or disagree with the statements. If you disagree completely, please give 1 star. If you agree completely, please give 5 stars. We want to know what you feel. There are no right or wrong answers.

TICK START		1 - I do not agree with this at all	2 - I disagree	3 - Maybe, I am not so sure	4 - I agree, but not completely	5 - I completely agree with this
	Micro-flush bio digester toilet disposes off toilet safely	1	2	3	4	5
	Micro-flush bio digester toilet looks clean and impressive in	1	2	3	4	5

²⁰ Water and Sanitation Management Team

	appearance					
	Micro-flush bio digester toilet is free from flies	1	2	3	4	5
	Micro-flush bio digester toilet does not emit bad odour	1	2	3	4	5
	Micro-flush bio digester toilet does not use too much water	1	2	3	4	5
	Micro-flush bio digester toilet can be used in both rainy and dry season	1	2	3	4	5
	Micro-flush bio digester toilet does not emit faecal matter into the env't.	1	2	3	4	5
	Micro-flush bio digester toilet is user friendly	1	2	3	4	5
	Micro-flush bio digester toilet is built to last	1	2	3	4	5
ALWAYS AT END	Micro-flush bio digester toilet is the best quality toilet among all the options available	1	2	3	4	5

COST AND FINANCING

52. How much money did you spend to acquire the micro flush bio digester toilet?

Up to 600 cedis	
600 – 1100 cedis	
1101 – 2000 cedis	
2001 – 3000 cedis	
3001 – 5000 cedis	
Above 5000 cedis	

53. Is the price of the micro flush bio digester toilet affordable as compared to other alternatives?

Yes	No	Declined to state	Don't know

54. How much time did it take for you to raise the required funding?

One day	
1-3 days	
4-10days	
11-21days	
21-60days	
Above 60 days	

55. How were you able to raise the required funding

Personal savings	
Loan from a friend	

Loan from a relative	
Sold a property	
Hire purchase	
Loan from a financial institution	

56. Did you encounter any challenge in raising the required funding

Yes	No	Declined to state	Don't know

57. In raising the required funding, did you receive any funding subsidy from a project or government agency?

Yes	No	Declined to state	Don't know

58. How much time did it take for you the toilet to be installed after making full payment?

One day	
1-3 days	
4-10days	
11-21days	
21-60days	
Above 60 days	

59. Were you satisfied with the time it took for the micro flush bio digester toilet to be installed?

Yes	No	Declined to state	Don't know

60. Did you receive any orientation on how to use the micro flush bio digester toilet?

Yes	No	Declined to state	Don't know

61. Were you satisfied with the orientation you received on the use of the micro flush bio digester toilet?

Yes	No	Declined to state	Don't know

62. Do you know anyone you could contact if you have problems with the use of the micro flush bio digester toilet?

Yes	No	Declined to state	Don't know

63. Would you recommend the micro flush bio digester toilet if someone asked you for the best toilet facility? SINGLE CODING ONLY.

Will tell people not to use the micro flush bio digester toilet	1
Will probably not recommend the micro flush bio digester toilet	2
Not sure at this point of time	3
Will probably recommend the micro flush bio digester toilet if someone asks me	4
Will definitely recommend the micro flush bio digester toilet, if I see someone using some other toilet facility	5

64. Considering everything that we have discussed regarding your interaction with the micro flush bio digester toilet, how satisfied are you with the technology?

1	2	3	4	5
Very Dissatisfied, really unhappy	Not satisfied	Ok, but can be better	Satisfied but there are minor issues	Extremely satisfied and Happy with all aspects

NON USERS

65. Are you familiar with the micro flush bio digester toilet?

Yes	No	Declined to state	Don't know

66. **If yes**, how did you get to know of the technology/facility (refer to Table below).

67. You mentioned..... which is your most important source? TOP RANK ONLY

	Encourage	Top Rank
Members of the WSMT		
Relations		
Media		
Friends / Neighbours		
District Assembly officials		
Donor project (e.g. GAMA)		
Private contractor / Artisan/Vendor		

68. Are you interested in obtaining a micro flush bio digester toilet?

Yes	No	Declined to state	Don't know

69. If yes, why? (refer to Table below).

70. You mentioned..... which is your most important reason? TOP RANK ONLY

	Reason	Top Rank
Convenient		
Affordable		
Impressive/aesthetics		
Durable		
Environmentally friendly		
User friendly		
Portable (uses less space/land)		
Others		

71. At what price will you be willing to pay for a micro flush bio digester toilet?

Up to 600 cedis	
600 – 1100 cedis	
1101 – 2000 cedis	
2001 – 3000 cedis	
3001 – 5000 cedis	
Above 5000 cedis	

72. How long will it take for you to raise the required funding for the micro flush bio digester toilet?

One day	
1-3 days	
4-10days	
11-21days	
21-60days	
Above 60 days	

73. How will you raise funding for the micro flush bio digester toilet?

Personal savings	
Loan from a friend	
Loan from a relative	
Sell a property	
Hire purchase (use now and pay later)	
Loan from a financial institution	

74. By what means would you prefer to make payment for the micro flush bio digester toilet?

Cash payment/deposit at bank	
Bank transfer into a bank account	
Mobile money payment	
Pay to a contractor/artisan	
Declined to state	
Other	

MARKET STUDY OF THE MICRO-FLUSH TOILET IN GHANA

INSTITUTION/USERS/NON USERS QUESTIONNAIRE

Consent Form

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The study will assess factors mitigating against the rapid deployment and scaling up of the Micro-flush bio-digester toilet technology in Ghana and provide recommendations for achieving increased uptake especially among residents in low income areas.

This interview will provide valuable input into building the evidence base and framework for actionable recommendations. The questions that would be asked will focus on your access/use of basic sanitation facilities.

Your institution has been selected by chance for this interview. Your participation is voluntary. All your responses will be confidential. You can choose not to answer any questions, and you can stop the interview at any time. There are no disadvantages to deciding not to participate or not to answer certain questions. However, your cooperation is greatly appreciated.

This interview will take about 20 minutes.

Would you like to ask me anything else about this interview?

Yes _____ No _____

Do you agree to participate in this interview?

Yes _____ No _____

GENERAL INFORMATION

NAME:

COMMUNITY:

REGION:

DISTRICT:

NAME OF SCHOOL:

DATE:

Basic Characteristics

75. How many people are in this school?

SCHOOL POPULATION	KG/PRIMARY		JHS		TOTAL	
	M	F	M	F	M	F
Pupils						
Teachers						
Food Vendors						
Others						

76. What type of toilet facility does your school normally use?

Type of facility	How many rooms does it have?			
	Boys	Girls	Others	Total

77. Are there ever times during the dry season when the school is unable to use the toilet they normally use?

Yes	No		Declined to state	Don't know

78. Are there ever times during the rainy season when the school is unable to use the toilet they normally use?

Yes	No	Declined to state	Don't know

79. What type of water facility/service is available in the school?

Rainwater harvesting	Borehole	Piped connection	Hand dug well	

USER EXPERIENCE (only users of biodigester toilets)

80. When did your school acquire this toilet facility?

Within the last 6 months	
Within the last 1 year	
More than a year ago or so	
More than 2 years ago	
Not sure	

81. Who provided the toilet facility?

District Assembly	
Donor project (e.g. GAMA)	
School	
Donation from PTA/old students	
Missionary	
Others (specify)	

82. I am now going to read out some statements regarding the micro flush toilet. I want to know how much you agree or disagree with the statements. If you disagree completely, please give 1 star. If you agree completely, please give 5 stars. We want to know what you feel. There are no right or wrong answers.

TICK START		1 - I do not agree with this at all	2 - I disagree	3 - Maybe, I am not so sure	4 - I agree, but not completely	5 - I completely agree with this
	Micro-flush bio digester toilet disposes off toilet safely	1	2	3	4	5
	Micro-flush bio digester toilet looks clean and impressive in appearance	1	2	3	4	5
	Micro-flush bio digester toilet is free from flies	1	2	3	4	5
	Micro-flush bio digester toilet does not emit bad odour	1	2	3	4	5
	Micro-flush bio digester toilet does not use too much water	1	2	3	4	5
	Micro-flush bio digester toilet can be used in both rainy and dry season	1	2	3	4	5
	Micro-flush bio digester toilet does not emit faecal matter into the env't.	1	2	3	4	5
	Micro-flush bio digester toilet is user friendly	1	2	3	4	5
	Micro-flush bio digester toilet is built to last	1	2	3	4	5
ALWAYS AT END	Micro-flush bio digester toilet is the best quality toilet among all the options available	1	2	3	4	5

COST AND FINANCING

83. How much money did your school spend to **acquire** the micro flush bio digester toilet?

Up to 600 cedis	
600 - 1100 cedis	
1101 - 2000 cedis	
2001 - 3000 cedis	
3001 - 5000 cedis	
Above 5000 cedis	

84. How much money does your school spend to **operate and maintain** the micro flush bio digester toilet per term?

Item	Cost
Toilet Roll (x1 per pupil per term)	
Soap for Hand washing (x1 per pupil per term)	

Detergent for cleaning per term (10lt)	
Soap for scrubbing (10lt)	
Scrubbing Brushes (x2 per term)	
Brooms (x2 per term)	
Mop with bucket	
Duster (x3 per term)	
Ceiling brush	
Gloves	
Rubber Boots	
Nose Mask	
Desludging per term (approximately every 45 days during school term – tank size 54m ³)	
Sanitary Janitor (for a term but paid monthly)	
Water (for a term but paid monthly)	
Electricity (for a term but paid monthly)	
Others (specify)	
Total cost per term	

85. Is the price of the micro flush bio digester toilet affordable as compared to other alternatives?

Yes	No	Declined to state	Don't know

86. Were you satisfied with the time it took for the micro flush bio digester toilet to be installed?

Yes	No	Declined to state	Don't know

87. Did you receive any orientation on how to use the micro flush bio digester toilet?

Yes	No	Declined to state	Don't know

88. Were you satisfied with the orientation you received on the use of the micro flush bio digester toilet?

Yes	No	Declined to state	Don't know

89. Do you know anyone you could contact if you have problems with the use of the micro flush bio digester toilet?

Yes	No	Declined to state	Don't know

90. Would you recommend the micro flush bio digester toilet if a school requested you for the best toilet facility? SINGLE CODING ONLY.

Will tell other schools not to use the micro flush bio digester toilet	1
Will probably not recommend the micro flush bio digester toilet	2
Not sure at this point of time	3
Will probably recommend the micro flush bio digester toilet if someone asks me	4
Will definitely recommend the micro flush bio digester toilet, if I see a school using another toilet facility	5

91. Considering everything that we have discussed regarding your interaction with the micro flush bio digester toilet, how satisfied are you with the technology?

1	2	3	4	5
Very Dissatisfied, really unhappy	Not satisfied	Ok, but can be better	Satisfied but there are minor issues	Extremely satisfied and Happy with all aspects

NON USERS

92. How much money does your school spend to **operate and maintain** your toilet facility per term?

Item	Cost
Toilet Roll (x1 per pupil per term)	
Soap for Hand washing (x1 per pupil per term)	

Detergent for cleaning per term (10lt)	
Soap for scrubbing (10lt)	
Scrubbing Brushes (x2 per term)	
Brooms (x2 per term)	
Mop with bucket	
Duster (x3 per term)	
Ceiling brush	
Gloves	
Rubber Boots	
Nose Mask	
Desludging per term (approximately every 45 days during school term – tank size 54m ³)	
Sanitary Janitor (for a term but paid monthly)	
Water (for a term but paid monthly)	
Electricity (for a term but paid monthly)	
Others (specify)	
Total cost per term	

93. Are you familiar with the micro flush bio digester toilet?

Yes	No	Declined to state	Don't know

94. **If yes**, how did you get to know of the technology/facility (refer to Table below).

95. You mentioned..... which is your most important source? TOP RANK ONLY

	Encourage	Top Rank
Members of the WSMT		
Relations		
Media		
Friends / Neighbours		
District Assembly officials		

Donor project (e.g. GAMA)		
Private contractor / Artisan/Vendor		
Other schools		

96. Is your school interested in obtaining a micro flush bio digester toilet?

Yes	No	Declined to state	Don't know

97. If yes, why? (refer to Table below).

98. You mentioned..... which is your most important reason? TOP RANK ONLY

	Reason	Top Rank
Convenient		
Affordable		
Impressive/aesthetics		
Durable		
Environmentally friendly		
User friendly		
Portable (uses less space/land)		
Lower operating cost		
Others		

99. At what price will your school be willing to pay for a micro flush bio digester toilet?

Up to 600 cedis	
600 – 1100 cedis	
1101 – 2000 cedis	
2001 – 3000 cedis	
3001 – 5000 cedis	
Above 5000 cedis	

100. How long will it take for your school to raise the required funding for the micro flush bio digester toilet?

One day	
1-3 days	

4-10days	
11-21days	
21-60days	
Above 60 days	

101. How will your school raise funding for the micro flush bio digester toilet?

Levies	
Loan	
Donations/philanthropy	
Sell a property	
Hire purchase (use now and pay later)	
Loan from a financial institution	

APPENDIX 3 TERMS OF REFERENCE FOR THE STUDY

CONSULTANCY SERVICES FOR A MARKET ANALYSIS / STUDY OF THE MICRO-FLUSH TOILET IN SELECTED COMMUNITIES AND REGIONS IN GHANA UNDER THE RI-USAID WATER & SANITATION PROJECT

INTRODUCTION

Data from the agencies responsible for the water and sanitation delivery indicate that sanitation coverage in terms of household toilets installation is about 15%. To address this huge sanitation gap, there is the need to have varied acceptable toilet technologies that meet set standards from which household can choose their toilet based on their peculiar circumstances including cost.

So with the development of the Micro-flush toilet which is based on the biofill digester technology and which is considered a better appropriate technology suitable for our local setting compared to the other existing toilets, it is expected that this new innovation would enjoy massive deployment and patronage. This is however not the situation and the reason for the lack of a concerted effort to scale up has not been researched into in order to establish what the causative factors are and how to address the challenge moving forward. The research problem therefore is why an innovative toilet such as the Micro-flush toilet with all its advantages appears not to be aggressively promoted for wider implementation in the sanitation sector to contribute towards bridging the gap in toilet installation at both the household and institutional level.

The purpose of the study therefore is to determine the factors mitigating against the rapid deployment and / or scaling up of the Micro-flush Biofill Toilet technology in Ghana. To analyse this research problem, both qualitative and quantitative methods would be used to collect the relevant data from all stakeholders who in one way or the other have been involved or connected with the development, promotion and installation of the Micro-flush toilets. The data to be collected would be analysed using the appropriate tools that would lead to the deduction of the right findings and conclusions including recommendation for scale up as well as for influencing policy decisions with regards to the technological options for latrines acceptable and approved for use in Ghana.

OBJECTIVES

The Problem Statement

Low / non aggressive promotion and installation of the Micro-flush Biofill Toilet to address the sanitation challenge in Ghana despite its numerous advantages or benefit.

The study therefore seeks to investigate and establish

- Whether or not the Microflush Toilet is indeed a superior technology to the KVIP in terms of cost, performance and sustainability
- The factors mitigating against the rapid deployment and / or scaling up of the Micro-flush Biofill Toilet technology in Ghana and to propose solutions moving forward.

STUDY OBJECTIVES

Main Objective

The main objective of the study is to determine the factors that would advance the business planning and implementation, effective marketing for the purpose of scaling up the installation of the micro flush toilet in the sanitation sector.

Specific Objectives

- Study of the market barriers and opportunities facing or available to micro flush small and medium-sized enterprises (SMEs) to succeed and scale
- Engage the developer (designer) of the technology, public institutions, private organizations and individual experts in the sanitation sector in discussions to determine the appropriate next steps needed to advance its wider implementation in the sector
- Engage current users to determine their perception and / or judgement regarding the performance and suitability of the Micro-flush toilet facility

SCOPE OF THE ASSIGNMENT

This is a Cross-sectional inquisitorial study targeting all stakeholders – individuals, groups, organizations & institutions who in one way or the other have been involved or connected to the development, promotion and installation of the Micro-flush Toilets in Ghana. It will involve stakeholder engagement at different locations spread across different Regions in Ghana, including Greater Accra, Ashanti, Brong Ahafo and Northern Regions and the use of varied methodological approaches for data gathering

The quality of the data to be collected in the course of the study, in terms of the validity and reliability, depends on the source of the data, the method of collection as well as the qualification and experience of the persons involved in the collection process. For this reason, the consultant would be required to coordinate and quality assure all the various component of the data collection process including the

preparation of the questionnaire, the interview guide as well as the selection and training of the research assistance who will be doing the actual collection

For this assignment, the consultant, with the guidance of the Rotary Ghana Water and Sanitation Project Host Committee, will be utilizing the Rotarian network of business expertise, both in-country and out-of country (e.g. cadre, WASRAG, etc.) to conduct this product or market analysis or to act as advisors. . The consultant will lead the data collection process and will be required to collaborate and work closely with Rotarians by tapping into the expertise within Rotary.

The investigative study will focus on the following:

1. Identification and engagement of all the key stakeholders
2. Determination of the sample size in terms of the location, category and the number of target respondents
3. Determination of the data collection methods & tools
4. Analysis of the data, deduction of findings and conclusions
5. Reporting of the Results and Recommendations

The consultant should ensure the proper and adequate engagement of all the key stakeholders throughout the conduct of the study.

OUTPUT

The Consultant should attain the following key outputs:

- The report of the Study detailing the processes, findings & conclusions and the extent to which it addresses the objectives of the study as well as recommendations moving forward.
- Four (4) copies of the final comprehensive and complete study report.

ACTIVITIES

The Consultant shall hold initial discussions with Rotary, the designers (or inventors) and the regulators (Ministry of Sanitation & Water Resources & CWSA) regarding their methodology and work plan for the execution of the consultancy services. The Consultant is to undertake the activities listed below and consider others that may be necessary for the achievement of the objectives set out in these terms of reference. The Client however, shall make modification and/or additions to these activities if it is deemed critical for the purpose of achieving the objective of the assignment

Expected Activities

The assignment will include, but not necessarily be limited to the following activities.

- Carry out Desk Study on the Micro-flush toilet (development, promotion & marketing)
- Organize kick-off / Start up meeting involving all the key stakeholders
- Conduct interviews with the relevant stakeholders to gather the required information
- Carry out specific location / field visits to observe, verify /confirm some of the sanitation issues
- Analysis of the data / information gathered, deduction of findings and conclusions
- Organize a meeting involving the key stakeholders to validate the findings & conclusions of the study
- Prepare the study report which should include the Results and Recommendations

METHODOLOGY AND WORKPLAN

Methodology

The Consultant shall provide a detailed methodological framework for executing the assignment in accordance with the technical proposals. The proposed methodology should be appropriate in approach and design in order to achieve the objectives set out. It will be essential to indicate very clearly how the proposed methodology will ensure the attainment of the objectives. The methodology should include a description of how the consultant will quality-assure his work, materials and reports.

Work-Plan

The consultant shall present a detailed work plan according to the requirement set out in this RFP document. The proposed work-plan shall be discussed with the Rotary Ghana Host Organizing Committee (HOC) of the Project and reviewed where necessary and the final plan to be agreed upon shall be strictly adhered to by the consultant. The assignment is expected to start by September 2019 and follow the work-plan proposed by the Consultant. The assignment shall be carried out in close collaboration with the HOC and the project implementing partners.

INPUTS

The Consultant's Input

For the proper execution of the assignment, the Consultant shall provide/hire the following inputs:

- Two (2) suitably qualified staff Research Assistants as proposed in the technical proposal for the assignment and shall not change any staff proposed without the approval of the client.
- Stationery, consumables for production of materials and the relevant reports as well as document/drawing reproduction and computing capacity as required;
- All transport or vehicles required for the assignment (*for own staff*) with all day to day running expenses, insurance etc. of these vehicles;
- All office facilities, accommodation and subsistence necessary for the assignment;

The staff requirement for this assignment is expected to include the following:

- Team Leader: MSc Civil / Sanitation Engineering /MSc Water & Environmental Engineering with minimum of 10 years post qualification experience and 7 years' experience in proposed position.
- Data Collectors (2No): Minimum qualification of HND in Civil / Environmental / Sanitation Engineering with minimum of 5 years post qualification experience and 3 years' experience in proposed position.

The Client

Relevant Materials and other documents prepared by the Host Organizing Committee (HOC) shall be made available to the consultant

The use of these shall not relieve the consultant from any responsibility for correctness and quality of the documents and work executed under this assignment.

All Materials and other documents prepared, as part of this assignment shall be made available to the Host Organizing Committee of the RI-USAID Water & Sanitation Project, in both soft and hard copies and shall be the bonafide property of the Rotary Ghana Water & Sanitation Committee

The client shall be responsible for facilitating the organization of both the start-up and validation workshops including the associated cost.