

TECH TIMES & BUZZ

Technology Applicability Framework

TAF assessment of the Divya Washing Machine

The Divya Washing Machine, an off-grid hand-cranked device that uses mechanical energy to agitate and clean clothes. The machine has a stainless steel 5kg drum capacity designed to use 30l of water per washing cycle, save detergent use, save up to 75% of time and 50% of water compared to washing of clothes using hands. The machine takes 30-minute wash time and 10-minute contact time.

For the period 2023-2024 the UK based Washing Machine Project (TWMP) distributed a total of 12 Divya washing machines to households, schools and community groups in Mayuge, Wakiso and Kampala. The organization's rationale for distribution of these machines was to alleviate the burden of traditional washing and empower women in vulnerable and low-income communities.

According to the producer/promoter, the technology has a clear objective based on research i.e., to ease washing for the vulnerable women, reduce the risk of back straining experience due to bending for long hours and inflammation caused by use of detergent during the process of washing clothes. A single unit cost between USD 300-400 however the machines are distributed free of charge because the technology promoter's interest is basically humanitarian.

The technology was subjected to TAF to evaluate its applicability and appropriateness in relation to six dimensions i.e., Technological, legal, environmental, skills and know how, social and economic. The evaluation took into account three perspectives i.e., the producer/promoter, regulator and user perspective.

During the TAF exercise, 12/16 machines distributed in Uganda were assessed. The assessed machines are used in schools (05), orphanage (01), community healthcare Centre for children with disabilities (03), women groups (02) and households (01). At the time of assessment, one out of the twelve (1/12) machines assessed was not functional.

A synopsis of the results position the Divya Washing Machine with a lot of positive traits and it is appreciated by the target communities who indicated that it has helped them to lessen the burden of washing as well as shorten the washing period. Nakandi of Gayaza who washes people's clothes for a livelihood was happy with the machine. She shared experience of how she got relief, no longer has to endure back pain, hands bruising due to washing and she now



washes double the clothes she used to wash before acquiring the machine. This change comes with her making more money daily. The machine can even be used in the very remote areas since it does not require use of electricity and involves manual supply of water. Detailed assessment results will soon be disseminated in a stakeholders' workshop during which the long-term future of the technology will be discussed.



Undoing borehole Rot using the Poldaw



Technical breakdown accounts for over 45% of non-functionality of point water sources. Corrosion/rotting of pump cylinder, socket joints, riser mains, pump rods and pump bucket is one of the key factors associated with technical breakdown of point water sources. WaterAid carried out a fact finding study in 2014 in North-eastern Uganda where 91% of the water sources studied (n=34) had high iron concentration. The investigations were expanded by dismantling select boreholes and assessing the installations to which results indicated the challenge of corrosive iron that would not allow the water source serve for more than a year. Against this background, WaterAid is piloting use of Poldaw PVC/Steel coupling riser main configuration. Under the pilot, 100 boreholes were upgraded i.e., 16 in Kabalore and 84 in Masindi district and performance monitoring is on-going. In December 2024, a team from the Ministry of Water and Environment specifically from Rural Water Supply and Sanitation Department (RWSSD), ATC and WaterAid carried out the periodic project monitoring to assess performance of upgraded boreholes. During the exercise, four (04) boreholes picked randomly were assessed. These boreholes were dismantled and system components examined.

All the four boreholes assessed had served the respective communities for at least a year since upgrade. During the exercise, the state of system parts i.e., pump bucket, bobbins, sockets, water tank, riser main and rods were checked. In addition, water quality and flow rate were tested.

Results were promising especially with regard to addressing the challenge of corrosion. Key system components that prior corroded were still intact and functioning well except the GI sockets that had corroded. Water quality was still compromised owing to the fact that all the sampled water sources were not cased and not flushed prior to upgrade. For Nyabubale and Kibamba boreholes, GI pipes fell in prior but these were not fished out and there is a high likelihood that they are rotting disposing iron in the water. Test results showed relatively higher iron levels (table below) that can be reduced by addressing the observed snags.



Borehole identifier name	Nyabubale primary school	Kibamba TC	Kibibira primary school	Rwensa community	WHO water quality standards
Iron concentration	0.5mg/l	1.5mg/l	Not checked	0.5mg/l	<0.3 mg/l
Conductivity	428	113	Not checked	160	500-1000 μ S/cm
pH	7.65	7.79	Not checked	8.22	6.5 -8.5

Users appreciate the improved functionality of their water sources. Prior, boreholes would break down like four times in a year. Since upgrade i.e., one full year now 3/4 boreholes had not broken down except Kibibira borehole that broke down once due to issues with the pump bucket. However,

users observed that water yields reduced after upgrade. The assumption was that the new plunger and foot valve allow in less water. To this effect, the technical team made modifications in effort to address the challenge. For all the four boreholes monitored a second pump bucket was added and long bobbins were re-

placed with shorter ones. After modifications, the average discharge rate stands at 15.2l/min with an average of 74.5 full strokes. The 63m deep Nyabubale borehole has the least discharge rate i.e., 11.8l/min and 78 full strokes. This is above 8.3l/min according to the Technical Specification Manual by Ministry of Water and Environment.



Menstrual Hygiene Management in Schools:

Skilling teenagers in production of safe and low cost sanitary pads



Lack of proper Menstrual Hygiene Management (MHM) services is repeatedly highlighted as one of the factors associated with school dropout and urogenital infections. In the recent years, there is growing effort to address challenges of poor menstrual hygiene management however more emphasis is on MHM education and this has not yielded much positive results because the real game changer i.e., technological options are lacking. According to Ministry of Education and Sports over 1.2 million girls aged 12-18 years face challenges relating to MHM. Discrepancies are more in rural areas where access to improved costly disposable sanitary pads is hard and instead old clothes are still used as towels for menstrual management. ATC

comes in with a handy solution i.e., training pupils/students and the school community at large to locally produce safe sanitary pads that can be used by all females in the school. The major input materials in the production process are banana pseudo stem and waste papers both of which are locally available for the school to continue production of sanitary pads. Training is coupled with provision of the necessary machines and start-up supplies. Trainings are followed with periodic monitoring and continued mentoring of trainees. In November 2024, 30 students and 02 teachers of St. Joseph Kibuzi secondary school got the opportunity to be trained. It was a five days training full of hands-on activities using the “do it from first principle” paradigm. Trainees appreciated the training for being practical and for the special skills they acquired, besides opening their eyes on the value of banana pseudo stems that they had been disposing carelessly.



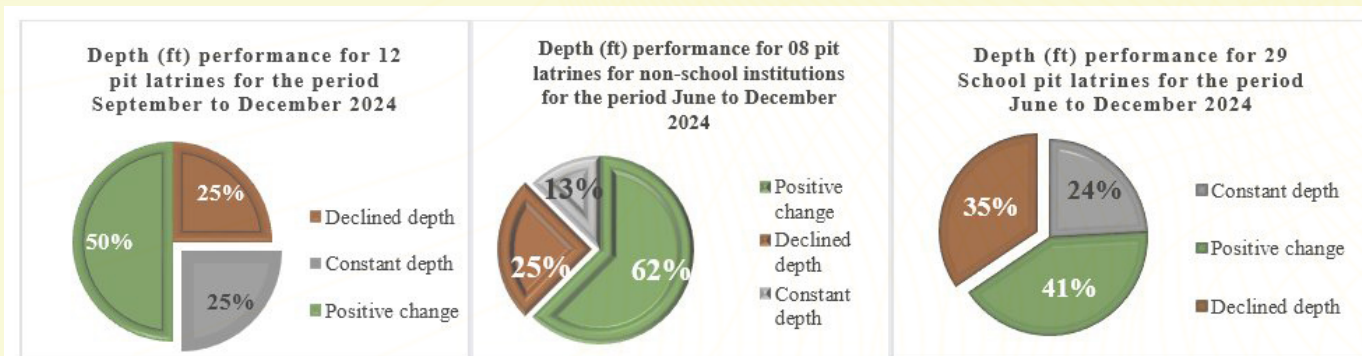
Sanitation

Piloting use of locally made organic bio-enzyme to improve functionality of pit latrines

In June 2024 the Centre embarked on a pilot project aimed at profiling the use of bio-enzyme as an organic and locally produced solution for improving functionality of pit latrines. The pilot started with baseline assessment aimed at benchmarking intervention progress. The project currently running in Mukono and Kayunga district covers 24 institutions under two cohorts i.e., one that started in June 2024 (June cohort) and the other that started in September 2024 (September cohort). The June cohort has 8 schools, one healthcare facility, three places of worship, one police station and one district local government administration block. In total it has 14 institutions with 37 pit latrines.

The September cohort on the other hand has six primary schools with a total of 12 pit latrines. Altogether, the study is being carried out on 49 pit latrines i.e., 32 unlined and 17 lined. The study involves weekly dosing of latrines with bio-enzyme and observation of performance. Four parameters are observed i.e., depth, presence of flies, presence of maggots and presence of odor. The study is planned to run for one year and has so far run for 27 and 10 weeks for June and September cohorts respectively.

Preliminary results below position the bio-enzyme solution as ideal for management of odor, flies and maggots in pit latrines. Results also highlight the potential for bio-enzyme to improve pit depth performance (figures below).



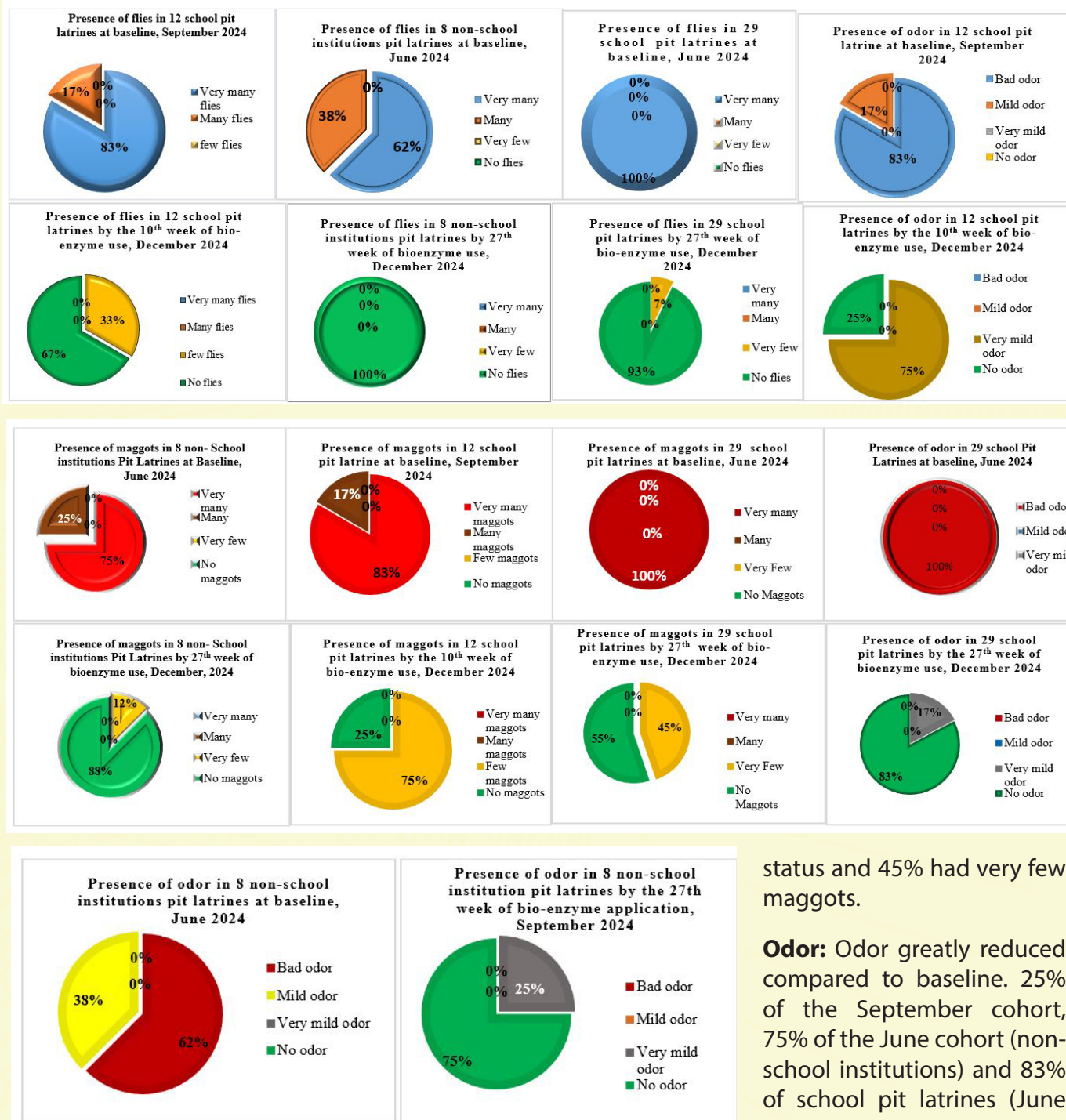
Pit depth: 50%, 41% and 62% pits respectively registered positive change. The positive change registered is between 1ft to 10ft recovered. Ndeeba secondary school registered the most successful story. Other institutions that registered positive pit depth change include; Miracle World Ministries (church), Kyabakadde C/U primary school, Masjid Noor, Kayunga Police Station, Kayunga Town Council and St. Matiya Mulumba Nenyodde primary school.

A constant depth registered by Ndeese primary school, Tente primary school, Nassejjobe UMEA primary school, Ndeeba C/U primary school, Namulanda CU primary school and Nama UMEA primary school despite continued latrine use can also be seen as a positive change.

Six institutions including Ntenjeru HC, Kyabakad-

de RC primary school, Bishop Brown primary school, Kanjuki secondary school, Kayunga girls' school and Nakifuma CU primary school registered a positive change i.e., for one of their pit latrines and a decline for the other pit latrine.

Institutions including Namagabi UMEA primary school, Kayunga Hospital Mosque, Lweza primary school, St. Joseph primary school and Mukono boarding primary school registered pit depth reduction. These facilities were found to have operation and maintenance challenges. For example, pit analysis revealed that Namagabi UMEA school pit latrine had a high volume of plastic bottles thrown in. The school population is largely Muslim. Muslim students use bottles for routine ablution after which they dispose the bottles in the latrines. The same challenge was observed for Kayunga hospital mosque.



status and 45% had very few maggots.

Odor: Odor greatly reduced compared to baseline. 25% of the September cohort, 75% of the June cohort (non-school institutions) and 83% of school pit latrines (June cohort) completely had no odor. The other percentage i.e., 75%, 25% and 17% respectively had very mild odor (figures above).

Institutions appreciate the bioenzyme technology for improving usability of pit latrines. The study is still ongoing and results will be shared accordingly.

Flies: There was improvement in pit conditions in terms of comfort and usability. Flies have been eliminated in June cohort i.e., 93% of school pit latrines, 100% of non-school institution pit latrines and 67% of the September cohort pit latrines. The other percentage i.e., 33% for September cohort and 7% for schools under the June cohort are on track to improvement given that they have been able to move from many flies' condition at baseline to few flies.

Maggots: Maggots in pit latrines greatly reduced in the three pit latrine categories i.e., in the September cohort 25% registered a status of no maggots by the 10th week, 75% pit latrines have few maggots. 88% of the non-school institutions pit latrines under the June cohort registered a no maggots' status and the other 12% still have few maggots. 55% schools under the June cohort registered a 'no maggots'

Sunda for Enhanced Water Management

Sunda technology is an innovation by Sunda Technology Global Co. Ltd, originating from Japan. The technology is used on point water sources (boreholes) to ease access, user fees collection and regulate use of water. It is a solar based system with a sensor that transmits data to a central data management system. This helps the operator to monitor and provide timely rehabilitation services in case of system breakdown.

As part of Sunda, water users are provided with coin-like cards where water credit is loaded and the card owner can access water any time of the day without having to rely on the presence of the caretaker. User fees are directly wired to the bank from the card as one fetches water, minimizing loopholes and user fees mismanagement. Over 300 boreholes in Mubende, Nakaseke, Luwero, Mityana, Gomba, Butambala and Kassanda district have been installed with Sunda technology. There are plans to install not less than 3000 new systems beginning with the year 2025.

Mubende Service Centre under the Rural Water Supply and Sanitation Department (RWS-SD) of the Ministry of Water and Environment is piloting use of Sunda technology for improving operation and Maintenance of point water sources. 233 boreholes in Mubende were upgraded with Sunda technology and the service Centre oversees their daily operation and maintenance through routine



monitoring, quality assurance, support supervision, snag management and community mobilization to embrace the technology.

A team from ATC and WaterAid carried out a benchmark visit to learn about the Sunda technology in real-life setting. During the visit, physical inspection was carried out on two boreholes in addition to interaction with water users to explore their perceptions, attitude and experiences about using the technology. Based on field findings, Sunda technology presents quite a number of good attributes. According to users, Sunda system was installed five years back and since then their boreholes have never broken down for even a single day. The only challenge faced is the relatively hard pump handle i.e., water users indicated that the pump handle on a 42m deep borehole is so hard for easy pumping by the vulnerable people. Pump test carried out indicated that on average it takes 95 strokes in 1 minute and 50 seconds to fill a 20l jerrycan. On the other hand, the 39m deep Kazo East community borehole is fairly softer to pump, taking 83 strokes in 1 minute and 27 seconds to fill up a 20l jerrycan.

We recommended subjecting the technology to Technology Applicability Framework (TAF) assessment to inform the sector and increase its probability of success.



ATC: The One-stop water, sanitation, hygiene and environment (WaSHE) technologies exposure and Learning Centre

There is growing recognition of ATC's role by institutions of higher learning. These institutions appreciate that ATC provides their learners with the opportunity to visualize learning and trigger creativity aimed at addressing WaSHE challenges. As such the number of institutions seeking to bring their learners to ATC for exposure learning has increased. In the gone quarter, students from three health science training institutions i.e., Kampala School of Health Sciences (41 students), Mildmay Institute of Health Sciences (24 students) and Uganda Institute of Allied Health and Management Science (UIAHMS) Mulago (150 students) visited the ATC basically to;

- i) Broaden their theoretical and practical knowledge of the existing water, sanitation, hygiene and environmental conservation innovations
- ii) Interact with experts and gain insight into sustainable solutions for global WaSHE challenges

iii) Foster collaboration between academic institutions and the Centre for applied research based on shared commitment to equip students with knowledge and skills necessary for advancing community health and environmental sustainability.

By the end of the exposure visit, students appreciated various technologies promoted at the Centre. They praised the practical approach and hands-on demonstrations, indicating that the exposure helped them to bridge the gap between theory and practice and gain more insight into the practical world. A number of students expressed interest in pursuing internship and collaborative projects with the ATC. They also wanted opportunities to collaborate on the going activities at the Centre so as to advance their skills.

Technology transfer drive highly appreciated: ATC technologies are a livelihood game changer!

"The ATC team is special with good intentions for us. Truth be told, they are very understanding and patient teachers. Even when you need to talk to them they listen and are always willing to give free technical advice. Choosing us out of more than 130 districts is too good to be true. It will be unfortunate if their operations in Mukono end without many of us adopting the good technologies...surely we shall have no one to blame. My appeal to members present today let us expand this project for the good of greater Mukono. We need to make use of this opportunity and adopt biogas and those other cheap technologies ATC is promoting to benefit our individual homes" Ajuk Margaret.

"I am grateful to ATC for giving me the opportunity to excel as a female mason. They support my career ... they have taken me to different learning platforms, given me opportunities to construct rainwater harvesting tanks, sanitation and biogas facilities. They have given me community exposure working with them since 2004. Together we have skilled women and supported them to grow their livelihood skills as masons. I am grateful to the management of the Centre for their dedication to uplift women. They always pick up, nurture and support women to be development movers and not spectators" Nabusayi Joyce, mason from Katosi Women Development Trust.

"I thank ATC for coming to add value to us through teaching us most appropriate ways of using things within our surroundings. I appeal to my people to take the opportunity serious amidst the increasing scarcity of firewood and high prices of charcoal. Using biogas will help us reduce the demand for firewood and charcoal, improve our living standards at home and also provide us with safe fertilizers for our gardens. I thank the Uganda government for establishment of ATC and facilitating it to come to us with handy technologies. The onus is on us to adopt these technologies to add value to our homes, agriculture and also increase opportunities for making/saving more money to educate our children and also meets demands of basic needs at home" Deputy Mayor, Ntenjeru TC.