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SMART Centres. A promising approach to reach WaSH related SDGs

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Introduction

A number of WaSH related challenges in developing countries, especially in Africa, include:

- Reaching SDG6, including "the last mile"- people in small rural communities
- Reducing costs and increasing the functionality of hand pumps for rural water supply
- Reaching SDG1 (Poverty), SDG 2 (Food security) and SDG 8 (Employment)
- Increasing the resilience of rural families to climate change

Methods

One way to tackle these challenges is the SMART approach. SMART stands for Simple, Market-based, Affordable, Repairable Technologies with a focus on water and sanitation. This approach is applied by SMART Centres who train the local private sector in technical and business skills. The centres are part of the SMART Centre Group which allows them to unite efforts and exchange experiences. The group is coordinated by the Dutch social Enterprise MetaMeta and is supported by organisations like Aqua4All and the Skat Foundation. The long-term goal of the centres is to bring knowledge into local structures and national vocational education. See also www.smartcentregroup.com
The SMART approach has the following pillars:

1. Applying innovative technologies (SMARTechs) to reduce cost of water and sanitation
2. Training the local private sector to build commercial supply chains of affordable technologies
3. Applying innovative approaches that include: promotion of Household water filters, scaling-up self-supply, Family Based Management, Well clubs and Faith & WaSH training

1. Innovative Technologies

Examples of SMARTechs include manual drilling of tube wells (boreholes), rope pumps, EMAS pumps, Wire-brick-cement and EMAS tanks to store rainwater, Tube recharge to avoid that wells dry up, low pressure drip irrigation, household water filters, corbelled and SaTopan latrines, Wash buckets, Tippy Taps and Dip taps for hygiene. These and other technologies can drastically reduce the cost of rural water supply. For instance, the cost of manual drilling is significantly lower than for machine drilled wells at 10 to 25% of the cost, (Danert, 2015). Cost of a locally produced SHIPO drill set is approx. $1000 and drills up to 50 m deep. A Mzuzu drill set drills wells to 25 metres deep costs approx. $300. Locally produced EMAS or rope pumps cost $40 -$120 and can pump from 40 metres deep. Corbelled latrines can be built without cement and SaTopan (odour free latrines) cost approx. $5. There are effective household water filters costing from $20 to $40 and hand-washing systems like the Tippy Tap or Dip Tap that can be made by families at zero cost.

2. Building Local Private Sector and Supply Chains

Building commercial supply chains for products and services is essential to make sure that activities go on after (donor funded) projects stop. SMART Centres do this by demonstrating technologies in an exhibition area and a trainings workshop where they train in a range of skills. For instance, after selection welders are trained in the production of well drilling sets and the production, installation and repairs of hand pumps. Well diggers are trained in drilling wells with different technologies. Masons are trained in building water storage tanks and latrines. Besides technical skills the centres also train and coach entrepreneurs in making a simple business plan, marketing and bookkeeping. The focus is on Market-based and Affordable technologies which may be interesting for NGOs and governments who aim to reach SDG6. Affordable technologies are also important for self-supply, so communities, households, farms, etc. are able to invest in their own water supply.

Laban Kaduma, WaSH entrepreneur in Tanzania
Plumber Laban Kaduma from Njombe, TZ was trained in 2005 in manual well drilling by the local organisation SHIPO with support of a Dutch organisation. In 2008 he started his company Uvinjo (Westra, 2011). Now he has 4 drilling teams and has drilled over 3000 wells of 20 to 50 metres deep that, including a rope pump, cost $700 - $1400 (depending upon geology and depth), each serving 20 - 200 people. The first well he drilled in 2006 at the KSG workshop in Njombe provides water to 200 people and is still functioning. Uvinjo also produces rope pumps. 70% of his sales are to families who pay themselves; an example of self-supply. The market for this self-supply was created 12 years ago with subsidised pumps for communal supply.
Photo: *Laban Kaduma demonstrating a small rope pump. Besides being an entrepreneur, he also trains others in Malawi, Zambia, Zimbabwe, Sierra Leone, Uganda and South Sudan.*

Entrepreneurs make profit by selling products and services to families, NGOs, schools, health care centres etc. The result is a commercially-sustainable supply chain with "*profit-based sustainability*". Richer families pay for the wells and pumps themselves. Poorer families and communities need financial support, at least for CAPEX (the investment cost of a well and pump). In areas where SMARTechs are technically possible, "*supported self-supply*" has great potential to contribute in reaching the target group of SDG6 and so "leave no one behind".

3. Innovative Approaches, Household Water Filters

Worldwide 2.1 billion people do not always have safe drinking water due to broken piped systems, unsafe water sources, recontamination in storage at home etc. The most, be it intermediate solution, is Household Water Treatment and Safe storage (HWTS). Of all treatment options, filters that can remove biological contamination and turbidity are the most effective. This because of consistent use (adherence) which has been measured to be 2 times higher than Chlorine (Brown, 2012). Unlike Chlorine, quality filters remove cryptosporidium which is a serious cause of child mortality. In several developing countries there is a local production of biosand and ceramic pot filters and more recently of table-top filters with a diatomaceous earth or membrane filter element. Costs range from $20 to $40, so the cost of safe water from filters is $1-$2 /prs. /yr. Challenges to scale up the use of water filters include the creation of awareness that clear water can be contaminated, build up a commercial supply chains and create payment options for families who cannot pay at one time. The poorest may need payment support.

Locally produced filters**.** This filter is produced in Malawi and cost approx. $ 18. Local production in this case means that a high-quality diatom filter element is imported from Asia and plastic containers are produced in Malawi. In this way transport cost are reduced while local value and employment is added. Similar production is taking place now in Ethiopia and Kenya.
Photo; A community worker in Malawi explaining a table top water filter

Self supply & Well clubs

Another innovative approach is self supply which stimulate families, farmers, others to invest in their own water systems. To compare, almost all farms in Europe had a well for domestic use, cattle watering etc. In the USA over 45 million hand pumps were sold to farmers who later on would buy a windmill or electric pump, thereby climbing up "the water ladder". Water for domestic and productive use resulted in rural development. The same logic applies in Africa. With a household well, rural families have water for domestic use but also for poultry, livestock and /or irrigation so they are able to produce food for themselves and sell the surplus. Countries who now have a policy to scale up Self-supply are Uganda and Ethiopia (Mekonta, 2015). To reduce cost, wells can be drilled via "Well clubs". A group of 5 to 10 families form a "Well club" and, after a short training and some technical support, drill their own well. This is possible with simple options like Baptist, EMAS or Mzuzu drilling. The cost of 10 - 60 m deep wells, including a small pump, can be from $100 to $500. To avoid over-abstraction of groundwater, families are encouraged to also install recharge systems near the well. To families with a household well it is strongly recommended that water used for drinking is treated with boiling, chlorine or a water filter.

Family Based Management (FBM) and Faith & water

Another innovative approach is FBM as opposed to CBM (Community Based Management). In rural Africa there are over 1 million hand pumps, mostly maintained through CBM. Some 35% of these pumps are not functioning, partly because of a lack of ownership and funds for repairs. If a pump is installed at the premises of a family who also owns the pump, it will in general be maintained because there is incentive that they repair the pump quickly. Family ownership means more water available nearby, reducing the burden of water collection as well as eventual income from productive use or sales of water. As it is clear that they are the only ones responsible for the pump repairs they fix the pump quickly. Experiences in Zambia with the FBM approach show that families with a well share with an average of 50 other people so *"family owned becomes community served".* Pump functionality using FBM in Zambia is > 95%. With the Faith & WaSH training as applied in Malawi, faith leaders and others are trained in aspects of hygiene and sanitation. They then transfer this knowledge plus local and affordable solutions to their, often remote, communities.

Results, Impacts

SMART Centres now exist in Tanzania, Malawi, Zambia, Mozambique and are starting in Ethiopia, Kenya, South Sudan, Niger, Ghana and Nicaragua. Results until now include:

- > 50 drilling & pump producing companies trained and going on independent from a Centre
- > 1 million people use SMARTechs like manual drilled wells, rope pumps, filters etc.
- > 12000 rope pumps installed
- 60% of the rope pumps are now purchased by families so Self-supply is being achieved
- SMART Centres are cooperating with organizations including CAWST and EMAS

Impact

- Helping to reach SGD6, especially in rural areas where other options are to expensive
- Higher functionality of handpumps. Spares available & affordable through local production
- Helping in reaching SDG1, 2 and 8. Household and farm wells yield water for productive use resulting in income & food. Production of wells/ pumps and water for irrigation create jobs

Discussion

A lesson learned with simple technologies is: “Simple is not easy”. For instance, the introduction of the rope pump in the last 20 years went wrong in many African countries due to inefficient designs, errors in the construction or installation in communities without the guarantee of management and funds for repairs. Also, organisations who introduced this technology did not maintain quality control and did not coach entrepreneurs for the 2 to 3 years as is needed. (Haanen, 2016).
Many families are willing to invest in improving their own water and sanitation systems. Recent investigation indicates that the total investments of families are even higher than investments by NGOs and Governments (Danert, 2020). Supporting self-supply makes much sense because of the social and economic impact it has. Hence it makes sense to invest in large scale and long-term capacity building in all aspects to scale up self supply.
A question is: Who can, who should fund capacity building in affordable WaSH solutions?

Conclusions

- In these times of Corona, it is even more clear than before that there should be local capacity to solve water, sanitation and hygiene problems.
- The SMART approach has a yet untapped potential to contribute to SDG6 and water related SDGs for poverty, food security and employment.
- To reach water related SDGs there is a need for the 3 Ts (Training, Training, Training)
- Training welders, drillers, masons, designers etc. in technical skills. Training and coaching WaSH entrepreneurs in business skills. Inform and create awareness of policy-makers, NGOs, others on the (new) possibilities with a SMART approach.

Reference list

Brown, J. & Clasen, T. (2012) High Adherence Is Necessary to Realize Health Gains from Water Quality Interventions. PLoS ONE 7(5): e36735. doi:10.1371/ journal.pone.0036735.
Danert, K. (2015). Manual drilling compendium. Rural Water Supply Network Publication 2015-2
Danert, K. & Hutton, G. (2020). Shining the spotlight on household investments for water, sanitation and hygiene (WASH): let us talk about HI and the three ‘T’s
Haanen, R. & Holtslag, H. (2016) 130.000 Rope pumps worldwide. http://smartcentregroup.com/wp-content/uploads/2017/06/RWSN-130.000-Rope-pumps.-R.H.-Paper.pdf
Naugle, J. (2009) WEDC conference. Sustainable Transfer of Manual Well Drilling Technology
UNICEF, EW, Practica; Technical note 3 Manual drilling 2009
Mekonta, L. & Butterworth, J. (2015). Great expectations: self-supply as a formal service delivery model for rural water in Ethiopia. 38th WEDC International Conference.
Westra, M.T. (2011). Laban Kaduma, professional driller. A story of development https://akvo.org/blog/laban-kaduma-professional-driller-a-story-of-development/