

Appropriate Technologies: To Solve Societal Problems & Create Entrepreneurship

Moses Kizza Musaazi, PhD, DIC

mkmusaazi@t4tafrica.co

www.t4tafrica.co

The Evils of Science

- President John Kennedy was asked what he feared most. He replied:
- **“I fear the evils of science that can be unleashed against mankind”**
- Musaazi’ s fear **“the looming disasters as a result of using natural resources carelessly”**
- What is your greatest fear???

Examples of SE

- Allow me the privilege of walking you through some of the products that are assisting in societal change through Social Entrepreneurship.
- Many of them were initiated by myself while others were challenges thrown in my face.
- Some date back to 28 years while others are of recent (>2010).
- **They ARE NOT ULTIMATE SOLUTIONS!**

Timber Seasoning Plant

- **Challenge:** Carpenters unable to afford electric timber seasoning.
- **Prevailing Situation:** Furniture made from unseasoned timber wobbles → unsatisfied customers → reduced sales.
- **Current Intervention:** seasoning timber
 - (i) under the shade (6-12 months)
 - (ii) direct sunshine (external drying & cracking)

Entrepreneurship bottleneck

- Poor quality of furniture; loss of customers
- Long time (months) return on investment; awaiting proper timber seasoning.
- Cannot handle large orders.

Basic Science Principles

- 1. **Heat source** at bottom of pile of timber; hot air rising (by convection); no fan
- 2. Cheap **heat/energy**; affordable by carpenters.
- 3. **Heat loss** minimised; insulated walls
- 4. **Simple** temperature monitoring & control

Innovation: Appropriate Timber Seasoning Plant

- **Wooden/brick box:** with a metallic base sitting on a saw dust furnace.
- **Results:** free fuel (sawdust); operated by security man; seasoning softwood & hardwood in 7 & 14 days respectively.
- **Entrepreneurship:** Carpenter seasons timber for others at a fee. An entrepreneur sells seasoned timber.

Timber Seasoning Plant




Timber Seasoning Plants in use



Commercial TSP



Housing, Water & Food

- **Challenges:**
 - **1. Housing;** poor and/or unaffordable.
 - **2. Water;** not enough & contaminated.
 - **3. Food;** not enough & poorly stored.
- 
- **4. Environmental** degradation.
 - **5. Poverty,** poor health, low education.

Prevailing situation:

- 1. Wall construction (esp. Houses) by fired clay/earth bricks: ➡ low & checked quality of bricks ➡ expensive & weak structures.
- 2. Trees cut indiscriminately ➡ reduced forest coverage ➡ reduced rains, etc.
- 3. Plastic & metallic water tanks: expensive & short life.
- 4. Poor housing, sanitation & water; increasing problem.

Fired bricks; swamp & hardwood destruction



Destroyed Swamp & trees



Firing bricks; high cost & inefficient

Kiln; not insulated & low efficiency



Makerere University construction; its carbon footprints



Quality Fired Bricks?



Plastic Rainwater Harvesting Tank (protected!)



ISSB production; cheaper & protects environment



PICT2825.AVI



ISSB Production



Comparison: ISSB with fired bricks



ISSB wall; fast, cheap & neat



**Fired bricks wall; slow,
A lot of cement & not neat**

Innovated Granary by MKM



Granary Loading



Granary Loading



Improving housing at low cost while protecting environment

- House & water tank from ISSB in 14 days!



Modernizing the African Hut

Homestead for the poor



Modernizing African Homestead



Thin Shell Concrete: Modernizing grass thatched roofs



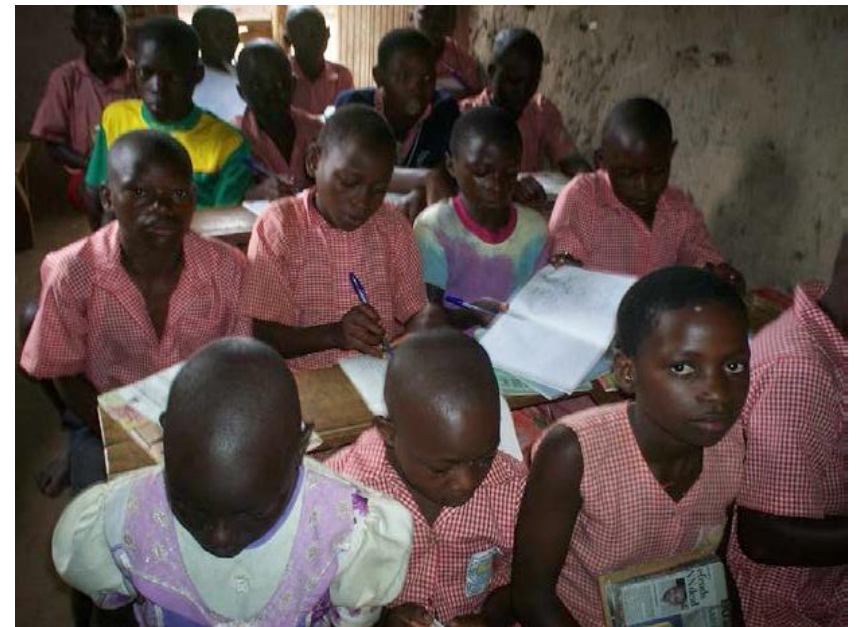
Typical rural school (Uganda)



ISSB Classroom Block & Water Tank



Completed ISSB Classroom Block



Lined Pit Latrine Construction: no formwork for the slab



Lined VIP from ISSB



VIP: with rainwater Hand washing & bathing facilities



Toilet with an incinerator

- Sanitary pads are properly disposed of



25,000-litre ISSB Water Tank @ Primary School



PICT2825.AVI



Teachers' Houses, complete with rainwater harvesting, from ISSB



Medical Solid Waste Management: by Incineration

- **Challenge:** To manage medical solid waste (syringes, gloves, bottles & accessories); by safe disposal methods.
- **Prevailing Situation:**
 - 1. Proper incineration in 2 hospitals and none in others & health centres.
 - 2. Others; waste pits, open burning or bush dumping.
 - 3. Cumulative dangerous waste; water, ground and atmospheric contamination.

Current Intervention

- 1. Imported, electric or diesel incinerators; expensive to buy and maintain.
- 2. Locally built, brick incinerators; temperature below required minimum (650 deg. C) and incomplete incineration.

Science & Design

- **Science:** Metal attains high temperatures faster than clay bricks. Heat stored in clay brick is waste.
- Hence clay brick incinerators; slow & inefficient.
- **Design:**
 - 1. **Metallic** incinerator.
 - 2. **Self-heat generation** from plastics.
 - 3. **Series burning**; total incineration.

Product: *MAK V*

- Incinerator *MAK V*:
- 1. **Metallic**, sand insulated.
- 2. **Triple** incineration.
- 3. **Smokeless** output.
- 5. **Zero energy** input; 100% self-energy generation.

Field Testing *MAK V*

- **MAK V Development**



MAK V @ Nsambya Hospital



Hybrid Cook Stove in use at Greenhill Academy, Buwaate



Solar Water Heating (SWH) facility being used by a pupil



MakaPads Story

- In 2001, the Rockefeller Foundation (RF) requested me to engage Architecture & Civil Eng. students to design an appropriate pit latrine for a primary school; to improve hygiene.
- Afterwards, RF requested me to use the winning design and construct the toilet for a primary school.

MakaPads Story

- Then RF expressed the deeper underlying problem; sanitary pads.
- The sanitary pads supplied to schoolgirls were filling up the pit latrines (and possibly increasing the stench).
- They requested me to come up with an appropriate way of disposing of used sanitary pads.

MakaPads Story

- RF finally told me of the most critical problem:
- Their support research had discovered that schoolgirls were:
 - 1. avoiding school during their menstrual days; 3-5 days per month.
 - 2. using pieces of cloth, paper, leaves, etc as alternatives to sanitary pads.
 - 3. performing poorly in P5-P7.
 - 4. dropping out of school in P5-P7.

MakaPads Story

- The cause of the all above; failure to access affordable sanitary pads.
- RF then tasked me to innovate a type of sanitary pad that is:
 - 1. non-reusable
 - 2. made out of local materials (as far as possible)
 - 3. made in a cottage type of industry
 - 4. sell price not to exceed US\$ 0.05

MakaPads Story

- RF offered me a grant of US\$ 78,000 (100% request).
- After 30 months of R&D, I innovated sanitary pads made out of papyrus and paper and costing US\$ 0.03 @, and meeting all other criteria.
- The pads are trademarked ***“MakaPads”***, patented and commercialized.

MakaPads Story

- ***MakaPads:***
- Have brought about huge academic and socioeconomic impacts to various sectors of people including refugees and HIV/AIDS victims.
- Are the only genuine pads made in Africa from local materials.
- Are the only chemical-free and biodegradable pads on (East) African market.

Papyrus; raw material for *MakaPads*

- Huge & wild papyrus growth in Uganda



Fresh papyrus: carefully cut to save environment



Production of *MakaPads*



Production of *MakaPads*



Solar-powered factory



MakaPads production



It's *MakaPads* Payday !



MakaPads packets



Schoolgirls receiving MakaPads



Keep one Girl in School with a price of a sweet

- Despite the low cost of a packet of 10 MakaPads (US\$ 0.58) the poor schoolgirls still unable to afford.
- Hence we have changed the packaging: A pack of 3 MakaPads for US\$0.15
- The poorest girl uses one pad while at school; US\$0.05 which is the price of a sweet.
- **This is affordable!!!**

Empowering People

- The Siemens Stiftung (Foundation) organized a competition called
- **“empowering people.Award”**
- Out of over 800 international entries ***MakaPads*** won 2nd Prize (Euro 30,000 = UGX 105,000,000).
- This was to recognize ***MakaPads*** empowering (i) schoolgirls with dignity to attend school (ii) people at the Bottom of the Pyramid with skills to get out of poverty.

Thank You