Urine separation as a business: The main cost factors

VUNA Symposium, Durban, 27 August 2015

PD Dr. Heiko Gebauer
Group leader on Business Innovation
Eawag
Professor for Service Management at Karlstad University in Sweden

International Space Station

US astronauts drink recycled urine aboard space station but Russians refuse

American and Russian astronauts use separate water filtration systems on ISS, as Nasa astronauts also collect Russian urine when available to increase supply

Ellen Brait in New York

Wednesday 26 August 2015 20.03 BST

Approach

Structure

- Validated household numbers (64’350), participation (20% to 80%), urine production rates (5 to 20 liters per week)
- Collection: Local collection teams (supervisor, drivers, laborers, community liaison officers) based at 12 WWTWs& Intermediate transportation
- Treatment (12, 60, and 120m^3 per day)
- End-products: Various types of fertilizers and customers, distilled water reuse

Creativity

Key partners	Key activities	Value proposition	Distribution	Customers
• M-Pesa (South Africa) (for cash-solution) • Local communities	• Installation of collection tanks • Marketing of urine drop-off • Managing money transfer	• Creating social benefits through a “Fair-trade” fertilizer brand	• Do-it-yourself-garden center • Small packages • (online subscription)	• Less price sensitive gardeners • High income • Social responsibility • Flower and inhouse plant lovers
	Key resources • Collection point • Transportation vehicle • Treatment • Branding & marketing skills		**Marketing** • “Branding” fertilizer as a social good • Shop-in-Shop concept	
Cost structure • Partly subsidized by EWS • Investment & operational costs of the collection points • Transportation costs • Reactor costs (investment & operation) • Branding & marketing, packaging, market development • Incentives for dropping-off the urine			**Revenue streams** • (100%-x) of the fertilizer price can be considered as a donation for the income of poor people (incentives) • x% covers the investment and operational costs	

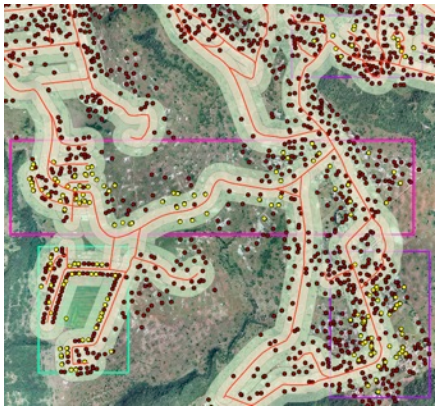
- “Pro-Poor” fertilizer
- “Large” fertilizer user with social interest
- “For Durban” fertilizer

Experiences in the business model development process

- − Urine volumes dropped down 16.7 to 6.5 liters per week. The collection quality matters (Can we deliver the collection service consistently?)
- \+ Significant improvements in the collection time (e.g., 50% less time needed)
- \+ Fertilizer samples made in a huge difference

Getting down from 4 to 2 mins per UDDT (class B)

Superior Vehicle Tracking



Scenarios for household participation and urine production

		Costs per liter urine			
Household participation	80%	R2.84 R0.11 R0.52 **R3.47**	1.63 0.09 0.52 **R2.24**	1.88 0.04 0.55 **R2.47**	1.63 0.0 0.52 **R2.15**
	60%	2.84 0.13 0.62 **R3.59**	1.63 0.09 0.55 **R2.27**	1.88 0.04 0.53 **R2.45**	1.63 0.04 0.52 **R2.19**
	40%	2.84 0.13 0.62 **R3.59**	1.63 0.11 0.52 **R2.24**	1.88 0.09 0.55 **R2.47**	1.63 0.09 0.55 **R2.27**
	20%	Collection: 2.84 Transportation: 0.18 Treatment: 0.62 **Total: R3.64**	1.63 0.13 0.62 **R2.38**	1.88 0.13 0.62 **R2.63**	1.63 0.11 0.52 **R2.26**
		5	10	15	20
		Urine production (in liters per week)			

Outlook to cost savings and revenues

eThekwini Park department

- 4’500 hectare on parks (500 playgrounds, 180 playfields, 60 parks, botanical garden, main roads and motorways (green areas), and 600 community gardens

Cost savings

- R 1250 per ton bulk fertilizer equal R 3.1 per liter of liquid fertilizer
- **Cost savings R 0.156 per liter urine << R 2.15-3.64**

Flower growers

- Specialized fertilizer
- Social interest

Revenues

- Fertilizer prices are R32 per liter
- **Revenues of R 1.6 per liter urine < R 2.15-3.64**

Specialized fertilizer

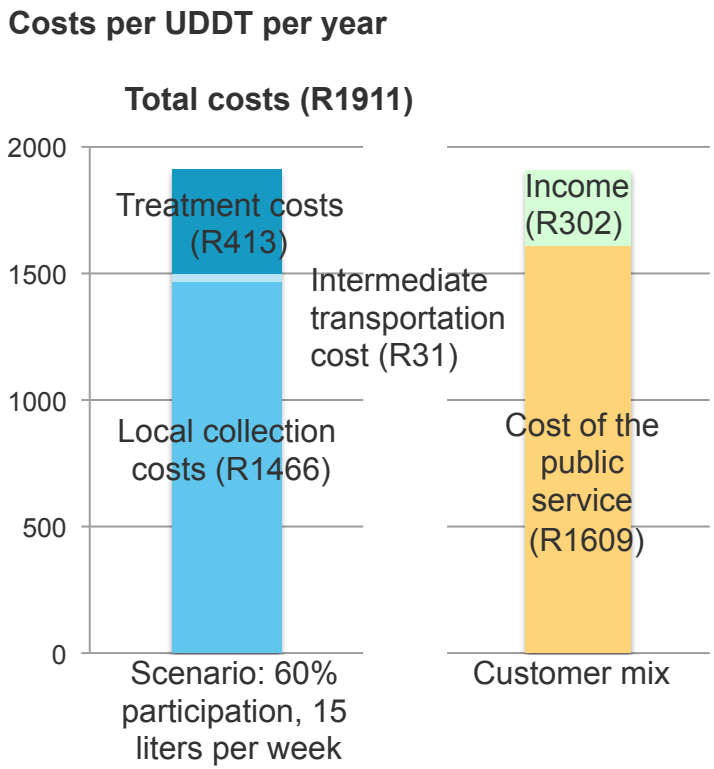
- DIY garden centers
- High prices for orchid, cacti or similar fertilizer (R92)
- Marketing & distribution costs (38%) & DIY center margin (20%)

Revenues

- Fertilizers R38.6 per liter
- **Revenues of R 1.9 per liter urine < R 2.15-3.64**

Summary – Reaching scale with this business model

- Increasing number of household participation and the amount of urine production
- Replicating the number of treatment reactors
- Improving continuously collection processes and customer portfolio (municipality, flower specialists to DIYs garden centers)
- Nutrient recovery from urine can offset some collection and treatment cost
- Public service costs and environmental costs



Durban

Durban successfully recovers nutrients from urine

EWS established a logistic system to collect urine from the UDDTs and operates the first larger-scale urine treatment reactor, and sells the liquid fertilizer

Ellen Brait in New York

Wednesday 26 August 2015 20.03 BST