Complexities around PPPs within the Circular Economy in Durban South Africa

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EThekwini Municipality
EThekweni Municipality, South Africa

- 2,297 km²
- 3.7 m people
  - 53% in formal housing
  - 32% in informal settlements
  - 15% in peri-urban & rural areas
Water & Sanitation Challenges

• Access to basic water and sanitation has been a constitutional right since 1994
• Water Service Authorities provide water and sanitation services
• Pro-poor transformation agenda
• Clear need for innovative solutions
• ‘Learn by doing’ approach
What is a Circular Economy Approach in the Sanitation Sector

- Not the environmentally unfriendly make → use → dispose
- Toilet resources
- Derive value from waste streams
A Path to a Circular Economy/Transforming Waste into Resources

Intervention Timeline

- 2000 Durban Water Recycling
- 2010 Dewats plant for treatment of waste water to recover water and nutrients
- 2012 LaDePa plant for processing of VIP sludge
- 2013 VUNA research on collection of urine from UD toilets and Nutrient Recovery
- 2017 Black Soldier Fly Facility to recover nutrients from UD waste
Context

- Over 80,000 urine diversion toilets (UDTs)
- Faecal waste collects in two chambers
- Commitment by Municipality to empty
- Opportunity to consider recycling options
BioCycle – Black Soldier Fly technology concept
Development Business Model
BMGF-city partnership urban sanitation
## Stakeholders

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<th>Stakeholder</th>
<th>Role/Responsibility</th>
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<td>BSF process plant CAPEX funding</td>
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<td>eThekwini Water and Sanitation (Municipality)</td>
<td>Municipal oversight and Program Management</td>
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<td>Emptying Contractor</td>
<td>Emptying of UDs and transporting of waste to plant</td>
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<td>The BioCycle</td>
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UD Waste to Resources process:

1. Weighbridge
2. Mixer
3. Feed prep
4. Grow Out Sheds
5. Separation
6. Pasteurisation
7. Pressing
8. Larvae Nursery
9. Residue
10. Thermal processing

UD Waste → Weighbridge → Mixer → Feed prep → Grow Out Sheds → Separation → Pasteurisation → Pressing → Oil

Larvae Nursery → Larvae

Residue → Feed Mix

Thermal processing → Biochar
Partnerships/Contracts to Address Value Chain

- Tender based contract using local entrepreneurs
- Service Level Agreement (SLA) BioCycle
- Contractor Interface
Tender Based Contract using Local Entrepreneurs

- Contract specifications
- Health, safety and environmental compliance
- Mentoring
- Quality control
- GIS management of data and implementation
SLA: Municipality and BioCycle

- Defines risks, responsibilities, business model structure
- Aims to reduce municipal operational costs
- Black Solider Fly (BSF) processing technology
Processing Plant Business Model

CAPEX
BMGF Grant Funded

Income
Municipal Gate Fee per ton of waste processed

Income
Sale of Products
- MagMeal
- MagOil
- Residue or Biochar

BSF Plant
Income and Costs Ring Fenced

Profit after Costs

Operational Costs
- Staff
- Utilities
- Consumables
- Electricity and Water
- Equipment Rentals
- Additives
- Packaging

Municipality 50%  Operator 50%
Results

- 50 000 UDTs emptied
- Processing plant operational since 2017 – thought not properly commissioned
- Iterative testing of processing elements on-going
  - Front end screening of detritus
  - Optimum feed preparation
- Discussions with potential market
- Climate control
- Back end product systems
Challenges

- Delays due to:
- Private sector and municipality different scm processes
- Operational challenges
- Environmental conditions
- Lower nutrient value of UD faecal waste
- Market acceptance and validation of products
EWS Iterative Approach
Feedback Loops

FSM Development Cycle

Problem Identification
Prototype Testing
Community Engagement with pilot
Re-design
Policy Development
Scale-up with Education
O&M/ Research
Re-imagine
Lessons Learnt

● Regulatory framework
● Incentives and penalties; checks on performance
● Social understanding and engagement
Lessons Learnt

● Blended funding to derisk
● Invested efforts geared towards cost recovery
● Engage potential markets early
Lessons Learned

● Remove bureaucratic barriers
● Adopt step-wise approach
● Need to be patient and perseverant!
Conclusion

FSM designed for resource recovery is an area of rapid technological innovation. Municipalities /Business have an opportunity to start seeing sanitation as a medium of valuable resources and fully embrace technologies and practice that support the circular economy, which also offers added economic benefits in creating jobs end even new business sectors and domestic markets.
Thank you for listening!