Complementary Local Urban Environmental Services

Report on CLUES tools & 10 cities around the world

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Prepared by

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3R WASTE India

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Moving Towards a Circular Economy

Cover photo: Neighbourhood clean-up activity in Kampala

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Introduction

The idea underlying Complementary Local Urban Environmental Services (CLUES) is that some cities have reasonably functioning solid waste management services and less functioning faecal sludge management services or vice versa and what can these waste chain learn from one another in any city and what can we learn comparing these on a more global scale? What is the possible synergy between two waste management chains in a city? In short, the idea is what is needed to get a proper functioning solid waste management system, a proper functioning sanitation system and what criteria apply to make them work successfully together. This idea was conceived at BMGF, WASTE and RWA at more or less the same time.

Next to WASTE having worked extensively on sanitation in cities and developed several tools in support hereof (sanitation decision support tool, the service and value chain etc.), it has a solid track record in working in solid waste management and developed several tools to support the work, such as integrated solid waste management. RWA also worked extensively in solid waste management and developed a benchmarking tool

The study is based on discussions between WASTE and RWA on what would be needed to get a proper functioning solid waste management system, a proper functioning sanitation system and what criteria apply to make them work successfully together. It has been further detailed and conducted with the help of 3R WASTE, many local experts, municipal officers and other local stakeholders. We are also grateful for the willingness of municipalities to share their policies and activities around solid waste management and sanitation.

The study nevertheless relied heavily on input and expertise from both WASTE & RWA who in their work, have realised that although off site sanitation and waste management in urban areas are mostly dealt with in different institutions, there is some overlap and cross over. Cross over when feacal matter is found in the waste fractions (flying toilets) or when plastics and other wastes fractions are found in the latrines. But also in ways how to organise the service chain one can identify similarity.

Additionally, more and more pilot projects in feacal sludge treatment add organic waste in the treatments to improve the treatment and conversion process (co-composting, biogas). And lastly some approaches towards implementing improved solid waste management and sanitation have some similarities as for example the need to get acknowledged in the financial sector and improvement of the private enterprises servicing the urban households.

Taking as a basis the tools developed by waste and sanitation practitioners at WASTE and RWA, we quickly realised that we required a new set of guiding questions to ensure that we are making proper comparisons. To be able to extrapolate results we furthermore realised that we would need to develop a new CLUES assessment tool to present the potential for complementarity between solid waste and faecal sludge management in any city.

As a starting point for CLUES we worked on the existing scenario in terms of solid waste management and faecal sludge management. In discussion with municipal stakeholders we quickly discovered that a graphical presentation facilitated the entire stakeholder process, so we developed a “spider” based on a set of similar criteria for solid waste as well as faecal sludge management.

To develop a tool is normally not a one-time process, we had to opportunity for one round of testing in the 10 selected cities where we studied CLUES. This in itself gave us some confidence about the usefulness of the tool, but we also realised that this is not yet a tool that can be launched into the market. Also filling in eth extensive questionnaires still requires handholding of trained “CLUES” local experts.

This report summaries the tool that was developed and tested in 10 cities. At the same time, we report in brief on the results for each of the 10 cities. For each city a short case study is also available as well as the comprehensive data sheets that back the city case study.

Reading guide

In Chapter 2 we describe the concept of complementary local urban environmental services (CLUES). In Chapter 3 we outline the methodology used in getting to the CLUES potential for a city. In the same chapter we outline how data are crunched and using Dhulikel, Nepal case as an example how the data can be interpreted.

In Chapter 4 the very brief results of the ten city studies (i.e. about 1 ½ page per city, mostly graphical) are presented. For each city we have also developed case studies of about 4 pages each. The case studies are backed by questionnaires running to close to 100 pages for each city.
In Chapter 5 we give some general conclusions on the city findings and conclusions per region, Africa, South East Asia and India.
In Chapter 6 the tool itself is assessed, recommendations are presented. These recommendations fall into two parts, on the tool itself, whereby some improvements can be made as this is the first version of the tool and secondly based on the city scoring tables, recommendations on cities where CLUES can actually be implemented.

Within the annexes the various tools and more background information can be found.

For various reasons, this report has taken a long time to see its publication, and it has been a joint effort of many.
First of all , we would like to thank the 10 municipalities who have agreed to give a free insight in their waste management and sanitation sector. Additionally, the local researchers have given valuable input and conducted the validation workshops, which gave us even more data and insights. Without their input and support this would have not been realised and we would like to thank the following persons or organisations:

City , country	Consultant / organisation
Dungarpur, India	3 RWASTE
Dakar, Senegal	Abdoulaye Faye and Mansour Fall
Dhulikel, Nepal	ENPHO
Kampala, Uganda	Michael Majale
Lusaka, Zambia	Danny Choba
Nakuru, Kenya	Paul Chege
Pune, India	3 RWASTE
Shatkira, Bangladesh	Practical Action Bangladesh
Trichi, India	3R WASTE
Warangal, India	3R WASTE

The project researchers are named here:
WASTE: Stan Maessen, Verele de Vreede, Sophie van den Berg, Valentin Post, Priska Prasetya
RWA: Joachim Stretz , Andy Whiteman, Sanjay Gupta, Brian McCarthy, Stuart Gower-Jackson
3RWASTE: Kulwant Singh, Sajib Mahanta

Finally, we would like to thank Roshan, Raminta and Alyse of BMGF who have been patient and from the beginning been very much willing to think along.

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The Concept

In rapidly urbanizing cities, the quality of the living environment is under great strain. New solutions need to be found for rapid extension of needed environmental services. Bundling of front-line service delivery arrangements for feacal sludge management and solid waste management has latent potential for a new dynamic sector of the economy to grow, and opportunity for such 'Complementary Local Urban Environmental Services' (CLUES) seems evident. In this project funded by BMGF (Bill and Melinda Gates Foundation), the potential for CLUES type initiatives is assessed. Simultaneously ,a tool for assessing the potential for CLUES type initiatives in cities will be set up and validated.

More and more initiatives around the world combining the treatment of feacal sludge with organic waste are found, proving to be interesting enough to pursue further in the hope to solve the sanitation and solid waste management problems worldwide. With these initiatives progressing the question arises if it is economically and technical essential that the two sectors should work more closely together in order to tackle the current urban environmental problems.

WASTE[1] and RWA[2] have developed jointly a set of questions around the sanitation and solid waste management sector plus a graphic tool to capture and present the probability for a successful CLUES approach in cities. This factsheet gives an overview of the setup of the tool and the general conclusions drawn from testing the tool in 10 cities in Africa and Asia (Dakar, Dungarpur, Dhulikhel, Kampala, Lusaka, Nakuru, Pune, Shatkira, Trichi, Warangal).

Complementary Local Urban Environmental Services (CLUES) is a concept in which the solid waste service delivery and product development intertwines with the feacal sludge service delivery and product development, thereby creating synergy in various areas so that work can be done more efficiently and effectively. One can think of joint processing of sludge and organic wastes, combining or intensified cooperation between implementing bodies and organisations, joint policy development, cost sharing, etc. Synergies could be found at different institutional levels as well as with different sectoral levels.

To analyse whether and how CLUES functions, the BMGF has funded the CLUES study, which looked at various system indicators to see whether Solid Waste and the Feacal Sludge value chains in 10 cities are functioning at all and how viable a CLUES approach in those 10 cities would be.

[1] www.waste.nl WASTE has developed the so-called Diamond approach within their projects on privatisation of sanitation. The approach of stakeholders is quite successful and currently being scaled up and rolled out in the FINISH Mondial programmes of WASTE and partners. The insights of the Diamond approach have served as a basis for the CLUES tool

[2] www.rwagroup.net. RWA has developed Benchmarking in waste management. Building upon the city assessments done for the Solid Waste Management in the World's Cities, UN-HABITAT.

Aim & scope of the research

Aim of the research is to assess the enabling and constraining conditions for complementary local urban environmental services – being the bundling of front-line service delivery arrangements for feacal sludge management and solid waste management in developing 'low income cities'; in order to provide a more compelling business case for wholescale delivery of essential urban services by local entrepreneurs.

Scope of the research is to assess the conceptual framework for complementary local urban environmental services (CLUES) franchises, contracts and concessions. CLUES is a potentially game changing breakthrough concept. It involves combining the collection, transport or valorisation of different types of materials (generated as waste) under one umbrella service arrangement. Through bundling essential public health services under single umbrella contracts, micro-entrepreneurs should be better able to strengthen their revenue sources, balance risks, maximize logistical synergies, attract credit, and make cost savings.
With the City Study done in 10 cities the researchers want to:

a. Understand the view of cities in combining Solid waste management (SWM)and feacal sludge management (FSM);
b. Explain gaps in institutional framework and resources for integration of SWM and FSM;
c. Know the views of the private sector who is doing solid waste business and their interest in combining FSM in their SWM collection and treatment business;
d. Explore possibilities for collection of FS and SW into one company umbrella and identifying gaps within the city's procurement system, taxation system, and available infrastructure;
e. Explore the possibilities for the use of solid waste transfer station for dewatering or processing of FS before moving to final treatment site if needed;
f. Explore different options like co-composting, and co-digestion for the joint treatment of both SW and FS into the SW treatment site; and
g. Estimate the volume of FS that can be processed together with SW. It applies in particular when SW is treated through anaerobic digestion and composting.

The project will provide an in-depth assessment of the situation, stakeholders and the institutional frame of existing systems. The work will be based on the Integrated Sustainable Waste Management (ISWM) approach, which analyses not only technical aspects of collection, treatment and disposal of solid waste including its reduction, re-use and recycling, but also the governance factors of successful waste management.
Analysing the management of solid and liquid wastes in this way allows planners (local governments) to highlight problems and identify the necessary focus for more successful planning. In this City Study the feacal sludge management will be included and, as we will be looking at the options for linking FSM & SWM, the emphasis within solid waste will be on the organic waste stream. The output comprises:

The work is guided by the question: What can feacal sludge management in cities, including slums and low-income areas, learn from existing decentralized approaches and solutions in the solid waste management sector and how can both services be improved upon based on the results of this research? There is an opportunity here for the development of locally based, sustainable, income generating solutions for the delivery of public services in poor urban communities.

Methodology

Whilst WASTE and RWA had developed various tools for solid waste management, vide integrated sustainable waste management and benchmarking in waste management. BMGF had earlier been instrumental in development of the SFD. Furthermore, through the Diamond Spproach WASTE had identified a framework how both solid waste and faecal sludge management could be dealt with at city level, the diamond model is more of practical guide. So **the methodology** had to be designed right from the start.

In a workshop experts (WASTE/RWA) from different disciplines from within the sanitation and solid waste value chains developed the **hypothesis** that transformational growth of access to environmental services assumes:

- Demand for services that is socially accepted, and the quality of front line service is environmentally, technically and financially appropriate.
- Applied technologies that can capture and treat the materials being generated, and produce outputs/products that have a positive market value.
- Proper service level arrangements that empower the service provider and bring their relationship with the customer closer together.
- Information technology solutions that make booking and paying for services easier, and provide a secure transaction platform.
- An encouraging public authority that fosters the role of regulator and change agent, rather than necessarily direct service provider.
- Levels of transparency that do not hamper entrepreneurialism in the environmental sector.
- Sources of funding that are available to initiate services before revenues start catching up.
- A professionalised services industry that is capable of providing quality services and is considered as dignified employment.
- Clear and present political will, potentially galvanised from a past or perceived crisis, that facilitates the development of local systems.

And in particular for the integration of solid waste and feacal sludge the CLUES approach assumes:

- An interface between the SWM and the FSM value chain in particular in coordinated policy setting for both value streams that lays a solid foundation for unambiguous legislation and regulations, management of national and local budget allocations and money flows, targeted institutional deployment, thus more chance of an integrated approach.
- Active coordination within and in between value chains that benefits the performance and makes the interface possible.

The assumptions that support the hypothesis were translated in 42 research questions that provide insight information about the functioning and the performance of the respective systems as well as information about the probability of a successful introduction of CLUES. The research questions can be found in Annex 4

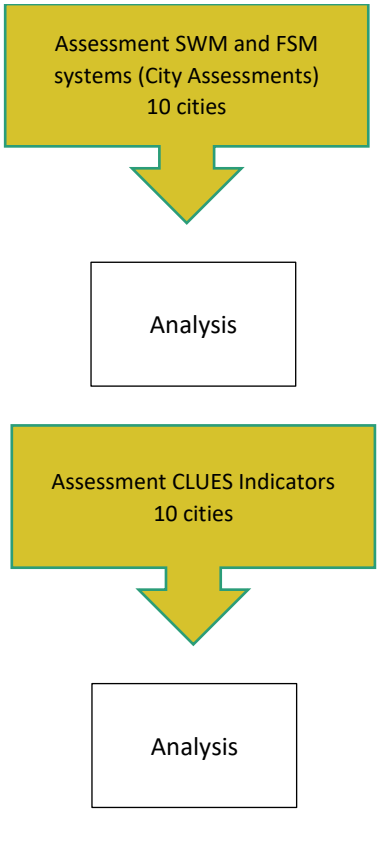
The collected data is analysed per investigated in three steps:

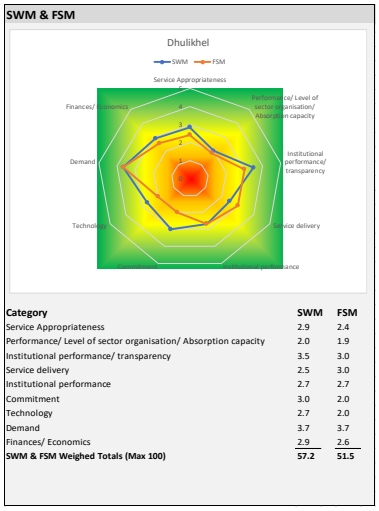
Step 1: Reflections on the research questions and scoring resulting in a final score for the system functioning and performance.

Step 2: Reflection and scoring on the probability for a CLUES approach

Step 3: Conclusions and recommendations on the introduction of CLUES.

Based on the analysis of all cities overall conclusions and recommendation have been made concerning system functioning and -performance and introduction of CLUES.




SWM & FSM

Dhulikhel

Category	SWM	FSM
Service Appropriateness	2.9	2.4
Performance/ Level of sector organisation/ Absorption capacity	2.0	1.9
Institutional performance/ transparency	3.5	3.0
Service delivery	2.5	3.0
Institutional performance	2.7	2.7
Commitment	3.0	2.0
Technology	2.7	2.0
Demand	3.7	3.7
Finances/ Economics	2.9	2.6
SWM & FSM Weighed Totals (Max 100)	57.2	51.5

Specific CLUES evaluation

Implementation of the research, the project partners WASTE and RWA divided their project members in 10 different research teams (RT) of 2 persons each. Each of the RT visited one selected city for about one week (5 days) to discuss FSM & SWM in the respective cities. The RTs were supported by local consultants and local partners.

A) Process steps in City Profile Reports:

<u>Information collection & gathering:</u>

Step 1: Literature review: project documents & reviews, general city information on human and solid waste management, (master/strategic) sanitation /solid waste plans; municipal budget allocations

Step 2: Mission to 10 cities; interviews with key stakeholders, conduct focus group meetings

<u>Analysis and Conclusions:</u>

Step 3: Analysis based on information step 1 and 2; analysis tools used:

Step 4: Formulation of conclusions and recommendation.

<u>Feedback and Consultation:</u>

Step 5: Feedback from local stakeholders (by email, consultation and focus group meetings)

Step 6: Feed feedback into City Profile Reports

B) Final Report

Step 7: Writing concise final Report

Step 8: Presentation of Final Report

Each of the 42 research questions had a uniform scoring system. The scoring system for both the SWM & FSM assessment and the CLUES analysis is presented below.

Scoring systems of the Sanitation (FSM) and SWM, Scores between 0 and 100

0 – 25	⇨ Very insufficient:	System absent and if present on all aspects the system does not function at all.
25 – 40	⇨ Insufficient:	On all aspects the system does not function sufficient.
40 – 60	⇨ Reasonable:	On institutional, financial and market viability the system does not function properly, On the other aspects the system functions reasonable.
60 – 75	⇨ Satisfactory:	On all aspects the system functions reasonable
75 – 100	⇨ Very satisfactory:	On institutional, financial and market viability the system functions very well, on the other aspects the system functions well.

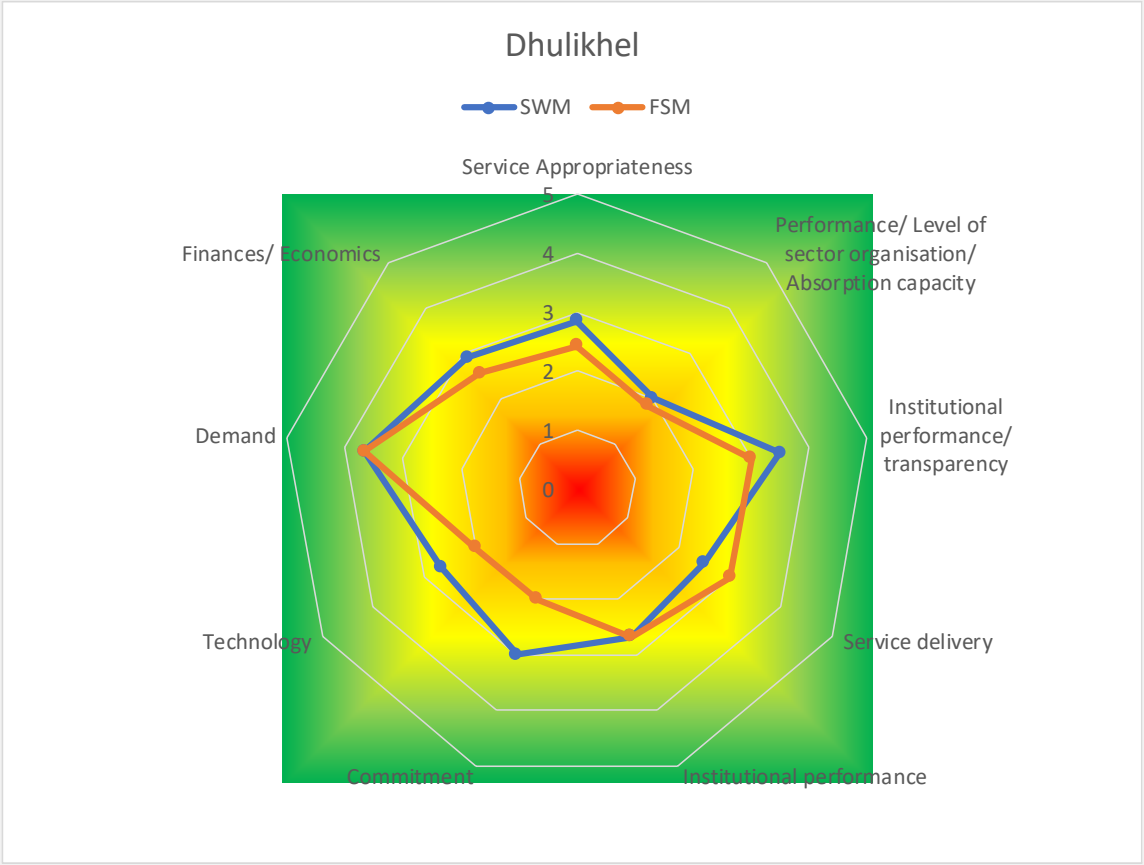
The grouped research questions with their weighed scores were then used to verify the potential of using / developing complementary solid waste and faecal sludge management services (CLUES potential) in each of the cities. Low scores signify that one can invest money and time better in other things, whilst high scores indicate that only minimal adjustments will be needed to create a win-win situation.

Scoring CLUES, Scores between 0 and 100

0 – 30 ⇨	Don't bother to CLUES	No use to invest in CLUES.
30 – 45 ⇨	Strong obstacles to CLUES	Many system adjustments necessary to introduce CLUES, only on small scale CLUES like activities, focus on enabling aspects like institutional performance, PPP arrangement, transparency and commitment.
45 – 60 ⇨	Obstacle to CLUES, 'easily' overcome	Some system adjustments needed to introduce CLUES, only on small scale CLUES like activities, focus on enabling aspects like technology, service appropriateness and financial viability.
60 – 75 ⇨	Facilitates CLUES with some improvements	No big adjustments needed, focus on strengthening of economical (market) viability.
75 – 100 ⇨	Strongly facilitates CLUES/already clued up	No adjustments needed, start with adjustments of legislation to enable large scale introduction of CLUES.

Below we have used the city of Dhulikel (Nepal) as an example to show how these two visuals need to be interpreted and how conclusions can be drawn from this.

SWM & FSM



Category	SWM	FSM
Service Appropriateness	2.9	2.4
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Institutional performance	2.7	2.7
Commitment	3.0	2.0
Technology	2.7	2.0
Demand	3.7	3.7
Finances/ Economics	2.9	2.6
SWM & FSM Weighed Totals (Max 100)	**57.2**	**51.5**

Spider diagram

The spider shows the scoring of the assessment of the city. Each of the corners of the spider diagram relate to one particular element, demand, technology, finances/economics, commitment, institutional performance, service delivery, institutional performance/transparency, performance/level of sector organisation/absorption capacity, service appropriateness.

Using the methodology described earlier each of the above have been scored (1 – 5 ranking with 5 being the best). This has been done both for solid waste management (SWM blue line) and faecal sludge management (FSM red line).

In the case of Dhulikel one can say that overall the Solid waste sector appears to be slightly better organised than the FSM sector. But none of the scores reach 4, which means that still much has to be done to get a well-functioning SWM & FSM

Specific CLUES evaluation

Weighed Values	
Capacity	8.5
Coordination	12.0
Market	13.0
Commitment	5.3
Viability	10.0
Totals weighed	**48.8**

Category	Short question Title	Score
Capacity	Good service agreements	1.5
	Tasks and Responsibilities	3.0
	Robust legal framework	2.0
	Service coverage	2.0
Coordination	Service interfaces	2.0
	Legal requirements for interfaces	4.0
	Coordination between service chains	3.0
Market	Service coverage	2.0
	Product regulations	4.0
	Public perception	4.0
	Subsidization of alternate products	3.0
Commitment	Awareness campaigns	2.0
	Recent Municipal initiatives	2.0
	Recent public protests	0.0
Viability	Financial sustainability	3.0
	Affordability and Willingness	2.0

Refresh Sunburst Graph

Sunburst

After weighing scores the sunburst gives a clearer view on which criteria need improvement to not only improve the FSM and SWM sector but also to get a positive appraisal for CLUES.

A total score above 49 indicates that a CLUES approach should be feasible and successful. The higher the score the more successful the CLUES approach is likely to be.

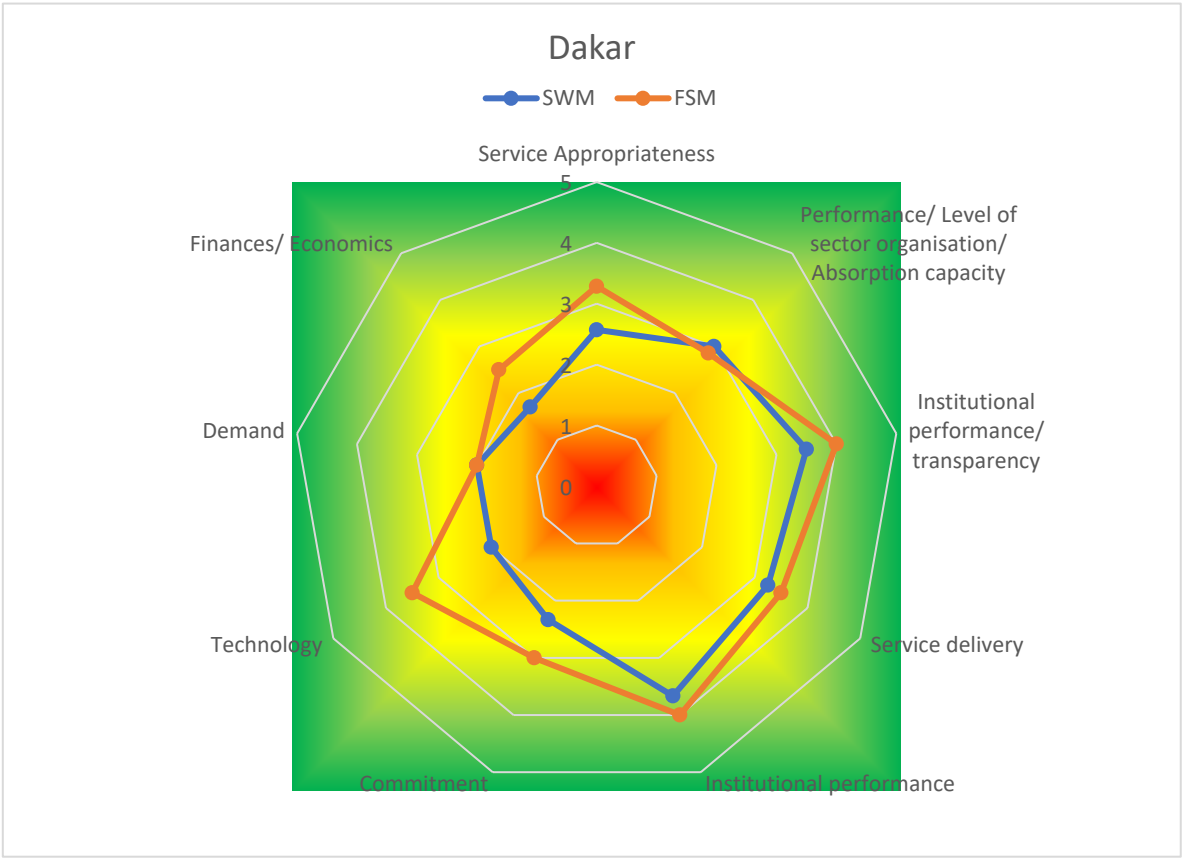
Results of the 10 city studies one by one

Following the description of the tools that has been developed in two stages (spider, sunburst), the scoring matrix used, an assessment of the 10 cities along these lines is made. We have tried to be very brief. The SWM, FSM assessments and the CLUES sunbursts of the 10 cities with the main conclusions per city are confined to 1 ½ page per city only. For each city a case study (about 4 pages) is also available as well as a much longer data report (close to 100 pages for each city).

Dakar, Senegal

Dakar, the capital city of Senegal, has a population of 3,137,197 (metropolitan area). 188,000 m^3/d of wastewater is generated with 35% of households are connected to a sewer. FSTPs collect and treat 1,735 m^3/d so that a total of 31% of faecal matter is safely treated and disposed. Each day about 1,800 – 2,500 tonnes of municipal solid waste is collected, less than 50% of the waste generated.

SWM & FSM Assessment



Conclusions

- Dakar is working hard on the institutional side to get the policies in place as such they are also performing quite well.
- Demand for product derived from organic waste and or FS is rather low. Although there is a keen interest for the dried sludge both in the agricultural sector as in the construction sector.
- The fast-growing city makes it difficult to keep de service levels up.
- The overflowing landfill Mbeubeuss and the low rate of separation weighs heavenly on the low score

Specific CLUES evaluation

Weighed Values	
Capacity	14.0
Coordination	4.0
Market	4.5
Commitment	9.3
Viability	8.0
Totals weighed	**39.8**

Category	Short question Title	Score
Capacity	Good service agreements	4.0
	Tasks and Responsibilities	4.0
	Robust legal framework	4.0
	Service coverage	2.0
Coordination	Service interfaces	1.0
	Legal requirements for interfaces	1.0
	Coordination between service chains	1.0
Market	Service coverage	2.0
	Product regulations	0.5
	Public perception	2.0
	Subsidization of alternate products	0.0
Commitment	Awareness campaigns	2.0
	Recent Municipal initiatives	4.0
	Recent public protests	1.0
Viability	Financial sustainability	2.0
	Affordability and Willingness	2.0

Refresh Sunburst Graph

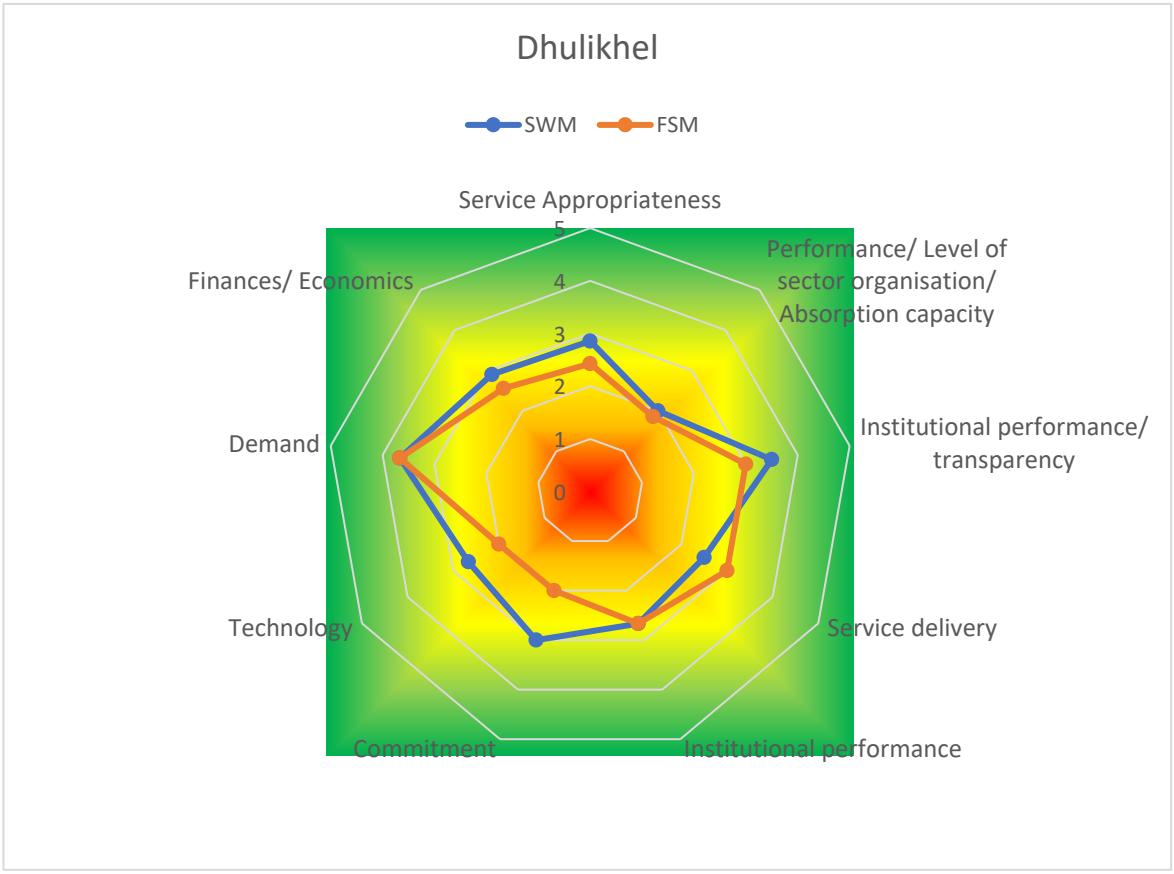
Recommendation for CLUES opportunities

- The enormous amount of waste produced and collected is quite a challenge in itself. To set up a CLUES approach by linking the two institutions, might set the city back instead of support.
- However, the commitment for change in both sectors might open opportunities of complementary initiatives, such as the Omnigester. An important criterion that must be met here is the demand for a product
- There is one initiative around separation at source on the island of Goré, including a composting site, might give nice opportunity for co-composting on small scale.
- Dakar is expanding in a planned way, this offers options for changing collection systems and including separation at source initiatives, which enables CLUES initiatives

Dhulikhel Nepal

Dhulikhel municipality is a secondary city in Nepal with a population of about 34,000. The city has no sewer. It generates 2,206 m3 / year of faecal sludge. Less than 40% of this is collected. 57% of the manually emptied FS is reused as compost without much treatment giving a total of 21% of faecal matter is safely treated and/or disposed. 2000 tonne of municipal solid waste is generated every day, 36% of households are serviced by waste collection services, whilst some do home composting as well. There is a dumpsite nearby and waste segregation is happening on-site.

SWM & FSM Assessment



Conclusions

- With a champion like the new mayor in place it is interesting to see how to improve the solid waste management and sanitation system.
- The extra impulse to improve the environmental services could be given with the input from the tourism sector, who are key stakeholders wanting a clean and attractive environment.

Specific CLUES evaluation

Weighed Values	
Capacity	8.5
Coordination	12.0
Market	13.0
Commitment	5.3
Viability	10.0
Totals weighed	**48.8**

Category	Short question Title	Score
Capacity	Good service agreements	1.5
	Tasks and Responsibilities	3.0
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Commitment	Awareness campaigns	2.0
	Recent Municipal initiatives	2.0
	Recent public protests	0.0
Viability	Financial sustainability	3.0
	Affordability and Willingness	2.0

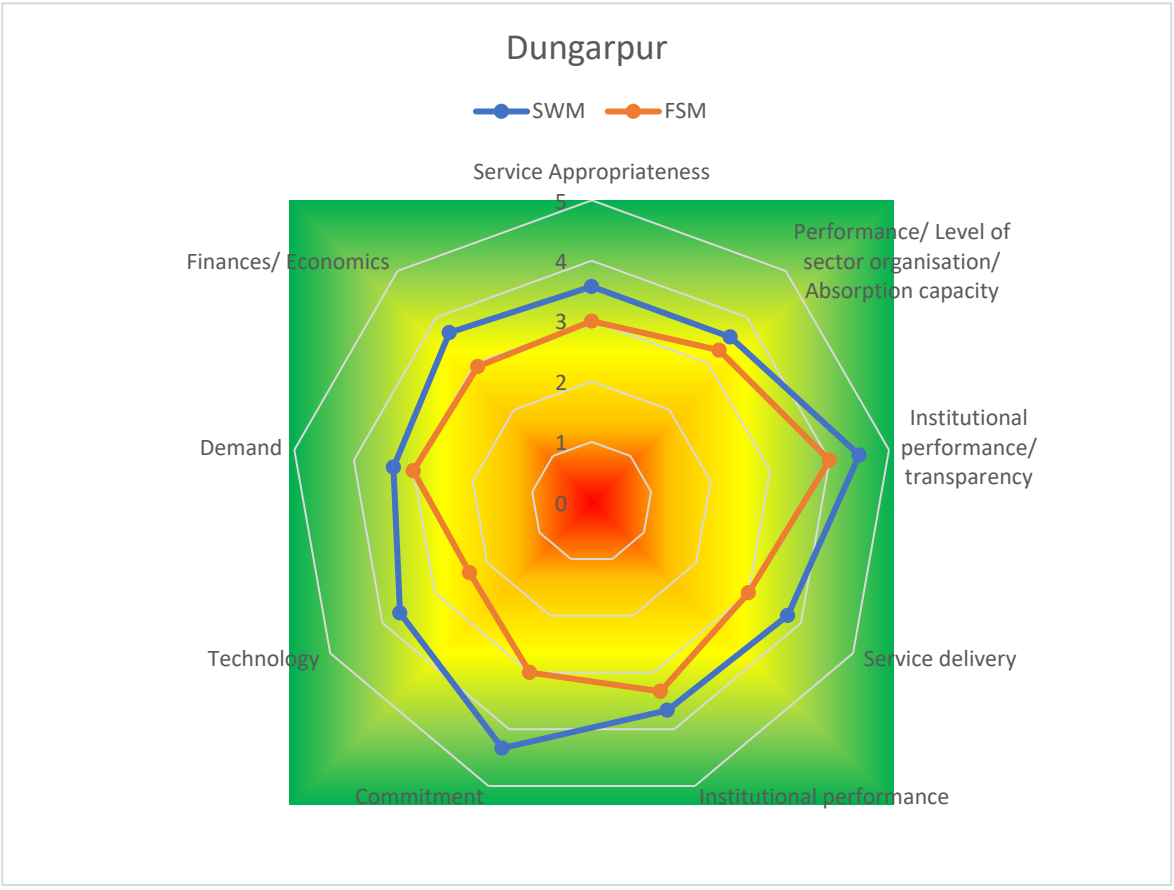
Recommendation for CLUES opportunities

- There is an interest from the municipality and one department is responsible for both sectors.
- The fact that FSM plants are in need of repairs offers an opportunity for adaptation to CLUES approach
- Composting is already done on household level as apparently some biogas toilets. Does that give options for CLUES on HH level?
- There is a market for Feacal Sludge, market study can point out if there is willingness to pay for improved quality.
- Make use of tourist sector to create demand for proper and inclusive service both SWM and FSM

Dungarpur, India

The city with a population of over 65,000 persons currently has 100% coverage of solid waste management and 100% of faecal sludge collection. 16 tonnes/day of municipal solid waste is collected and disposed at landfill where some segregation takes place. The cesspool trucks of the municipality collect only 3.5 m^3/week from septic tanks (70%) and pits (30%). Recently an anaerobic digestion plant has been put into operation to co-treat faecal sludge.

SWM & FSM Assessment



Conclusions:

- The overall performance is quite good as is the commitment
- Collection of faecal sludge needs to increase
- The city is improving rapidly with the support and pilot projects from FINISH Society, the challenge is to make these projects sustainable.
- Creating more demand for good products derived from waste and or feacal sludge is needed.

Specific CLUES evaluation

Weighed Values	
Capacity	13.0
Coordination	14.7
Market	12.0
Commitment	12.0
Viability	12.0
Totals weighed	**63.7**

Category	Short question Title	Score
Capacity	Good service agreements	3.0
	Tasks and Responsibilities	3.0
	Robust legal framework	4.0
	Service coverage	3.0
Coordination	Service interfaces	4.0
	Legal requirements for interfaces	3.0
	Coordination between service chains	4.0
Market	Service coverage	3.0
	Product regulations	3.0
	Public perception	3.0
	Subsidization of alternate products	3.0
Commitment	Awareness campaigns	4.0
	Recent Municipal initiatives	2.0
	Recent public protests	3.0
Viability	Financial sustainability	3.0
	Affordability and Willingness	3.0

Refresh Sunburst Graph

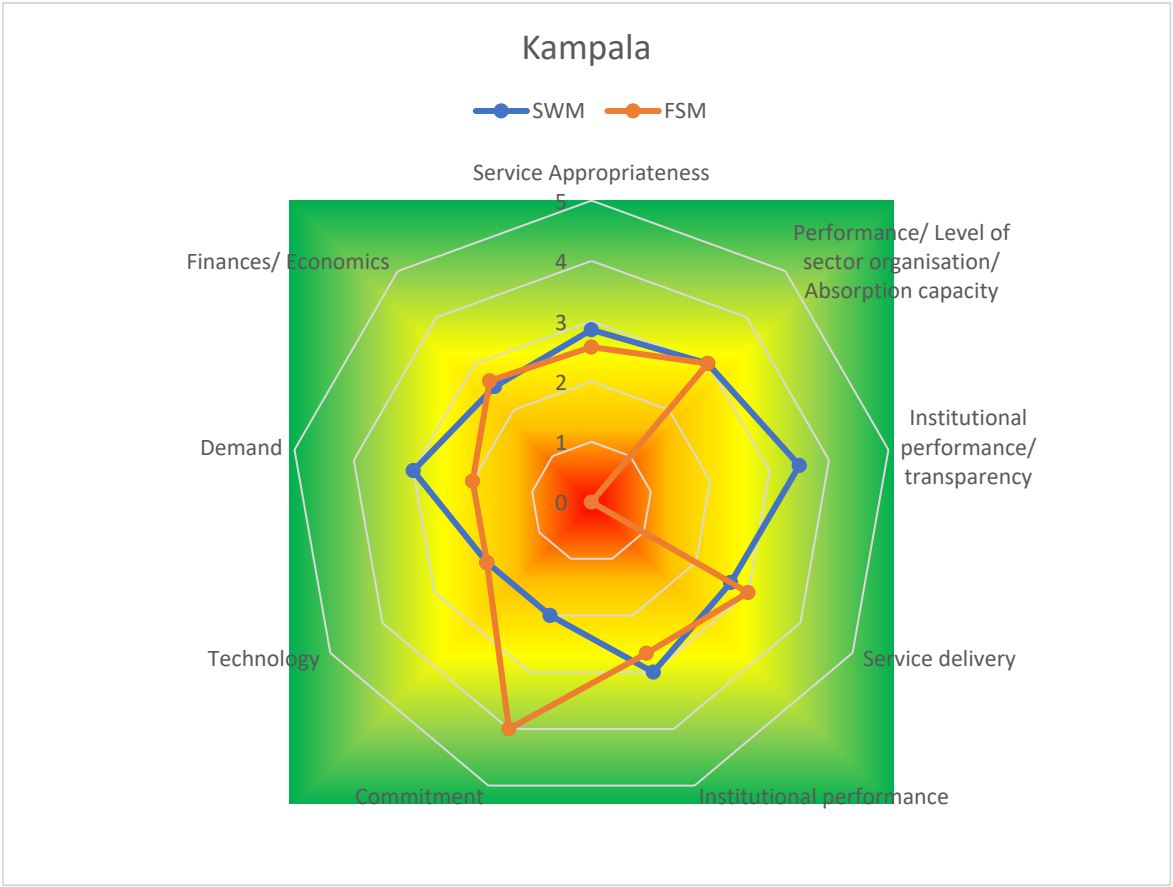
Recommendations for CLUES

- The municipality already is taking both FSM & SWM into account, but could need more capacity development
- There is a co-composting plant just starting up, it would be good to support it intensively do market research for the product and stimulate the market.
- Stimulate separation at source. There is a market for the compost. For other recyclables there is a need to improve the market
- The researchers commented that the municipality is absolutely interested, but they are very much in need of capacity building and convincing successful examples (preferably in India)

Kampala Uganda

Kampala, the capital of Uganda is a hilly city with a total population of 3.2 million people (metropolitan area). Solid waste collection is handed out to 5 consortia of formerly independently working waste collectors, plus the municipality itself. Up to 60% of the waste is collected (about 1440 t/d) and brought to the managed but overflowing. Recuperation and recycling is largely informal. 18% of households are connected to a sewer. The FSM is slowly becoming more and more organised. A large part of the emptying happens at night by manual emptiers (up to 65%) and in daytime by cesspool emptiers. 58% of faecal sludge is safely collected and disposed.

SWM & FSM Assessment



Key challenges in FSM & SWM

- Inclusive service (include low-income communities) is a clear challenge in Kampala
- Business approach of Cess pool emptiers can be improved.
- Waste collection services can improve their services, the fee system is not always clear, which is not helping to get trust from the clients.
- The opportunity for coordination is high as the KCCA is responsible for both the SWM as the FSM and can easily learn from the various experiences.

Specific CLUES evaluation

Weighed Values	
Capacity	9.0
Coordination	14.7
Market	5.0
Commitment	6.7
Viability	6.0
Totals weighed	**41.3**

Category	Short question Title	Score
Capacity	Good service agreements	2.0
	Tasks and Responsibilities	3.0
	Robust legal framework	2.0
	Service coverage	2.0
Coordination	Service interfaces	4.0
	Legal requirements for interfaces	3.0
	Coordination between service chains	4.0
Market	Service coverage	2.0
	Product regulations	1.0
	Public perception	2.0
	Subsidization of alternate products	0.0
Commitment	Awareness campaigns	3.0
	Recent Municipal initiatives	2.0
	Recent public protests	0.0
Viability	Financial sustainability	3.0
	Affordability and Willingness	0.0

Refresh Sunburst Graph

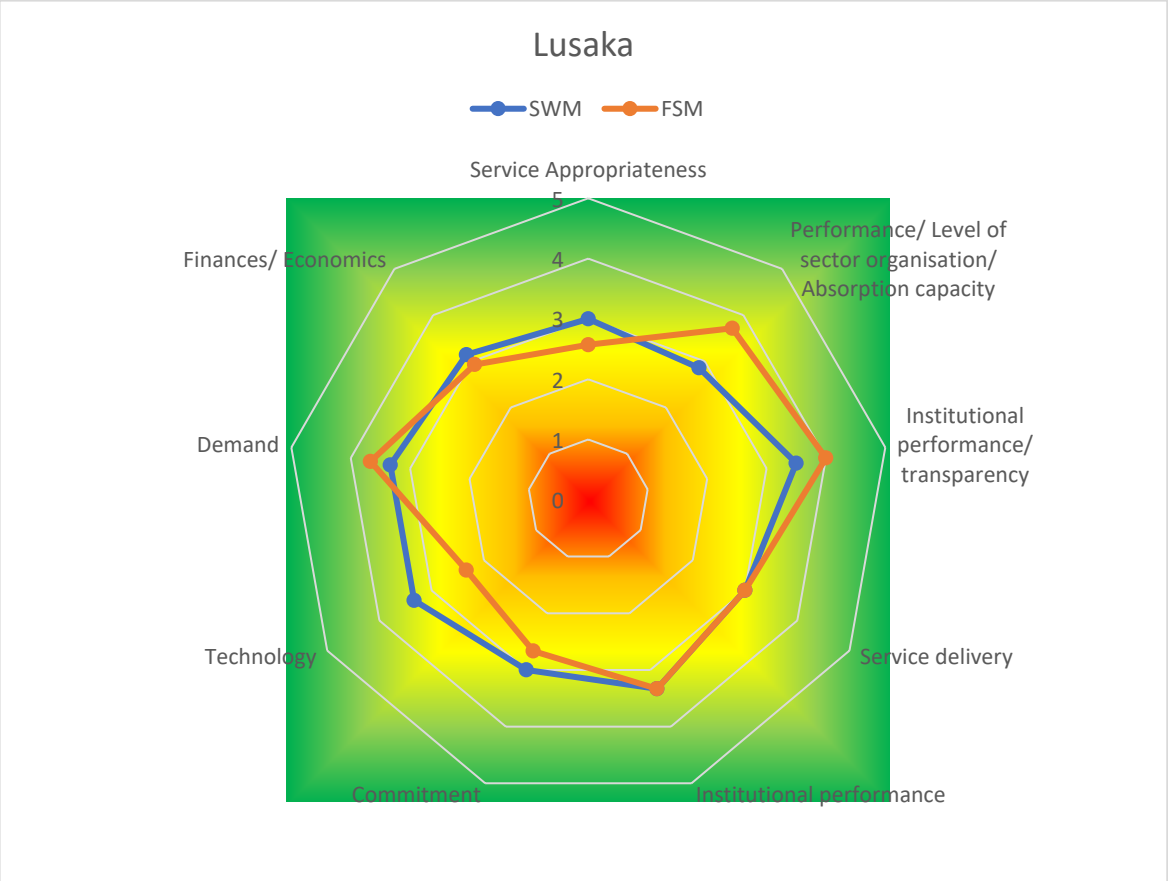
Key challenges and opportunities for CLUES

- Inclusive service (include low-income communities) is a clear challenge in Kampala
- Business approach of Cess pool emptiers can be improved.
- Waste collection services can improve their services, the fee system is not always clear, which is not helping to get trust from the clients.
- The opportunity for coordination is very high as the KCCA is responsible for both the SWM as the FSM and can easily learn from the various experiences.

Lusaka, Zambia

Lusaka is the capital of Zambia with a population of 1,747,152. It produces 1005 t/d of municipal solid waste. Solid waste management is the responsibility of the LCC (Lusaka City Council). The city has two distinct areas. Private enterprises deliver SWM collection services. Also, FSM is serviced by the private sector of which the Lusaka Water and Sewerage Company (utility) is the largest. Smaller entrepreneurs provide desludging services. In peri-urban settlements waste collection services are provided by community-based enterprises. Desludging services are provided by small (informal) entrepreneurs. Sludge is treated either at wastewater treatment plants supervised by LWSC, ends up in the drainage system or at public places or is contained in pits. 25% of faecal sludge is safely collected and disposed.

SWM & FSM Assessment



Key challenges in FSM & SWM

- The Lusaka FSM and SWM systems encounter many challenges.
- On paper, policies are up to date, responsibilities seem to be well delegated and organised.
- Attempts are made to close existing gaps with the new Urban Sanitation Strategy, caused by combination of factors including the ever growing population, lack of financial and personnel resources, and lack of political and administrative commitment result in a low coverage of environmental services.
- Lusaka is unique in these city studies as it is one of the only cities where FSM seems to be better developed than the SWM.

Specific CLUES evaluation

Weighed Values	
Capacity	12.0
Coordination	14.7
Market	12.0
Commitment	10.7
Viability	6.0
Totals weighed	**55.3**

Category	Short question Title	Score
Capacity	Good service agreements	3.0
	Tasks and Responsibilities	4.0
	Robust legal framework	3.0
	Service coverage	2.0
Coordination	Service interfaces	4.0
	Legal requirements for interfaces	4.0
	Coordination between service chains	3.0
Market	Service coverage	2.0
	Product regulations	4.0
	Public perception	3.0
	Subsidization of alternate products	3.0
Commitment	Awareness campaigns	3.0
	Recent Municipal initiatives	2.0
	Recent public protests	3.0
Viability	Financial sustainability	3.0
	Affordability and Willingness	0.0

Refresh Sunburst Graph

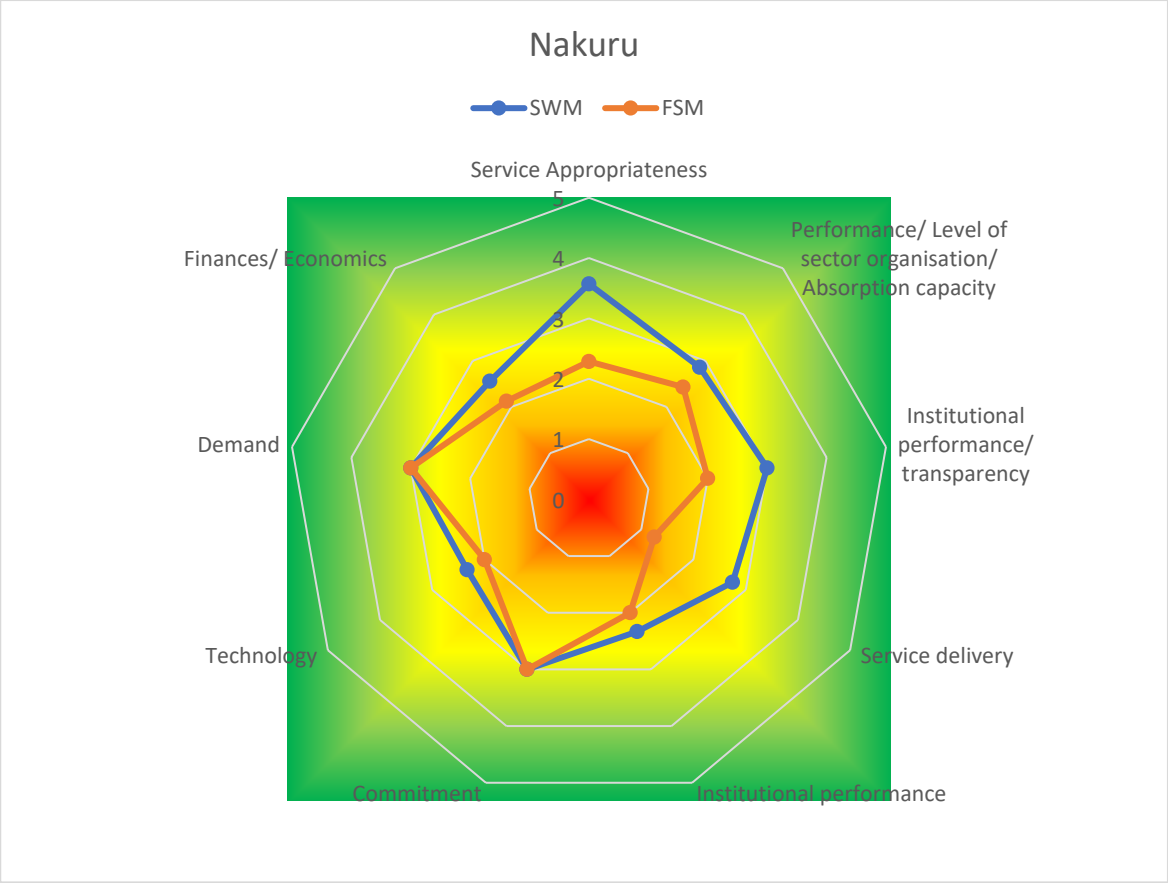
Recommendations on CLUES

- Lusaka is a large city with many different challenges concerning SWM and FSM. The main constraint is the lack of political and administrative commitment. Therefor starting with an approach on large scale, placing heavy reliance on involvement of the political and administrative entities, will most probably not solve problems and challenges. Start CLUES like initiatives at a smaller scale, learn and only then start upscaling. Smaller scale initiatives could gain traction and support of the local authorities, and scaled up once momentum is gained.
- Unlike SWM, the FSM in Lusaka is at the moment very donor driven mainly because of the Lusaka Sanitation Project (LSP) supported by the World Bank). The sector attracts significant attention of (foreign) consultants and (I)NGOs. The influx of international development funds and expertise is now a strong driver for change, but in the long term the effects of the LSP on the Lusaka FSM system is unclear. The LSP might also pose opportunities. It is therefore recommended to start engaging for a CLUES approach in the frame of pilots implemented under LSP.
- While the FSM is presently donor driven, SWM is local and market driven. Though many improvements can be made, SWM interventions might prove more sustainable. It might prove beneficial in the long run to start CLUES activities from a SWM market perspective, and build the inter-sectoral collaboration from that platform.

Nakuru, Kenya

Nakuru in Kenya has a population of 419,088. It generates about 288 t/d of solid waste or 72,117 tonne / year. About 60-70% is collected through door to door and open disposal points in residential blocks. There is informal sorting of mixed plastics. The landfill is uncontrolled and not engineered, though there is some management and entry control. It receives 200 ton/d average (also from outside Nakuru Municipality). Extensive sorting takes place at disposal site. 27% of Nakuru is connected via the sewer to not fully operational treatment plants. 36% of faecal sludge is collected.

SWM & FSM Assessment



Conclusions and remarks

- Both sectors have big challenges
- The solid waste has a system in place but is very much lagging behind in technology
- The Sanitation sector needs a lot of improvement.

Specific CLUES evaluation

Weighed Values	
Capacity	7.0
Coordination	5.3
Market	8.0
Commitment	6.7
Viability	8.0
Totals weighed	**35.0**

Category	Short question Title	Score
Capacity	Good service agreements	1.0
	Tasks and Responsibilities	2.0
	Robust legal framework	2.0
	Service coverage	2.0
Coordination	Service interfaces	1.0
	Legal requirements for interfaces	2.0
	Coordination between service chains	1.0
Market	Service coverage	2.0
	Product regulations	3.0
	Public perception	3.0
	Subsidization of alternate products	0.0
Commitment	Awareness campaigns	2.0
	Recent Municipal initiatives	3.0
	Recent public protests	0.0
Viability	Financial sustainability	2.0
	Affordability and Willingness	2.0

Refresh Sunburst Graph

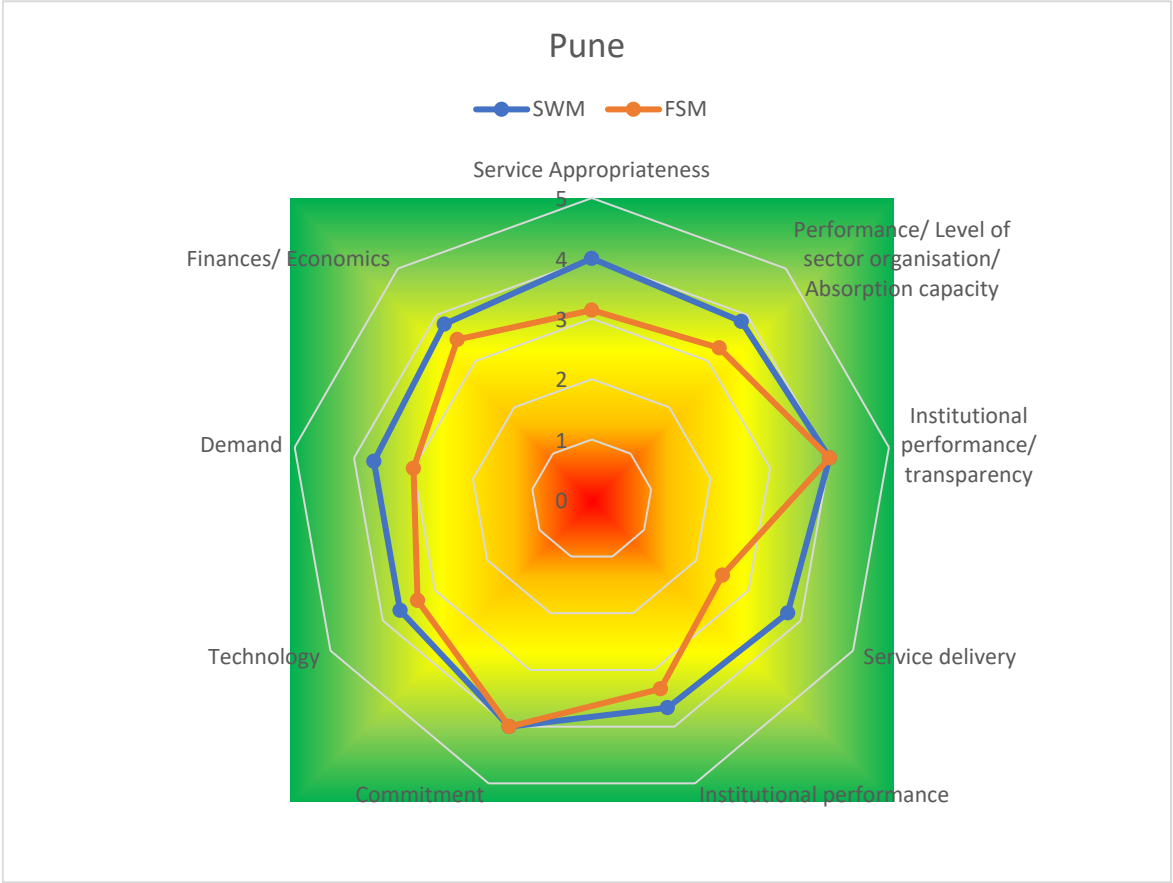
Recommendation for CLUES opportunities

- Even though the scores are low it seems that activities in Nakuru are already gearing towards integration of faecal sludge management and organic waste. E.g the briquetting. A market study and options for upscaling is recommended
- Important for success is the marketability of the products.
- Tourism might be an extra driver for local government to get more involved in CLUES activities.

Pune, India

Pune is the 8th largest city in India and has a population of about 5 million. The amount of waste generated is 2,100 tons/day in 2018, 80% of this is effectively collected. The door to door household waste collection is done by a network of around 3000 waste collectors. Around 815t/d of both dry and wet waste is processed through various technologies. 611 t/d ends up in the landfill site. About 100 t/d of dry waste is recovered from the dumping site. 92% of households are connected to sewerage, generating 744,000 m^3/d of sewer. There are 10 STPs in the city with a total capacity of 567,000 m^3/d. Due to inadequate pumping capacity and sewerage system 416,000 m^3/d and 328,000 m^3/d of sewage is finding its way to the river. 65% of faecal sludge is safely collected and disposed.

SWM & FSM Assessment



Conclusions:

- The scores of the two sectors nicely reflect the observations of the researchers, that Pune is on its way to a fully functioning SMW and sanitation system.
- It is not strange that in a fast growing city as Pune the service delivery in FSM continues to be lagging behind.

Specific CLUES evaluation

Weighed Values	
Capacity	14.0
Coordination	14.7
Market	12.0
Commitment	16.0
Viability	10.0
Totals weighed	**66.7**

Category	Short question Title	Score
Capacity	Good service agreements	4.0
	Tasks and Responsibilities	4.0
	Robust legal framework	3.0
	Service coverage	3.0
Coordination	Service interfaces	4.0
	Legal requirements for interfaces	3.0
	Coordination between service chains	4.0
Market	Service coverage	3.0
	Product regulations	3.0
	Public perception	3.0
	Subsidization of alternate products	3.0
Commitment	Awareness campaigns	4.0
	Recent Municipal initiatives	4.0
	Recent public protests	4.0
Viability	Financial sustainability	3.0
	Affordability and Willingness	2.0

Refresh Sunburst Graph

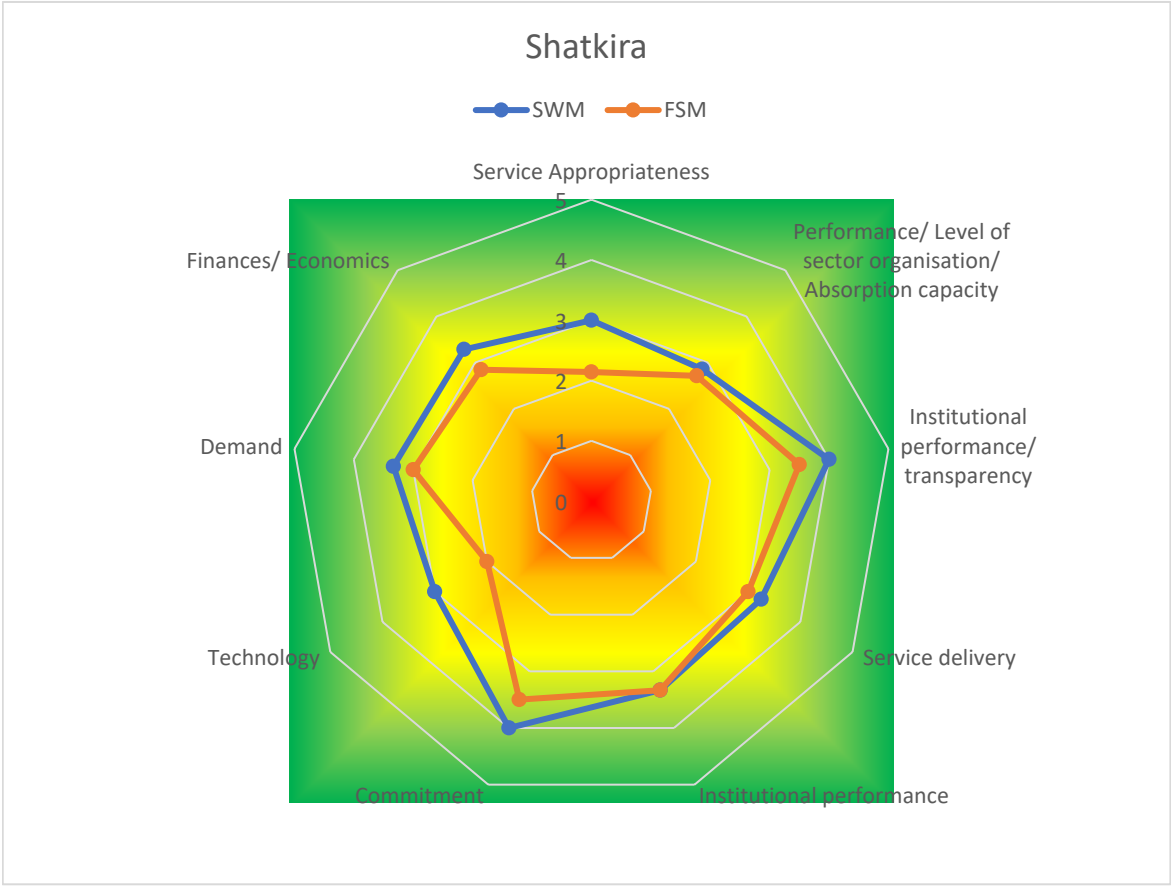
Recommendations on CLUES

- Pune seems to have all the right opportunities to set up a successful CLUES. However the fact that is it a huge city with more than 8 million inhabitants will make it difficult to actually merge the two services.
- Opportunities for collaboration in technical solutions can be present however, provided a market for the products deriving from the FSM & Organic waste can be found and facilitated and developed.

Shatkira, Bangladesh

Shatkira is the district headquarters of the Shatkira district - Southern Bangladesh and has 150.000 inhabitants. Large parts of the city are regularly inundated during the monsoon. Because of this, though the city is ODF, the management of faecal sludge is a major problem. The amount of household waste collected (75% organic) is 9,855 tonne/year or about 30 t/d. Per year, Shatkira generates 250,000 m^3 black water containing 12,570 m^3 excreta (dry). 0% of faecal sludge is safely collected and disposed.

SWM & FSM Assessment



Conclusions

- Both faecal sludge as well as solid waste management encounter many challenges due to lack of resources, awareness of the citizens and lack of capacity.
- It is difficult to convince citizens of their responsibilities and enforcement poses a big challenge.
- With help the municipality has gotten a clear idea how to address the issues around sludge and organic waste but lacks the resources.
- Despite good track-record on fee and tax collection it still needs foreign investments to materialize the ideas.

Specific CLUES evaluation

Weighed Values	
Capacity	12.0
Coordination	13.3
Market	10.0
Commitment	12.0
Viability	12.0
Totals weighed	**59.3**

Category	Short question Title	Score
Capacity	Good service agreements	2.0
	Tasks and Responsibilities	4.0
	Robust legal framework	4.0
	Service coverage	2.0
Coordination	Service interfaces	3.0
	Legal requirements for interfaces	3.0
	Coordination between service chains	4.0
Market	Service coverage	2.0
	Product regulations	3.0
	Public perception	3.0
	Subsidization of alternate products	2.0
Commitment	Awareness campaigns	2.0
	Recent Municipal initiatives	4.0
	Recent public protests	3.0
Viability	Financial sustainability	3.0
	Affordability and Willingness	3.0

Refresh Sunburst Graph

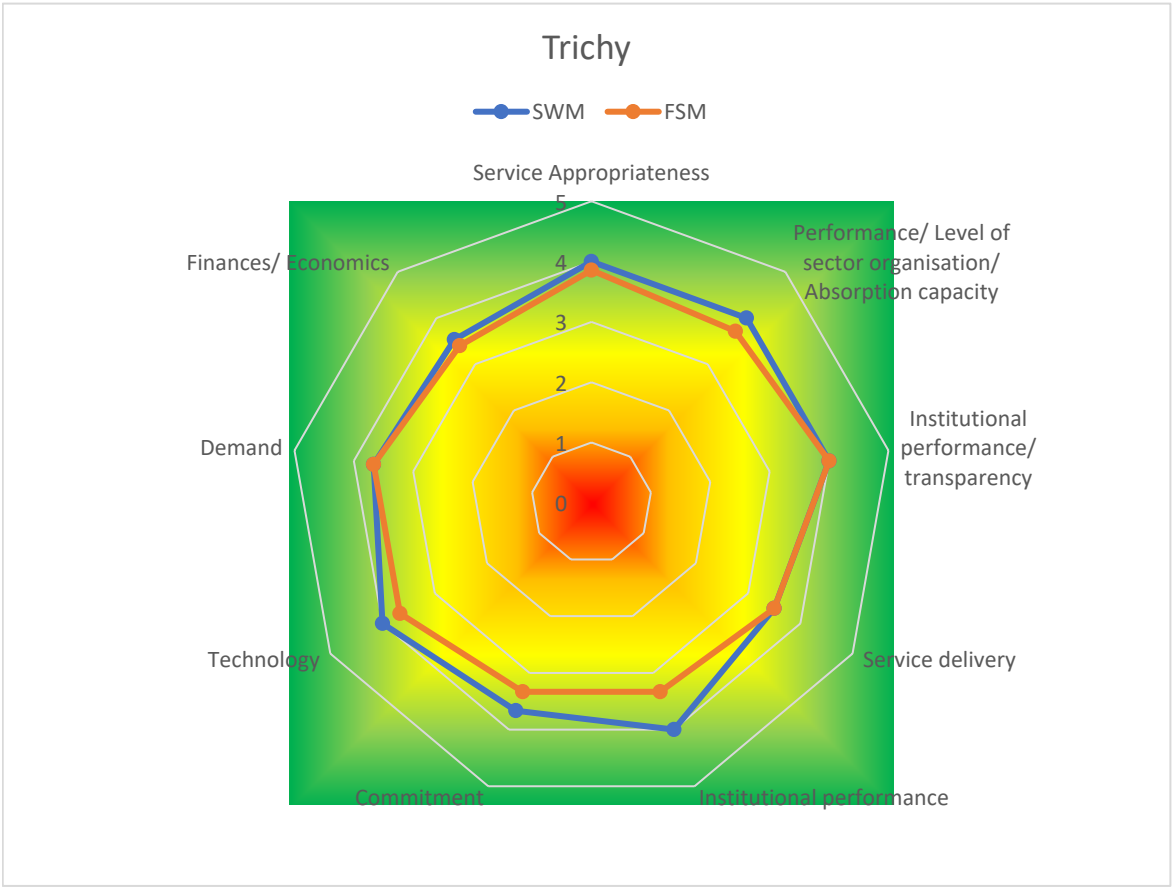
Recommendations on CLUES

- In order to scale up the small pilots, a comprehensive plan should be developed to enable the local authorities to implement CLUES service provision at a city level scale. The plan should include realistic upscaling scenarios including adaptive technologies and financial strategies.
- Strengthen the National Faecal Sludge Platform and promote more (climate)- adaptive technologies in the FSM sector.
- Find alternatives for the market hurdles like the compulsory certification of composting and co-composting, branding and labelling.
- Intensify the inclusion of the agricultural sector in the CLUES sector thus enlarging the potentials for reuse of co-compost.

Trichy, India

Tiruchirappalli, also known as Trichy, is located along the Cauvery river delta in the State of TamilNadu, India has a population of 916,674. The amount of municipal solid waste generated in Trichy is 450 t/d, 360 t/d is effectively collected by SHG members. 225 t/d wet waste is generated of which 90 t/d goes to 28 Micro Composting Centres, 6 t/d goes to two bio-methanization plants. The IL&FS composting plant which used to compost 100 t/d has become dysfunctional. Of the 225 t/d dry waste, 202 t/d is sold to 195 existing recycling vendors. For the remaining inert waste 13 t/d a MoU has been signed with M/s Ultra tech cements for further processing. The amount of faecal sludge generated in Trichy is 21,000 m^3/d. MLD. TCC has ensured 100% collection rate and safe. disposal of sludge. 40% of the Trichy area has sewerage connected to the wastewater treatment. Some remaining faecal sludge from onsite sanitation is collected by 37 private operators and emptied at the faecal sludge plant. 60% of faecal sludge is safely collected and disposed.

SWM & FSM Assessment



Conclusions

- As in all Indian cities both the SWM & FSM are developing in an even way the selected aspects have scoring in the same range. The FSM lags only a bit behind of the SWM scoring.
- This can probably be contributed by the national policy focus on sanitation and solid waste.

Specific CLUES evaluation

Weighed Values	
Capacity	13.0
Coordination	16.0
Market	15.0
Commitment	13.3
Viability	12.0
Totals weighed	**69.3**

Category	Short question Title	Score
Capacity	Good service agreements	3.0
	Tasks and Responsibilities	3.0
	Robust legal framework	3.0
	Service coverage	4.0
Coordination	Service interfaces	4.0
	Legal requirements for interfaces	4.0
	Coordination between service chains	4.0
Market	Service coverage	4.0
	Product regulations	4.0
	Public perception	4.0
	Subsidization of alternate products	3.0
Commitment	Awareness campaigns	3.0
	Recent Municipal initiatives	4.0
	Recent public protests	3.0
Viability	Financial sustainability	3.0
	Affordability and Willingness	3.0

Refresh Sunburst Graph

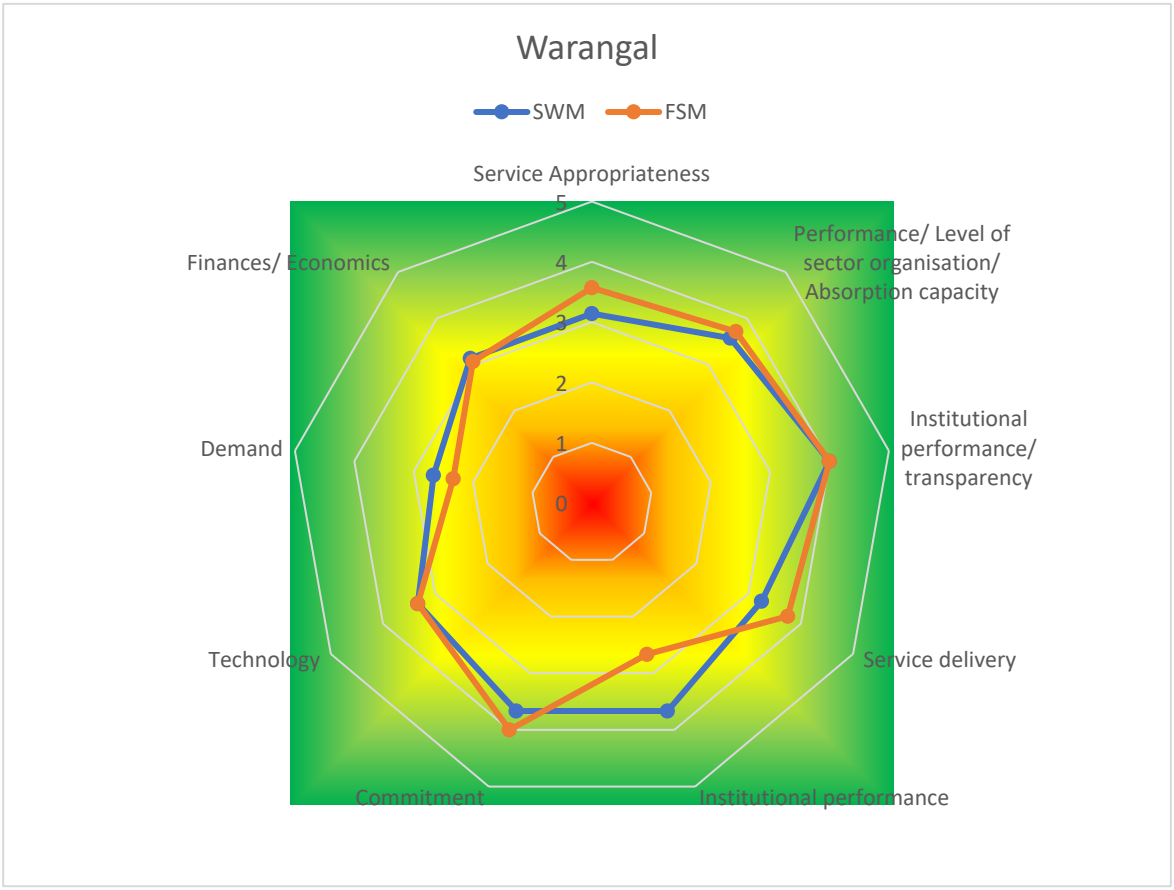
Recommendations on CLUES

- Although the city seemingly has everything going for CLUES, the Tiruchirappalli City Corporation is headed by the Commissioner who has the jurisdiction of both SWM and FSM. Administratively, the powers are not divided into two separate departments for the service chain of both these sectors. CLUES approach is well understood by the municipality and they are keen on combining both the services wherever possible with proper guidance and training. However, mixing human waste with wet waste in the MCCs will have aesthetic and practical concerns.
- The CLUES approach in Trichy does not seem an option, unless there is an intensive support from the outside and examples of successful practices can be shown in India.

Warangal, India

Warangal is the district headquarters of Warangal Districts in Telangana, India and has a population of 819,400. 300 tonne /day of municipal solid waste is generated in Warangal, with nearly 100% door to door collection. Most of wet waste is transported to the dumping site with a small quantity of the wet waste is used in the two existing bio methanation plants. For the dry waste, nearly 100% is handled by the DRCCs and a small portion (138 t/month or about 6 t/d) is transported to the recycling units in different parts of the country through their dry waste collection central point. Warangal is declared Open Defaecation Free, there is no sewerage system, the onsite sanitation system includes septic tanks, twin and single leach pits. The city has a 100% collection rate which results in 30 m^3/d of faecal sludge. 85% of the sludge finds its way to the two treatment plants. The products of both plants are not yet being marketed fully.

SWM & FSM Assessment



Conclusions

- Both sectors are evenly developed one of the few cities in which the management of FSM scores overall higher than SWM
- The demand for products lags behind the improving technology as is the finances and economic opportunities for the sectors.

Specific CLUES evaluation

Weighed Values	
Capacity	12.0
Coordination	10.7
Market	10.0
Commitment	16.0
Viability	12.0
Totals weighed	**60.7**

Category	Short question Title	Score
Capacity	Good service agreements	3.0
	Tasks and Responsibilities	3.0
	Robust legal framework	3.0
	Service coverage	3.0
Coordination	Service interfaces	2.0
	Legal requirements for interfaces	4.0
	Coordination between service chains	2.0
Market	Service coverage	3.0
	Product regulations	2.0
	Public perception	3.0
	Subsidization of alternate products	2.0
Commitment	Awareness campaigns	4.0
	Recent Municipal initiatives	4.0
	Recent public protests	4.0
Viability	Financial sustainability	3.0
	Affordability and Willingness	3.0

Refresh Sunburst Graph

Recommendations on CLUES

The score indicates that CLUES approach could be a viable opportunity. The weakest link is the development of a proper market.

Comments from the city on the CLUES concept: Marketability of the co-compost will however be in question due to mental barriers of using human waste as compost. During the stakeholders workshop the concept of CLUES was explained and it was well appreciated, but the city officials were keen to get informed on different strategies and successful case studies for creating a market for co-compost.

General conclusions regarding opportunities for CLUES approach

The 10 city research and their spiders and sunburst led to some more general conclusions around the CLUES approach. These conclusions are based on the data analysis of the 10 cities, and on assumptions the experts formulated during the study, assumptions on factors that can facilitate a successful **introduction of CLUES type interventions:**

Size of the city

When a city is relatively small, such as Dungarpur and Shatkira with relatively lower populations, the problems related to urban environmental service delivery are still somewhat manageable. On the other hand, smaller cities receive less attention and funds from the central levels. CLUES-like initiatives are easier to initiate and to manage. The institutional setting is also often simpler than that of, for example, mega cities or capitals. In a city like Lusaka or Dakar, it will be very difficult to organize CLUES initiatives because of the complex institutional setting despite the relatively well functioning systems.

Coordination of both systems (FSM and SWM) is managed by one authority.

Organic waste and feacal sludge are often managed by 2 or more authorities which act completely separate from each other. Policies, cash flows, budgets or regularization are separated, making it difficult to combine both waste streams. This issue becomes even more manifest when a city is being serviced with sewerage-lines.

Presence of an explicit existing market for urban environmental service delivery and reuse products.

In many cities, attempts have been made to set up initiatives for organic waste. However, without much success, the main reason being the lack of a real market. When such a market is present CLUES initiatives are likely to succeed.

Proven ability. When the local authorities have a proven ability to deliver urban environmental services in an efficient and effective manner the opportunities for a CLUES approach is bigger. Often there is already an official and functioning link with the private sector and the added value of such cooperation has already been proven.

Presence of local champions. As with all new innovations that still have to prove themselves, local champions are crucial for a successful implementation of the concept. Knowledge and the (political) willingness as drivers for change make the difference between success and failure. However it is important to consolidate the innovation as much as possible in the institutional sector to avoid that the initiative is dependent on the presence of the champion only,

The situation in Asia and particularly India is different from the African cities. We therefore present these differently below.

Conclusions and Recommendations

With the analysed cities and the assumptions there are some trends to be detected in the cities this chapter looks at them from a geographical perspective.

African Context for CLUES

Cooperation between the 2 value chains

Often the 2 value chains are clearly separated from each other: the municipality organisations are often responsible for the SWM collection, while utilities (and/or private sector) are often the executing entity for FSM.
The chains are on all levels separated: policy making, operational and budgeting. This makes it very complex to combine both chains.

Capacity organisations

Financial capacity of private service providers

In Africa contracts often do not exceed one year or in many cases there are no contracts at all. Short contracts have a devastating effect on the (economic) viability of enterprises. As a result of the short term contracts, most entrepreneurs cannot/will not invest in their businesses. Banks do not provide the necessary loans that enterprises need to grow. Due to the lack of funds and long term perspective, enterprises do not save money for maintenance of equipment.
This is particular the case for small and medium enterprises who operate in the peri-urban areas, where payment structures do not provide any assurance of payment and security. The utilities and larger companies get concessions or are active in the conventional built-up areas where profit margins and payment rates are higher. In these conventional areas fees are set by the local authorities or even by the utilities themselves and though even in these cases the fees do not match the lowest requirement of even the operational costs, the payments rates are fairly high in these areas.

Technical capacity of private service providers

From a technical point of view, according to the reports, there is not much going on. The most commonly used technologies comply reasonably with the standards for appropriateness. However, when a bit deeper into the matter is discussed, discussions with de-sludgers show that the equipment used in particular does not meet the safety standards and is by no means all material suitable for the task to be performed (type of equipment used does not match type) sludge or is not suitable for the terrain.
New technologies that were found are very much in pilot phase often part of a funded project, with not much insight yet on marketability and thus sustainability of the project.

Organizational capacity of private service providers

Small and Medium entrepreneurs are quite often not well organized both internally as sector-wise. Often the sector is NGO-driven, which is not per se a bad thing, but it often disconnects the private sector from the public sector. Because of it they cannot make a fist against the forces that obstruct their sectors to grow and sustain over time.

In many interviews ‘enforcement’ is seen as the missing link: “when the local authorities start enforcing the rules, things will become better” is the general thought. The perception that with a system of enforcement also a system of incentives should be developed is completely overseen.

Commitment

There is relatively little leadership by the authorities and political leadership concerning SWM and FSM. SWM and FSM has in general no priority and there where the opposite is the case the situation is considerably better than there were SWM and FSM is no priority.

Most municipalities also do not consider SWM and FSM as a real high priority and therefore do not provide much guidance and initiative to make the systems work. This shows in the organisational setup. Operators are often badly organised and what organisation can be found is often NGO-driven instead of local government or business-driven. Although a current trend is that utilities are trying to organise at least the de-sludgers.

Political decision-makers are optimistic about what could be possible with regard to FSM and SWM, but in practice little comes of it. The service delivery in these sectors is highly politicized and there are few real champions who want to burn their fingers on these sectors. And if there are champions, they are either too high or too low on the organizational ladder or work for NGOs preventing them to have a lasting influence.

Unfortunately, NGOs active in one city rarely have a comprehensive approach which leads to a patchwork of initiatives and organisational set ups. This again is not good for a proper functioning market.
The mushrooming of NGOs in the sector often prevent a comprehensive approach in the SWM and FSM sectors.

Real commitment in Africa for CLUES-like interventions is low.

Market or demand

In order to create the enabling conditions for upscaling the whole value chain should be more or less functioning. Remarkably the bottle neck seems not to be the service delivery but the receiving side: the status of the landfills and the feacal sludge treatment sites. In most cases the treatment sites do not function or work very badly, the capacity is insufficient to even process the current supply, let alone the supply that belongs to a complete coverage of the city or they are completely absent. Many treatment sites are being used for purposes for which they are not designed.

Reuse of organic waste is usually informal and only marginally contributes to the total system of waste collection and processing. Solid waste recyclables such as plastics and metals yield the most revenue, organic materials generally the least. The calorific value of the organic products is so low that professionals such as farmers and market gardeners do not want to pay the price that the producers of the products of compost and co-compost[3] should be able to demand in order to guarantee a profitable business operation. The organic products must be upgraded to briquettes and enhanced compost, for example. When provided for free, raw reuse products are being used.

A formal market for co-composting and other reuse products is in most cases practically absent, though there is certainly potential. There is a number of demo-projects initiated by NGO's and companies which seem to work but lack a large market. The parallel with the composting market (composting of organic waste) is clear: composting is often considered as a viable means to generate income but fails because the product itself (compost) has not enough value for consumers to pay enough to cover the costs involved to make the product. Several researches show that only with mineral fertilizer enriched (co-)compost has enough value that consumers want to pay a price that makes the production of co-compost economically worthwhile.

Financial Viability

We did not encounter fully developed and comprehensive business models for CLUES that include service delivery and commodity production (reuse products such as briquettes, co-compost). There is anyway little political eagerness among decision-makers to get involved in CLUES-like initiatives. The 2 sectors in itself have already enough problems.

Due to the lack of leadership there is no unambiguously tariff and fee system and are in particular the smaller SW collectors and de-sludgers depended on the clients' preparedness to pay for the services because for each job fees need to be negotiated. The low social status of the sector and the low negotiation skills of the entrepreneurs doesn't make getting adequate payment any easier.

[3] Mixture of organic waste and faecal sludge composted together and resulting in the product of co-compost.

From a financial perspective, none of the landfills or FSTPs studied make profit or even reach a break-even point. Gate fees are not collected and where reuse products enter the market the products are given away for free. Business-minded thinking is completely missing. Business plans in this sector are rare and there is no clear picture of expense and income flows. Technical knowledge is missing and political priority setting is low.

The clients do appreciate the services provided by the private sector and do want to pay for services as long as there is some quality delivered. Appreciation is mostly felt for services provided in the urban conventional built-up areas because services are delivered by more regular bigger enterprises. Appreciation is much less in the peri-urban areas where small enterprises and CBE's provide their services. This is not because of the use of technical inferior materials and equipment, but mainly because these small companies lack control, a decent pricing structure, lack of official contracts and a clear set of requirements that the services have to meet.

Local municipal policies are usually not geared towards the development of local markets for FSM and SWM. Prices and fees are often set by politicians without a proper business model base and are too low to ensure an economical feasible sound business administration of enterprises. Often only the richer and bigger companies survive who do not service the peri-urban areas. Consequentially, the urban areas are being serviced by small to medium enterprises who cannot economically survive with the set fees and prices for their services. Economic considerations have no priority with policy and decision makers.

In general, it can be concluded that the level of organization and institutional capacity to a large extend determines whether CLUES-like interventions will work.

Recommendations:

- Institutional setting and PPP: The activities should focus on the establishment of PPP arrangements in a way that public and private sector are committed. PPP parties agree on common goals and deliverables and by signing such an agreement show their (financial or other) commitment. Whilst
- Technologies: There needs to be agreement on technology to be deployed, at the same time innovations should be hampered. When implementing new technologies whether it is a pilot project or an upscaling and implementing of new and higher technologies, the market and institutional capacity should be present. If these do not have a high enough score in the CLUES sunburst, the technology is deemed to fail the moment the pilot stops receiving funds from a project.
- Coordination: Their needs to be a coordination mechanism to ensure that partners do work together, partners particularly private sector should be protected from political interference.
- Commitment: These commitments should ideally be medium term (up to 5 years) with milestones or clear results at regular intervals and partners are measured against their performance.
- Market: real markets for reuse hardly exist. A strategy for developing the market should be included in the PPP arrangement.

There is a clear need to set up the existing systems more efficiently. This applies for SWM as well as FSM. When a combination of the two is possible, that yields efficiency, it may be worthwhile to set up CLUES-like systems. As both sectors are often separated from each other in such a way that the decision structure hinders effective merging.

Asian Context:

In Asia it is interesting to note that the Indian cities have some clear differences, while the two cities in South East Asia have a lot of commonalities with African cities. The differences are discussed in the following paragraph after which the conclusions about India are presented separately to get a clear distinction.

South East Asia

Of course, here only two cities (Dhulikhel, Nepal and Shatkira, Bangladesh) contribute to the general conclusions. The overall conclusions are very similar to the conclusion from the African continent especially with the smaller cities in Africa, as they both are also quite small.
But some small differences can be noted, these are highlighted here.

Data

While in Africa the data on waste production and composition are still very much based on estimations as given by the World bank from several years ago, the figures here are more detailed and accurate. This however does not mean that the whole solid waste management chain is better, but it is a clear sign that the importance of waste management is being acknowledged by the municipalities.

Cooperation between the 2 value chains

Currently, there is no clear examples of cooperation between the 2 value chains except maybe on household level where the citizens in some cases mix the organic waste with feacal sludge in their biogas toilets. This might be an interesting angle to reduce the amount of waste, and feacal sludge to be managed, but is only feasible in low to very low density areas.

India

The situation in India differs quite much with the African and South East Asian context.

Commitment

The political commitment in India is high at all levels. This is probably due to the fact that the Indian National Government is focusing very much on cleaner and healthier cities via the Swachh Bharat Mission (Clean India Campaign) (Urban) of the Ministry of Housing and Urban Affairs has a clear influence on the state of the cities. In Dungarpur for instance they are proud to be the first city in Rajasthan to declare itself free from open defecation. All four cities (Pune, Dungarpur, Trichy and Warangal) are active in improving the solid waste management.

While sanitation has been high on the agenda for some time, the commitment has been very much been focussed on the realisation of toilets, not so much setting up proper sanitation chains with proper systems for latrine emptying and feacal sludge management. The latter is now more point of attention in the Swachh Bharat Mission.
The 4 researched cities are looking for opportunities to improve the FSM as well. All did see advantage in especially the joint treatment of organic waste and feacal sludge. However, the cities are looking for successful examples which can be scaled up immediately. The interest for pilot projects might be there as well, but not stated as such in the outcome of the studies.
The commitment in the cities is high at it is largely nationally induced and politically interesting.

Compared to scores of the African cities the overall score on SWM & FSM is relatively high and also the FSM management is in most cities nearing the level of the SWM scores.

Institutional performance

The institutional performance scores high in all cities, which can be explained by the overall level of the Indian local government and the special emphasis given at this moment to sanitation issues in India. Still al the cities state that they could benefit from capacity building in the field of waste management and sanitation to be able to improve the service and strengthen the service and product chains. The importance for good pilots preferably in India is also mentioned several times.

Cooperation between the 2 value chains

Cooperation between the 2 value chains in the treatment part is only existing in pilot projects. Except in Dungarpur where the waste collectors collect FS in the afternoon after their solid waste collection. In all cases the local government expressed interest in opportunities to link the activities on the treatment phase, but

requested Indian examples that proved their viability. This shows opportunities for setting up pilot projects in India or making a good inventory on existing projects ready for scaling up.

Capacity organisations

The sector is very fragmented and therefor have little influence on the local government. The licencing system is not working properly and as the shit flow diagrams show there is little to no control on the actual dumping of feacal sludge. The work in both sanitation and waste collection are regarded as low and is not much respected in the community.

Conclusions on the Tool used for this study

This tool that has specifically been developed is based on the benchmarking tool of RWA, the Integrated Sustainable Waste Management assessment tool and sanitation assessment tool of WASTE.

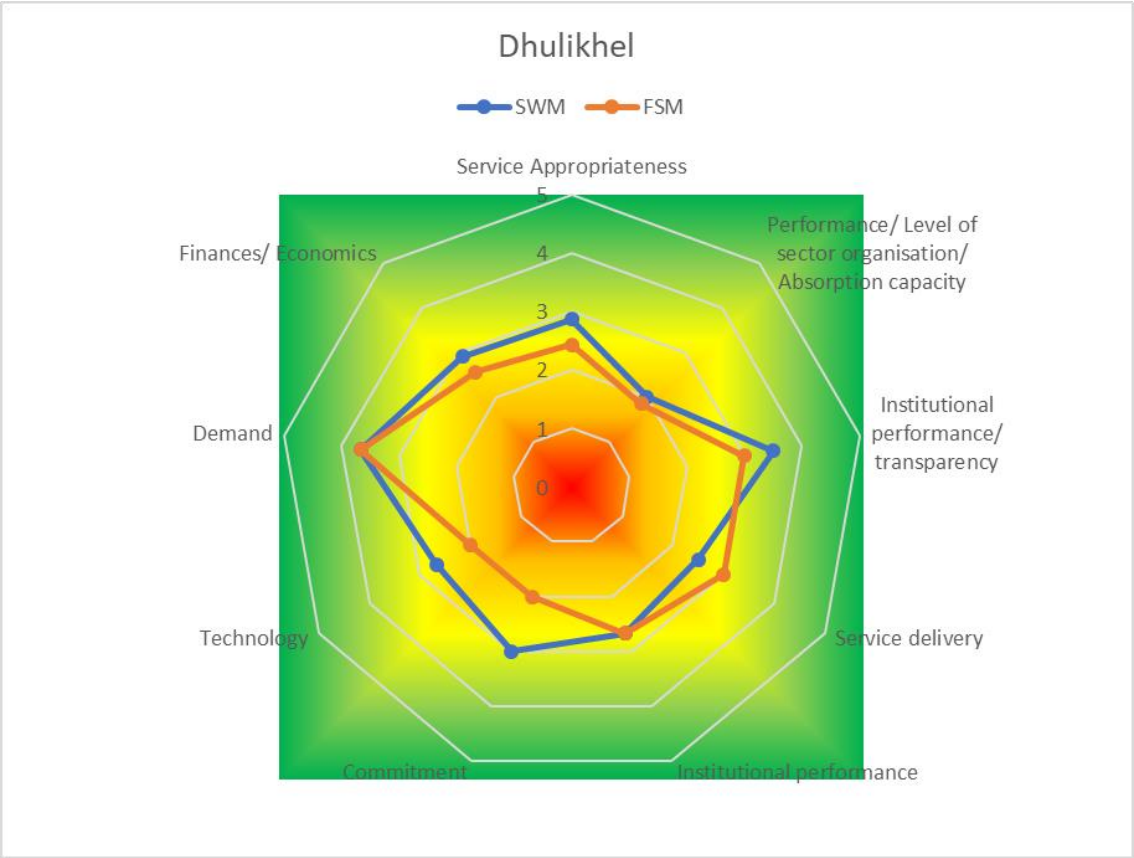
The questionnaire is based upon 7 assumptions and from these 12 hypotheses. (See Annex 1)

1. The level of Service & Product Appropriateness
2. The level of Professionalism
3. The level of Transparency
4. The level of Public Private Arrangements (SLAs)
5. The level of Institutional performance
6. The level of Commitment
7. The Technology used
8. The Economic (Market) viability
9. The Financial viability

Within these assumptions 3 to 4 vital questions were formulated in which the researcher should score from 1 – 5 to be explained as:

1= question is not addressed at all
2= question is raised, but insufficiently addressed
3= question is sufficiently addressed, but still shows relevant limitations
4= question is satisfactorily addressed
5= question is addressed in a way that exceeds expectations given the local circumstances (e.g. best practice example)

These scores were translated into a Spider Diagram showing the SWM & FSM in one graph. The researchers recognized the interviewed cities is the diagram and more importantly most municipalities also recognized their city in the spider graph.



During this study the researchers were asked to code the questions themselves. During the feedback of the researchers it became clear that clear benchmarks would make the coding more objective and less subject of discussion.

From these in total 38 question as selection of 16 questions was made that were felt essential to measure the opportunities for a CLUES approach.
The questions (with green background in Annex 4) were:

3.2	Are there campaigns around solid waste management and Sanitation / various kinds
5.1	Are service agreements/ contracts of good quality and form? Are they based on realistic performance and clear service level descriptions? Is or can informality be included? (Aspects from corruption enter here as well)
5.3	Are customers involved in planning, service arrangement etc? Would they participate if given the chance? (also: check on affordability and willingness to pay if available)
6.1	Does a clear definition of tasks and responsibilities of different actors exist, either in written form or as mutual agreement? If not, what conflicts/ misunderstandings exists in the distribution of tasks?
6.2	Is the legal framework robust and flexible enough to allow for better service provision, financing and regulation of both services? Is it applied and enforceable?
7.1	Has the City taken a significant initiative to improve FSM/MSW management in recent years/months?
7.2	Have there recently (e.g. within the last two years) been any recent protests over FS/MSW status quo?
8.3	Of the total generation, how much FS and SW is currently effectively captured and treated as intended by the various technologies employed in the city, and where are the leakages from the system?
9.1	Are there any regulations preventing sales of products (regarding human waste/urine)? Questionnaire/Interviews, desktop, existing market studies?
9.2	Is public perception preventing sales of products (human waste/urine)? Questionnaire/Interviews, desktop, existing market studies?
9.3	Are competitive products (fertilizer, gas, electricity) subsidized/having a low price and therefore difficult to compete with? Questionnaire/Interviews, Ministry of agriculture/energy?
11.2	What household fees are established per day / week / month / year for solid waste collection and feacal sludge management in local currency and US dollars. If not, all households pay the same, give the highest, lowest, and median fees and how they are determined. What is the total revenue, connection rate (how many customers can be reached by the corresponding payment system) and collection rate (how many actually pay)
11.3	Please provide a budget allocation overview for investments and operational costs for both areas, if available include private sector activities (e.g. private feacal sludge collection and /or service contracts), existing strategic planning frameworks, nationally or internationally supported budgets or specific projects as well as independent, externally financed contributions (such as NGO).
12.2	Include the policies the possibility of interface between FSM and SWM?
12.3	Are there legal objections of such interfaces?
13.2	Is there coordination between the 2 chains and at what level?

These questions received a 3rd score and with a weighing formula the outcome can be seen in the sunburst graph, indicating the probability of a successful CLUES approach:

When working further on the tool it is clear that some work has to be done on the questionnaire, by setting benchmarks to get a more comparable overview between the cities. Also the reporting template can be improved to make the final reporting easier.

We had also hoped to be able to set up a waste flow diagram similar to the Shit Flow diagram, but often the data on solid waste management were not accurate enough to build a proper diagram. Where possible we have produced a flow diagram, but at this moment there is not a fixed format available.

Annex 1: Criteria for successful Service Provision

The following Indicators attempt to describe the quality of the service delivery and product development of the solid waste system as well as the feacal sludge systems.

1. The level of Service & Product Appropriateness

   The level of appropriateness of services includes the social and cultural, environmental technical and financial acceptability of services and products for clients and users. The combination of these appropriateness elements define whether services and products are have a potential worth for clients and have economic value.

2. The level of Professionalism

   In particular in the urban environmental service delivery and product development work is often considered by clients as well as the local government as illegal low level (sometimes criminal) work and only suitable for the low-casts of the society. The level on which the environmental services industry is considered professionalized and as dignified employment, determine the chances of a successful sustaining business environment.

3. The level of Transparency

   The need for transparency, so far, appears to have been felt in the context of public authorities alone. It is clear that the government has to be completely transparent in its dealings, the need for transparency in the private sector is in no way less important than in the public sector.

   Transparency is a means to strengthening governance as well as business environment.

4. The level of Public Private Arrangements (SLAs)

   Public–private partnership arrange dealings between the and private sectors, typically of a long-term nature. Public–private partnerships are increasingly used for city wide smaller activities which involve many actors. The level of public private arrangements define the position of the service provider in its business environment. Well defined service level arrangements empower service providers and strengthen the relationship with the customer.

5. The level of Institutional performance

   Institutional performance or quality of public-service provision focuses on the operations of organizations that formulate, implement or regulate public-sector activities and private provision of goods for the public. The level of clearly defined roles improve the quality of the institutional performance.

6. The level of Commitment

   When urban environmental management systems are not accepted and backed by the politicians and decisionmakers in cities, their implementation may actually never take place. Political commitment should therefore be seen as a driving force stimulating the SWM and FSM. There is a clear and present political will, potentially galvanized from a past, present or perceived crisis.

7. The Technology used

   Adopted technologies can capture and treat the materials being generated.

8. The Economic (Market) viability

   Acceptance viability - The acceptance of your product by the consumer (the market) that is, your product solves a problem, fills a need, creates a fad, or in some way is embraced by the consumer in such a fashion that they will trade you their hard earned money in exchange for having it
   Technologies adopted produce outputs/products that have a positive market value.

9. The Financial viability

   Financial sustainability of the urban environmental service delivery is the capacity of the sector to meet its current (O&M) and future (investments) obligations. If the capacity is too low it will not be able to withstand shocks and in future to maintain its capacity to provide services.

Annex 2: Criteria for a successful CLUES approach

In general, it can be stated that the chance to successfully set up a Complementary Local Urban Environmental Service Delivery System is the greatest if a series of criteria are met.

- Known actors (local champions and decisionmakers) are committed to SWM and FSM and favour the combination
- There is institutional and technical capacity for service delivery of both the sectors
- There is effective cooperation between the 2 value chains (in principle organic waste & feacal sludge)
- There is a potential or real economical viable market for service delivery and/or reuse products
- This market is economical/financial viable The integration of both sectors will benefit the financial viability of actors both service delivery systems.
- Overall that existing SWM and/or FSM system of the municipality functions well.

Annex 3: Local Government

Local governments play an important role in natural resource development, agriculture, water and sanitation, education, health or trade sector. However, it hardly ever operates as the only actor in such a sector. Central and local government agencies, international and national NGOs, CBOs and private enterprises play each their part in urban environmental sectors as service delivery or in the field of supply, legislation and demand creation. The sector as a whole usually have defined (or required) outputs and therefore it is important to analyse the sector as a whole in general, and the specific role LG plays or may play to guarantee an optimum output of the sector in which all other actors play their distinct role as well. In some sectors local government may function as the stimulator or co-ordinator of local socio-economic development. In other sectors local government may fulfil the role of setting standards or of quality control on behalf of higher levels of government. A prerequisite could be to prepare a district (or area) profile as found in the text box below of the local government concerned, including all relevant socio-economic aspects, their potential and constraints.

Sample Table of Contents of District Profile

1. Identity of the Group/Region
    a. Description
    b. Map/Physical Boundaries
2. Statistical Information
    a. Category 1 (i.e. Population)
        i. Sub-section 1 (i.e. Age Distribution)
            1.Description
            2.Graph
            3.Interpretation/meaningful conclusions
        ii. Sub-section 2 etc....
    b. Category 2 etc....
3. Studies, Plans and Projects Taking Place in the area
4. Conclusions
5. Source list (for all cited information)
6. Complete list of General Statistics (Chart form)

Local government plays or may play a co-ordinating role in all sectors that are relevant for the development of its area of jurisdiction. Traditionally local government plays a role in the *social service sector* like in water & sanitation, health or education. Sectoral description and analysis assists the local government in formulating adequate development strategies in this social service sector. The enabling government, however, facilitates (or may facilitate) *local economic development* as well. Blakely[4] defines local economic development as the process, in which local governments or community based (neighbourhood/ peoples') organisations engage themselves to stimulate or maintain business activity and/or employment. Local economic development aims to develop local employment opportunities in sectors that improve the welfare of the community while using existing human, natural and institutional resources. Local economic development is depending on a number of factors, like natural resources, labour, capital investment, entrepreneurship, transport communication, industrial composition, technology, size, export market, (inter)national economic situation, local government

[4] Edward J Blakely (1989: Planning Local Economic Development; Theory and Practice.

capacity, national government spending and general development support. It can be seen that describing and analysing key-sectors will help the local government to play its enabling role.

Local government, in reference to its area of jurisdiction, is responsible for a rather uniform service delivery to all people and operates very different from a NGO working for a well-defined target group in a specific sector (i.e. mission, output & actors). A bureaucratic decision making structure in which all stakeholders have to be involved according to pre-defined procedures differs from a flexible NGO decision making structure (i.e. structures & systems). The local central government agency is depending on national decision making and only entitled to certain implementation decisions (factors, actors, structures & systems). Salaries are paid, but funds for operation and maintenance are inadequate. CBOs may have a flexible decision making structure as long as all members participate in the process (management, staff motivation & culture).
Some major elements in the description of Local Governance structures and procedures are the following:

a) The decision making in reference to daily management, policy making and projects:
- Internally, i.e. inclusive all stakeholders within its area of jurisdiction: e.g. village organisations, village staff, local councils, LG professional staff, LG management, LG Council and their role in the project cycle: identification, formulation, appraisal, implementation, monitoring, evaluation. The organisational core issues to consider in the description and analysis include: ***actors, strategy development, structures, systems and management style.***
- Externally for issues which are outside the competence of LG concerned, e.g. local CG administration, local co-ordination platforms (e.g. LG, LA, NGO, PE), local political parties, provincial/ regional professional staff, provincial/regional co-ordination committees, national political parties, national ministries, national ministers, cabinet, parliament, president. The organisational core issues to consider in description and analysis include ***factors, input, actors, structures & systems.***

b) The way the allocation of funds / expenditure takes place:
- From outside (CG, donor); ***(Consider factors, inputs & systems);***
- Internally (recurrent / development; to departments, to projects, to areas). ***(Consider input-output, actors, structures, systems, management).***

c) How is monitoring (and evaluation) organised? ***(Analyse the organisational systems).***

d) What are the manager's questions? Who raises them? ***(Analyse structure and management style).***

Annex 4: Questionnaire for CLUES

General city profile

For a quick assessment on FSM & SWAM the following data are needed:
General City Profile (Precise and concise)

- Description City, Facilities, Fleet
- Original city selection criteria questions plus motivation
- SWM & FSM Mass Balance Flow,
- SWM & FSM Financial Flows
- Population (permanent and migrating)
- Description of Technical Setup/systems (service & value chains)
- Description of main Stakeholders in value chains
- Description of the Institutional setup
- Population % served
- Crises and drivers (key observations)

Solid waste & sanitation assessment

N.B. To make the question numbers concise with the questionnaire we start with the hypotheses at number 2. One could say that hypothesis 1 is. A full understanding of the city profile is needed.

N.B the questions with a green background have been used in the actual CLUES analysis

Hypothesis 2: Demand for services is socially accepted, and the quality of front line service is environmentally, technically and financially appropriate. (Social / Cultural aspect)

	Research Questions	Data Collection Tool / Method	Data Source
2.1	Is the technology used/proposed based on **real demand** (embedded in the society, **owned** by end-users and/or pro-actively requested); **inclusive** for all income groups and **cultural and gender-wise** acceptable?	Stakeholder & Focus Group meetings, literature review, household interviews	Minutes meetings, transcripts of interviews, literature
2.2	Has the used/proposed technology sufficient quality in regards to **functionality** (facilitating its intended use), **reliability & repairability** (built-in continuity of the functionality), **eco-security** (minimum impact on environment and **replicability** (fit for scaling up)?	Stakeholder & Focus Group meetings, interviews constructors, literature review, household interviews	Minutes meetings, transcripts of interviews, literature
2.3	Is the technology used/proposed financially **affordable** for all end-users? Does the technology used/proposed generate enough **economical gain** to actors in the value chains to **sustain over time**?	Stakeholder & Focus Group meetings, interviews creditors (MFI's, Banks etc.), literature review, household interviews	Minutes meetings, transcripts of interviews, literature

Hypothesis 3: The environmental services industry is professionalised and considered as dignified employment. (Social / Cultural aspect)

	Research Questions	Data Collection Tool / Method	Data Source
3.1	Are there NGOs active in Solid Waste Management and Sanitation	Interview with city	
3.2	are there campaigns around solid waste management and Sanitation / various kinds	interview with city	
3.3	are the various professions in solid waste management and sanitation acknowledged within the government?	policy documents	
3.4	Are there procedures in place on responsibility	policy documents / interviews with services	
3.5	Is occupational health within the industry taken up and followed up?	policy documents / interviews with services	
3.6	are there quality standards for output of the services/	policy documents / interviews with services	
3.7	Are the services represented in any type of platform working in which they can ventilate their opinion?		

Hypothesis 4: Levels of corruption that do not prevent entrepreneurialism in the environmental sector. (Social / Institutional aspect)

	Research Questions	Data Collection Tool / Method	Data Source
4.1	Does PS/NGO perceive municipality to be corrupt? Eg. are payments to PS made in full and on time?	Interview with PS/NGO	Word of mouth
4.2	Are there any performance indicators included in service delivery contract/franchise documents. Are these reasonable?	Service contracts (obtained from either PS or City)	Viewed example (non-commercially sensitive parts)
4.3	Are procurement procedures open and transparent? Eg. are operational service contracts/franchises procured through E tendering?	Interview with City	Word of mouth

Hypothesis 5: Service delivery arrangements that empower the service provider and bring their relationship with the customer closer together. (Institutional aspect

	Research Questions	Data Collection Tool / Method	Data Source
5.1	Are service agreements/ contracts of good quality and form? Are they based on realistic performance and clear service level descriptions? Is or can informality be included? (Aspects from corruption enter here as well)	Assessment of contracts and contract procedures, if not accessible, interviews with contract partners	Interviews, desktop study (might require local legal input)

5.2	What feedback loops exist between the customer and the service provider? (complaints office, awareness measures, other)	Interview with service provider, customer organisations	interviews (could also be deducted from contracts)
5.3	Are customers involved in planning, service arrangement etc? Would they participate if given the chance? (also: check on affordability and willingness to pay if available)	Interview customer organisations, local initiatives, city representatives	desk review of existing studies/ documents, interviews

Hypothesis 6: Public authorities that fulfil the role of regulator and change agent, rather than necessarily direct service provider. (Institutional aspect)

	Research Questions	Data Collection Tool / Method	Data Source
6.1	Does a clear definition of tasks and responsibilities of different actors exist, either in written form or as mutual agreement? If not, what conflicts/ misunderstandings exists in the distribution of tasks?	Interview with city, access to strategic planning, if existing, field managers, other actors as required	Official documents, internal structure, management qualifications
6.2	Is the legal framework robust and flexible enough to allow for better service provision, financing and regulation of both services? Is it applied and enforceable?	Assessment of existing legal documents	Legislation
6.3	What are the common perceptions of municipal service delivery, private sector engagement and the role of the customer (citizen) among the different actors? (is either of the services (or the lack thereof) a political issue?	Interviews with separate stakeholders: City, NGO, private sector, customer organisations	Newspaper cuttings

Hypothesis 7: There is a clear and present political will, potentially galvanised from a past, present or perceived crisis. (Political / Legal aspect)

	Research Questions	Data Collection Tool / Method	Data Source
7.1	Has the City taken a significant initiative to improve FSM/MSW management in recent years/months?	Interview with City	Plans or projects, verified by field observation
7.2	Have there recently (e.g. within the last two years) been any recent protests over FS/MSW status quo?	Interview with City	Newspaper cuttings
7.3	Are there any legal cases going on related to waste/FSM?	Interview with City	Word of mouth

Hypothesis 8: Adopted technologies can capture and treat the materials being generated. (Technical aspect)

	Research Questions	Data Collection Tool / Method	Data Source
8.1	What technologies have been adopted within the FSM and SWM service and value chain over the past 20 years?	Request for Information (RFI) questionnaire, Profiling exercise with ISWM Card Game, Shit Flow Diagram,	Interview with the sector stakeholders, Desk top review
8.2	Have any technologies adopted within the FSM & SWM service/value chain over the past 10 years failed, and if so why?	Requeté for Information (RFI) questionnaire	Interviews, desk top review of sector studies, physical observations
8.3	Of the total generation, how much FS and SW is currently effectively captured and treated as intended by the various technologies employed in the city, and where are the leakages from the system?	City Profiling exercise with ISWM Card Game, Shit Flow Diagram, E!Sankey	Interviews, desk top review of sector studies, physical observations
N.B. Mass balance flow of FSM and SWM through full service and value chains with indication of technologies used at each step (including leakage points from chains)			

Hypothesis 9: Technologies adopted produce outputs/products that have a positive market value. (Economical aspect)

	Research Questions	Data Collection Tool / Method	Data Source
9.1	Are there any regulations preventing sales of products (regarding human waste/urine)? Questionnaire/Interviews, desktop, existing market studies?		
9.2	Is public perception preventing sales of products (human waste/urine)? Questionnaire/Interviews, desktop, existing market studies?		
9.3	Are competitive products (fertilizer, gas, electricity) subsidized/having a low price and therefore difficult to compete with? Questionnaire/Interviews, Ministry of agriculture/energy?		

Hypothesis 10: Information technology solutions that make booking and paying for services easier and provide a secure transaction platform. (Technical aspect)

	Research Questions	Data Collection Tool / Method	Data Source
10.1	Is there an appetite for the uptake/use of digital means of booking and/or paying for services? E.g. Chemical toilets in Pune.	Interview with City & identified stakeholders or relevant digital service providers	Interview with the sector stakeholders, word of mouth, Desk top review
10.2	Is the existing infrastructure and institutional capacity, like connectivity/mobile data/skills/etc. suitable for the implementation of IT based solutions?	Interview with City & identified stakeholders or relevant digital service providers	Interview with the sector stakeholders, word of mouth, Desk top review
10.3	What is the preferred means of a secure transaction platform? By users: Blockchain/PayPal/(RSA)Zapper, SnapScan/others. Mobile phone payment	Research	Interview with the sector stakeholders, desk top review

Hypothesis 11: Sources of funding that are available to initiate services before revenues catch up. (Financial aspect)

	Research Questions	Data Source
11.1	Please provide total annual budget and recorded costs for solid waste management and feacal sludge management activities for the most recent budget year, given in local currency and in US dollars, if possible as a cost breakdown per major activity, e.g. awareness raising, collection, transport, disposal, reuse, recycling. If different from the budget, explain why the difference	Annual budget
11.2	What household fees are established per day / week / month / year for solid waste collection and feacal sludge management in local currency and US dollars. If not, all households pay the same, give the highest, lowest, and median fees and how they are determined. What is the total revenue, connection rate (how many customers can be reached by the corresponding payment system) and collection rate (how many actually pay)	Household fees
11.3	Please provide a budget allocation overview for investments and operational costs for both areas, if available include private sector activities (e.g. private feacal sludge collection and /or service contracts), existing strategic planning frameworks, nationally or internationally supported budgets or specific projects as well as independent, externally financed contributions (such as NGO).	Municipal budget

Hypothesis 12 The interface between the SWM and the FSM value chain in policy setting increases the likeliness that integration occurs.

	Research Questions	Data Source
12.1	What FSM and SWM policies have been developed and how are they implemented?	
12.2	Include the policies the possibility of interface between FSM and SWM?	
12.3	Are there legal objections of such interfaces?	

Hypothesis 13 Active coordination within and in between value chains benefits the performance and makes the interface possible.

	Research Questions	Data Source
13.1	At what level coordinate stakeholders within the value chains?	
13.2	Is there coordination between the 2 chains and at what level?	

These questions should be answered by giving a score:

Explanation scoring for the assessments of SWM & FSM or the Spider:
1= question is not addressed at all
2= question is raised, but insufficiently addressed
3= question is sufficiently addressed, but still shows relevant limitations
4= question is satisfactorily addressed
5= question is addressed in a way that exceeds expectations given the local circumstances (e.g. best practice example)