

A SYSTEMS APPROACH TO WASTE GOVERNANCE – UNPACKING THE CHALLENGES FACING LOCAL GOVERNMENT

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SUMMARY: Understanding the waste service delivery challenges facing municipalities and unravelling their inter-relationships, can be a daunting challenge. Municipalities in South Africa are known to face challenges such as insufficient budget, capacity and equipment. A systems approach is shown here to be a useful tool to unpacking these challenges and highlighting their interconnectivity. The research identified four broad challenges to waste service delivery at the municipal level, including financial management; equipment management; labour management; and institutional behaviour. This is manifest within municipalities as ineffective utilisation of municipal resources (financial, equipment, capacity); non-compliance with environmental legislation; no or poor levels of service delivery; and potential environmental and human health impacts. However, these broad challenges were found to contain further primary, secondary, etc. root causes, both internal and external to the municipality. This analysis allowed for targeted intervention by municipalities, in support of sustainable and compliant waste service delivery.

1. INTRODUCTION

The South African Environment Outlook (DEAT, 2006) indicates that the levels of municipal waste collection countrywide, has only improved by 2.7% between 1996 and 2001, with almost 50% of the South African population not receiving a regular waste collection service (DEAT, 2006). South African legislation (Republic of South Africa, 1996) stipulates that waste removal and disposal is the responsibility of municipalities, however, an increasing trend of poor service delivery with regards to waste management is evident. Municipal capacity assessments showed that 59.7% of the 231 local municipalities could not perform their waste management functions (Godfrey & Dambuza, 2006). The main reasons given included insufficient budget, too few staff, lack of appropriate equipment and poor access to service areas. This is compounded by a lack of reliable waste data for the country, making it difficult to assess current levels of waste generation, waste disposal and associated service delivery (DEAT, 1999; Godfrey, 2004).

While it is recognized that there are many well operated sanitary landfill sites in South Africa, in line with international best practice, of the 1280 known public and private landfill sites (general and hazardous) in the country, only 44% are duly authorised through permits (DEAT, 2006b) and of those permitted, compliance with permit conditions is seldom audited and often unknown.

Municipalities are therefore faced with a number of challenges regarding the provision of a complete and effective waste collection service and the disposal of waste to legally compliant landfills. Using a systems approach, this paper aims to unpack some of the challenges facing municipalities in South Africa regarding effective solid waste management, in an attempt to identify specific points for intervention.

2. A SYSTEMS APPROACH

Systems thinking has developed over the past seventy years from General Systems Theory, first proposed by von Bertalanffy in 1936 and based on the study of complex natural and social systems. Complexity of systems is an underlying premise to systems theory. "*Environmental problems are complex in the ecological domain, and usually controversial in the socio-economic domain*" (Poch et al., 2004:872). According to Fiehn & Ball (2005) "*Waste and the management thereof is a complex system of interrelated activities which require the input from a number of sectors, involves a wide spectrum of waste types and requires that collection, storage, handling, recycling, treatment and disposal be conducted in various different ways*". Waste management is typically about more than technology, collection and disposal, it involves institutional, social, legal and financial aspects, and is dependent on both intra- and inter-organisational collaboration, and engagement with civil society. It requires taking cognisance of local social, economic and environmental conditions (Zurbrugg, 2002).

According to Churchman (1979), given the complexity of a problem, very often one is uncertain where to begin. The problem and its sub-problems are interconnected and overlapping, so that the "*solution of one [problem] clearly has a great deal to do with the solution of another.*" Churchman (1979:4). A systems approach is therefore seen as a means of describing "*the complex interaction of the individual elements of the system.*" (Silvern, 1973:1). Environmental governance is often complex in nature, involving ecosystems and institutions, functioning within a socio-economic climate. A systems approach, which examines the linkages, interactions and interdependencies between the elements that make up the entirety of the system, provides a useful means of unravelling the complexities of environmental governance, and in particular effective waste governance.

A systems approach has long been used to monitor and manage waste streams, optimizing waste collection, minimization, reuse, recycling, treatment and disposal (Bridgwater et al., 1975; Clark, 1978; Haynes, 1981). However, it has largely been used to model material and energy flows in the waste system (Bridgwater et al., 1975; Sundberg et al., 1994). It is shown here to also be a useful tool in understanding the governance challenges facing a municipality or country.

3. CASE STUDY

Five local municipalities were selected as part of ongoing research projects. The objective being to analyse the current obstacles to waste management service delivery at a municipal level. The research projects were undertaken during 2007. The five local municipalities, all urban municipalities, differ in the percentage of the population being serviced (Table 1) from 15.2% to 83.2% of households serviced.

Table 1: Local municipalities included in case study

Municipality	Population (2007) ⁽¹⁾	Households (2007) ⁽¹⁾	2006/07 Operational budget for refuse (£/annum) ⁽²⁾	Operational budget per household (£/annum) ⁽³⁾	% Households with access to refuse collection (2007)	Operational budget per serviced household ⁽¹⁾ (£/annum)
Municipality 1	268 954	79 191	£2 015 867	£25.5	83.20%	£30.6
Municipality 2	435 217	105 592	£1 982 366	£18.8	57.50%	£32.7
Municipality 3	449 776	146 542	£1 859 169	£12.7	48.00%	£26.4
Municipality 4	527 203	137 353	£2 019 655	£14.7	29.20%	£50.4
Municipality 5	349 087	89 831	£810 084	£9.0	15.20%	£59.3

⁽¹⁾ Statistics South Africa (2007). Community Survey, 2007. Basic Results: Municipalities.

⁽²⁾ Municipal Demarcation Board Capacity Assessments (2006/07); Municipal Budgets (2006/07)

⁽³⁾ Assuming service delivery to all households

⁽⁴⁾ Assuming currency conversion of R15/£1

3.1 Materials and Method

While a systems approach was not identified as the theoretical basis for analysis going into the research projects, it emerged naturally during the first interview as an appropriate means of data evaluation and as such, was adopted as the basis for further interrogation and refinement of results. The systems approach was found to be highly appropriate to unpacking the obstacles to service delivery, since many of the obstacles were found to be inter-related both within sub-systems and across sub-systems. Semi-structured interviews (Whitley, 2002) were held with the managers and senior staff responsible for waste management in the five local municipalities. The purpose of the interviews was to understand current waste management practices and unpack current obstacles to implementing constitutional responsibilities. Interviews lasted between 1-2 hours and were conducted in the offices of the interviewee. Between one to five researchers participated in each of the interviews.

The findings of three of the five interviews were then workshopped within the project team (typically 3-5 team members), using an open space technology (Owen, 1997) or ParticiPlanning approach (Figure 1) to further unpack the identified obstacles and clarify linkages between obstacles. Each researcher put forward obstacles noted from the interviews by means of 'single-issue cards'. These obstacles were discussed within the group and their position and connectivity to other obstacles identified based on information provided by the municipality.

The obstacles, and relationship between obstacles, clarified during the post-interview workshops, were then transferred to Microsoft[®] Office Visio[®] Professional 2003 (Figure 2), allowing the findings to be further refined, logically positioned and structured. Unlike Haynes (1981), the identified problems were not arranged according to waste management processes, i.e. generation, collection, disposal; but rather allowed to cluster naturally into more operational sub-systems which often cut across the waste management activities - collection, transportation, landfilling. Draft systems diagrams were submitted to the municipality for comment before finalising.

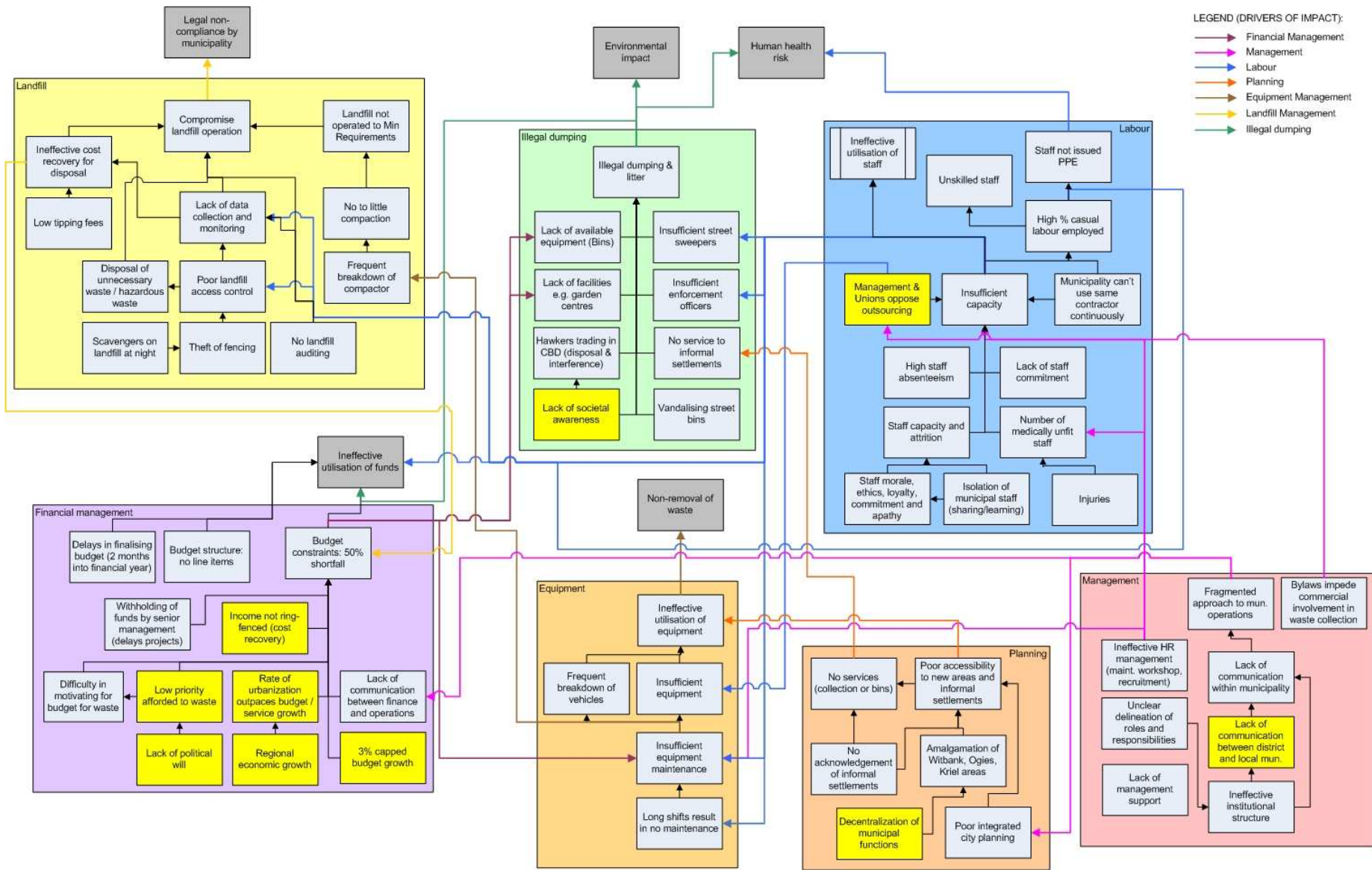


Figure 2: Obstacles clustered by themes and linkages between sub-systems shown.

These four strategic governance themes shed light on the reasons and relationships which contribute to tensions, challenges and shortcomings in service delivery and legislative compliance. Interestingly the four themes are found to be common across all five municipalities, although slight nuances, or municipal-specific problems, are noticed between municipalities, e.g. one municipality experienced a number of underlying waste issues around service delivery in tribal land which was found not to be applicable to the other municipalities. Another municipality experience the problem of increasing numbers of dead animals and the lack of personal protective equipment (PPE), not found in the other municipalities.

While these four broad themes of obstacles to effective waste management are not surprising¹, what the systems approach highlights is that these should not be seen as the obstacles, but rather the symptoms of a number of underlying and inter-related root causes. For example, while many municipalities identify lack of budget for undertaking service delivery as a major obstacle (Municipal Capacity Assessments), the real underlying reasons include, amongst others:

- capping of municipal budgets (year on year growth) by National Treasury;
- ineffective cost recovery for disposal at landfills (many municipalities do not charge for disposal to landfill, due to lack of capacity or fear of increased illegal dumping);
- delays in finalizing municipal budgets (up to three months delays were reported);
- theft of infrastructure, e.g. fencing around landfill sites, increasing opportunity costs;
- reducing operational waste budgets by senior managers (without consulting those whose functions are impacted by the changes).

One could therefore conclude that a lack of funding is not the underlying problem, but the result of a number of inter-related sub-problems manifesting in the ineffective utilisation of funds. The result is that the identified issues impact upon the efficient utilisation of resources within local government and ultimately the levels of service delivery. According to Churchman (1979) efficiency of operations is an overriding objective of systems. *"Any manager who is alert looks around his system and discerns where unreasonable wastes are occurring, if he's a good manager, he does his best to eliminate these wastes in order to reduce the total costs of operation of the system"* (Churchman, 1979:16). Wastage of resources and system inefficiency is evident from the systems diagrams, for example:

- the lack of control of illegal dumping within one of the municipalities (through the lack of service delivery to the community), requires the regular hiring of vehicles and staff to clean up areas;
- the low staff morale and high percentage vacancies, leads to high absenteeism which requires the hiring of casual labour at considerable cost.

Inefficiency in the system results in opportunity costs² within the municipality, i.e. every vehicle and staff member sent to clean up uncontrolled illegal dumping, means less equipment and staff to fulfil basic service delivery. This results in inefficient utilisation of equipment, human resources and available budget.

¹ A recent report by the Department of Environmental Affairs and Tourism (DEAT, 2007) highlighted the obstacles that are faced by local government in achieving service delivery for waste. The three identified obstacles included Financial Capacity; Institutional Capacity; Technical Capacity.

² Opportunity cost is considered the cost (sacrifice) incurred by choosing one option over an alternative one. Every action has an opportunity cost.

As a result, the underlying obstacles³ to service delivery have manifested within local government as:

- ineffective utilisation of municipal resources (financial, equipment, capacity)
- non-compliance with environmental legislation, e.g. landfill operations
- no or poor levels of service delivery
- potential environmental and human health impacts.

In line with systems thinking, these strategic issues should not be viewed in isolation, but in the light of their interconnectivity with other issues. The systems diagrams allow municipalities to identify first, second and third order obstacles, which may need to be solved in sequence to overcome a specific problem.

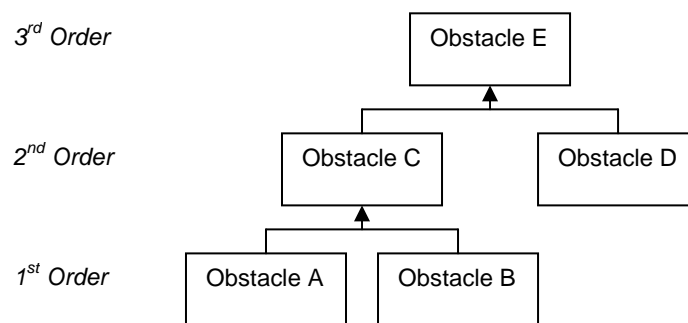


Figure 3: Recognising the inter-relationship of first, second and third order obstacles

The resultant system diagrams also identify '*internal*' and '*external*' obstacles where *internal* obstacles may be considered those over which the municipality has direct control, and *external* obstacles those over which the municipality has little to no direct control (Figure 2 – yellow cells), i.e. reliant on another sphere of government or another government department to intervene. Even within a municipality, there may be obstacles over which the waste department has control and those which are reliant on other departments within the municipality. One may argue that distinguishing internal and external obstacles is largely subjective, e.g. while lack of societal awareness is indicated as an external obstacle, i.e. an issue over which a municipality has little control, much can be done by municipalities to educate their citizens with regards to good waste management practices.

Haynes (1981:70) identifies this as "*those parts of the total system which contain the problem and those which contain the problem solvers*". Haynes recognises that there are those problems which the municipality can solve alone, but there are others which require a joint effort between municipal councils, governing institutions and the other identified problem solvers. However, where the authors differ from Haynes is that these external obstacles are seen as imperative to solving the problems of service delivery by municipalities. According to Haynes (1981:70) "*there is no sense in proposing solutions which are beyond the scope of our 'problem solving system' ; no matter how good such solutions might seem in theory they will only remain an intellectual exercise until it is within the power of our 'problem solving system' to execute them.*"

³ It must be stressed that not all obstacles have been identified in this case study. It is the opinion of the authors that many more obstacles and connections between obstacles exist, which need to be further explored.

What the systems diagrams show (Figure 2), is that without intervention by national government departments, e.g. National Treasury, Department of Provincial and Local Government, or Department of Environmental Affairs and Tourism, municipalities will be unable to overcome many obstacles currently impeding effective service delivery and legislative compliance. This does not however imply that municipalities can ‘wash their hands’ of addressing current obstacles to service delivery, in hope that external parties will ‘solve’ the problems for them. Instead it requires a joint effort driven by municipalities and supported by national and provincial departments.

While external obstacles are mostly identified in the financial sub-system, since the financial sub-system impacts upon other sub-systems (e.g. hiring of staff, purchasing of equipment, etc.) the effects of external influences are likely to be felt throughout the waste management system.

4. CONCLUSIONS

It is acknowledged that this study only included the opinions and perceptions of municipal officials from five urban municipalities. The authors would suggest that future applications of this approach in a waste management governance system be extended to include the views and perceptions of other stakeholders (within government and civil society) recognising their importance for effective waste governance as proposed in the Governance Triologue Model (Turton et al., 2007).

Application of the systems approach proved to be a useful tool in unpacking the challenges and their interconnectivity as they relate to waste service delivery faced by municipalities in South Africa. Identified broad themes of challenges to waste service delivery included:

- financial management
- equipment management
- labour (staff) management
- institutional behaviour (management and planning).

This is manifest within municipalities as:

- ineffective utilisation of municipal resources (financial, equipment, capacity)
- non-compliance with environmental legislation, e.g. landfill operations
- no or poor levels of service delivery
- potential environmental and human health impacts.

Using a systems approach allowed both researchers and waste officials to not only identify specific challenges, but to unravel the underlying root causes (primary, secondary, etc. and both internal and external) to some of the challenges. The authors could also show that for waste governance it is imperative to address external obstacles even though they fall outside the so called ‘problem solving system’. By identifying root causes, specific interventions could be recommended to assist municipalities to overcome the challenges and improve current levels of service delivery and compliance to waste and environmental legislation.

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