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Landfill Management Using Social Ecological Resilience Theory. A Qualitative Study

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ABSTRACT

Increased urbanization escalated solid waste generation and disposal in Kampala, the only landfill is not managed sustainably to meet public health and environmental safety requirements a condition that makes life-threatening and requires revised landfill maintainable activities over time since the modern equipments are yet to be achieved. Sanitary landfill staff were interviewed and shared the challenges as well their involvements. Results revealed that there is the general neglect of landfill infrastructure and staff, which directly impacts on people's lives. We conclude with a social ecological resilience theory that, human activities are a contributing factor, though the future of waste management requires amendment of the Solid waste management Ordinance.

Keywords: Landfill, Management, Resilience social ecological theory, Kampala capital city authority, Uganda.

1. Introduction

Uganda is one of the poorest developing countries where solid waste management is still traditional and the most common ways of disposing waste is through burning, local composting and animal feeds. Citizen Sanitary landfill receives approximately 974.45 tonnes daily from both Kampala Capital City Authority and private contractors. Management of solid waste in Kampala was partially privatized and waste handlers are approved by both National Environment Management Authority and Kampala Capital City Authority (N. E. M. Authority, 1999; G. o. Uganda, 2010) . In early 1990s government admitted failure to deliver quality services to the people due to the big debt and this saw the birth of privatization in delivering services like solid waste (Okecho, 1995; Ramanadham, 2003; Van de Walle, 1989).

Different methods of solid waste management were applied in Kampala City Council (here by called Kampala Capital City Authority) since the 1970s but they did not seem to solve long standing problem of poor solid waste management. Prior to the KCCA Act 2010 solid waste management was decentralized to the five divisions of KCCA which saw privatization at its peak, thus hijacking the system by mafias (N. V. Uganda, 2002) in the ruling party hence poor services delivery that left people in Kampala decrying of poor service and this resulted into accumulated garbage on the city roads, in markets, skips, blocked water channels (Matagi, 2002) thus causing floods and creating backlogs of garbage within the city center. Due to increased urbanization in Kampala City ((UBOS), 2005), the divisions declared that the generated waste overwhelms their capacity to collect (K. C. C. Authority, 20012-2013) due to the increased migration of people from the rural areas to the city, definitely impacted on the generation of waste in Kampala. (Tukahirwa, Mol, & Oosterveer, 2010). This study followed past research done in landfill management (Fauziah & Agamuthu, 2012; Mwiganga & Kansiime, 2005) however sustainability in landfill management in Uganda has been neglected.

2. Methodology

A qualitative method was employed to understand deeper the challenges that lead to failure of sustaining the landfill (Creswell, 2013). Data was collected for a period of nine months, from the landfill at Kitezi. A research assistant was recording all garbage trucks that dumped garbage due nonfunctioning of the weigh bridge. Garbage trucks were categorized in terms of estimated tonnes as advised by the acting landfill manager who compared estimates with computerized old data previously generated from the weigh bridge. Data was input in the Micro Excel 2013 for verification and processing. The analysis took on the thematic analysis of the experiences and opinions of sixteen employees working at the landfill (Walker, 1985).The anlaysis involves transcribing interviews, documents and observational notes. Qualitative research design was used because the research was seeking for indeepth explanations of the current state of affairs and seeking for sustainable ways of managing the Mpererwe landfill hence making the study largely descriptive (Ritchie & Spencer, 2002).

3. Results

The development and analysis of the study themes in this study, the guiding questions asked resulted into field notes which later where transcribed to generate themes as seen in figure 1 below.

3.1. Qualitative Data Analysis Framework

Figure-1. shows the development of thematic framework

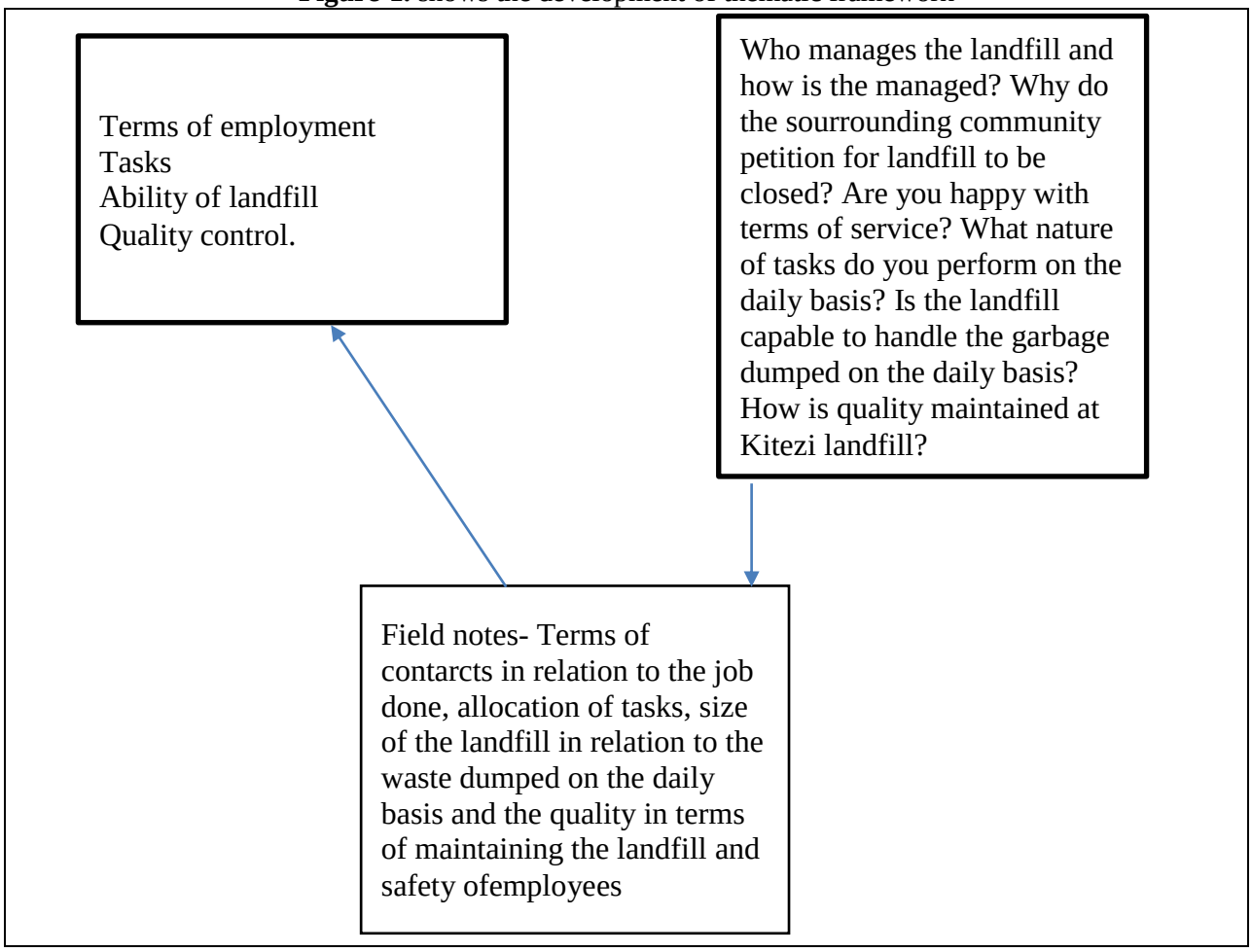

Table one below shows the amount of garbage dumped at the Kitezi landfill on a monthly basis in tonnes from both KCCA and private sector. KCCA increased on the tonnage dumped at the landfill in the month July, August and October while as private sector tonnages increased in the month of April, May, July, October and November. While May, June & July are a rainy season in Uganda, this could have influenced increased garbage since the countryside farmers' yields, feed town dwellers and most of the waste has been characterized as 75% organic. Also the trend appears to be similar for private however, there a diversion in moths April, October and November this could be as a result of increased supervision from KCCA to enhance efficiency in the collection.

Table-1. Solid Waste Tonnes dumped by both KCCA and private collectors from April to December 2013.

	WEIGHT								
MONTH	**APRIL**	**MAY**	**JUNE**	**JULY**	**AUG**	**SEPT**	**OCT**	**NOV**	**DEC**
KCCA	11018	16101	16907	17654	17388	15535	17674	15581.3	16964.54
PRIVATE	9490	9227	8787	9073	7300	8274	9825	9216.3	8553
TOTAL	20508	25328	25694	26727	24688	23809	27499	24797.6	25517.54

The qualitative results indicate the nature of tasks on a daily basis included;

Management of the landfill, manually records all trucks that dump garbage, processing of accepted waste, and mitigation of the direct environmental impacts associated with the landfill operations i.e. dust, noise, odor and insects (pests) and control, treatment and monitoring of leachate. The analysis generated themes in common categories and thematic traces generated themes like; terms of employment, tasks, ability of landfill, Quality control.

All respondents were not happy with the terms of employment since KCCA took over the management of the landfill and they had this to say; "*we are on contract, but our salaries are not at the same scale like the new KCCA staff because we are old stuff from the old system of KCC this demotivates us putting into consideration the nature of dirty environment we work in*……".

For tasks, employees at landfill, said; "*we have done a lot of work many activities since the landfill is open 24 hours, it's a hectic job to work at a landfill from sweeping, directing garbage trucks to taking records and general administration in smelling environment takes a lot of determination therefore management should reconsider our terms of service……..".*

The interviewees confirmed that the landfill has ability to handle the waste, but; "*it has been neglected by former administration, though after closure by NEMA the new management of KCCA is trying to ensure that the landfill is managed in a sustainable way through to avoid the landfill from turning into a nuisance to the public…..*" .

In terms of quality control, a lot has to be done on matters relating to safety of site users especially sorter, they dislike safety gargets hence high risk exposure. Figure 2 below records the number and date of the accidents on the landfill, number of salvagers and salvagers suspended for not complying to the safety measures .However from the figure, it is evident from the dash board that there are no serious quality control measures at Kitezi landfill since the board is placed on the wall of store room and there is serious need to strengthen the quality measures.

Figure-2. Health and safety board placed on the kitchen structure.

According to the interviewees, quality control was carried out in accordance with the provisions of the specifications. A health and safety board has since been placed on sight to highlight issues pertaining

to safety of site users.The acting manager of the landfill claimed that , "*The direct environmental impacts were mitigated resulting in the reduction of dust and insects, minimisation of noise and bad odours*……".

The observation results indicate that waste pickers where not wearing safety gears yet they are dealing with a dirty product which is likely to expose them to many health risks. When the administration of the landfill was asked to explain the observed situation, she said that; " *some waste pickers are sturbon and they claim not to be comfortable while wearing protective gears and preffer picking waste with their bear hands and management has not put in place strick punishments for those who refuse to comply*….."

The following are some of the activities were not managed professionally by the contracted company which resulted into termination of the contract but still with KCCA new administration, the situation is far from reaching the optimum level of sustainability since some Tipping Fronts are not yet done, providing access for garbage trucks is a problem during rainy season, treating the waste needs is expensive, dumping of garbage is free and delayed chemicals needed to carry out some field analysis on the Leachate.

3.2. Current and Past State of Concerns at the Landfill

Prospector UAP 367L Strengthening soft areas within Southern Tipping Front 23rd September 2013

South-Eastern Tipping Front prior Marrum of September

The social ecological resilience theory (Folke, 2006). argues that, social environmental systems are fundamentally linked and human activities cannot be separated from environment and it assumes that leaders are partially responsible. In our study leaders are the current management of the landfill, contractors like OTADA previously contracted to manage the landfill prior to Kampala capital city authority (KCCA) takeover, private companies contarcted by National environment amanagemet Authority, the non governmental organisations, institutions i.e. KCCA (new management of the city) and their adaptive ability i.e., familiarizing to right way of storage and disposal and management of the landfill, transformation commitment to manage the landfill in health and environment manner, systems put in place in support of landfill staff to perform their job easily.The findings of this study, are inline with previsous studies done by (Ashley et al., 1999).

Human activity has been seen as a hinderance in sustainability managaement of the landfill as some drivers from private companies off load garbage away from the allocated tipping areas for the day and this interupts with the treatment of the waste as allocated by the landfill management. The residents in the area dump the garbage near the gate, along the road and the fence of the landfill other than dumping it at the landfill since dumping is free of charge.This leads to additional costs on the management of landfill hence hiring causal workers who should collect and sweep the road, gate and fence to maintain the sanitation required standards and avoid closure by NEMA (NEMA, 2005).

Given the assumption of the theory, one might not be wrong to conclude that the previous and current administration have not been very supportive to ensure sustainability of landfill in Kampala. Though there is general improvement in collection efficiency (Madinah, Boerhannoeddin, & Rriffin, 2014), the sustainability of Kitezi landfill lives a lot to be desired. It is management's responsibility to ensure that the landfill is maintained well to hinder future health related risks to the surrounding community. The solid waste Ordinance has all guidelines concerned with solid waste management Act in Kampala, though it was amended in 2002 and 2006 (KCC, 2000) respectively, since then, its implementation has been

tested by the disciplinary actions hence need for amendment in support of changing people's attitude towards waste generation, storage and disposal. KCCA needs to invest in awareness of reduction, storage, transportation and disposal to make it a shared responbility to all Ugandan, by involving all stakeholders Kampala will be garbage free.The improved sanitation will help to reduce the health care budget through preventive measures and the education of residents will help reduce the human related activities like indiscriminated disposal that hinders sustainability management of the landfill.

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