

Effects of Institutional Framework Lapses in Solid Waste Management—A Case of Ngomongo, Nairobi, Kenya

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Abstract

Institutional frameworks serve as vehicles for proper solid waste management. Lapses in institutional structures create ecological disasters that affect public health and environmental degradation. Municipal solid waste management is a critical subject worldwide, and removal and control of municipal solid waste remain a global task, specifically in developing countries. The objective of the research was to analyze the effects of institutional framework lapses in solid waste management in Nairobi, Kenya. The case of Ngomongo illustrates lapses in waste institutions in Nairobi City. The research design for the study used a mixed-method where primary data was collected using a transect walk, questionnaires with 385 households administered, and satellite images. Focus group discussions and key informant interviews were used to ensure the validity and reliability of the data. The results show the lapses that exist in institutional frameworks in Nairobi City as supported by the objective of the study. The effects are demonstrated by the doubled number of mini-landfills, and open waste sites on the roadside over the decade.

Keywords

Institutional Frameworks, Solid Waste Management, Ngomongo, Nairobi City, Kenya

1. Introduction

Institutions are critical when it comes to the management of solid waste because they guarantee stability and facilitate collaboration, ease transaction expenses, arbitrate disputes, and generate information. Institutional framework settings are crucial for the policy outcomes that enhance sustainability and also interactions between actors. A lapse in them results in a devastating effect on the environment (Kaza et al., 2018; Ozoike-Dennis et al., 2019).

With a projected double urban population by 2050, addressing institutional framework lapses would reduce negative effects on the environment in cities and urban areas (Mutisya & Yarime, 2014; Kaza et al., 2018). Institutional framework lapses in solid waste manifest in various forms and most dominantly are sporadic illegal dumpsites witnessed within urban and city surroundings (Kouloughli & Kanfoud, 2017; Kathambi & Ogutu, 2021). Nairobi City takes on a unique global city outlook for its national park and thus a lapse in institutional frameworks on solid waste management would jeopardize its park's habitat (Kathambi & M'Ikiugu, 2018; Ogutu et al., 2019a).

In Nairobi City County (NCC), SW institutions include; the Ministry of Environment and Natural Resources, National Environmental Management Authority (NEMA), Nairobi City County, Water resource management (WRM), and Kenya National Cleaner production center (KNCPC) (Nairobi City Council, 2015). KNCPC promotes waste reduction and prevention through sustainable consumption and production. These are regulatory institutions that foresee the formulation and implementation of policies/regulations/acts/by-laws. Water Resource Management is responsible for water quality, pollution of water sources by waste, and other pollutants prohibited (Nairobi City Council, 2015; Ozoike-Dennis et al., 2019; Oduro-Appiah et al., 2019). Others are those who do the collection of waste and disposal e.g. private service providers, National Governmental Organizations (NGOs), Community Based Organizations (GBOs), and waste recyclers (NEMA, 2014; Ministry of Environment and Forestry, 2019).

Rapid urbanization is a growing challenge for solid waste management in Nairobi City County because of the increased waste generation with no marching remedial measures. The expanse of waste not met by the institutional framework structures in place and is evident with heaps of garbage on roadsides, and estate gates, among others (Mutisya & Yarime, 2011; Butu et al., 2013; Al-Khatib et al., 2015; Oduro-Appiah et al., 2019). SW institutions in NCC take on different roles in solid waste management that have a duplicate mandate becoming a hindrance to the enforcement of SW policies, regulations, by-laws, and Acts. The challenges come in terms of personnel, infrastructure, technology, and financial sustainability, given the low priority of what SW is, advanced by the perception that waste is a non-resource (NEMA, 2016; Ministry of Environment and Forestry, 2019; Kathambi & Ogutu, 2021).

Lack of Accountability, compromised integrity characterizes these institutions, which run with overlapping mandates. The conflict that exists in these institutions is illustrated by Nairobi City County, the department of environment and NEMA, where a double payment of the SW license by SW operators to collect waste, and disposal of trash to the designated landfill in Dandora. Also, the problem of curtails who have established an anarchist system separate from the formal system, neither NCC nor NEMA can regulate them (Nairobi City Council, 2015; NEMA,

2016; Oyake, 2017; Bundhoo, 2018).

The effects of solid waste institutional lapses illustrated by the case of Ngomongo in Nairobi City show the significance of improved institutional frameworks. Ngomongo is within NCC and uniquely located in a densely populated area with double waste generated. Historically, looking back, in 2003, it had the least waste generation; the population had not rapidly grown. Within the next 14 years, waste generation had increased, and the people had doubled with minimal institutional capacity to handle waste, thus the uprising mini landfill (Allison & Von Blottnitz, 2010; Okot-Okumu, 2012; NEMA, 2016; Kaza et al., 2018).

Conceptual Framework

The conceptual framework for this study focuses on effect of an enhanced SWM institutional framework which has effects on coordination of stakeholders, improved enforcement of SWM policies and regulations, monitoring and evaluation of policies which ultimately leads to sustainable SWM in Nairobi County. The pivotal role of enhanced institutional SWM frameworks highlights its importance in environmental sustainability in the wake of rapid urbanization taking place.

2. Materials and Methods

The conceptual framework (**Figure 1**) highlights the enhanced institutional framework on SWM in NCC includes; monitoring and evaluation of SWM policies, better coordination of stakeholders, improved SWM enforcement, and a sustainable SWM in NCC.

The study used a mixed method research approach in data collection on effects of institutional lapses on SWM in Nairobi. A sample size of 385 households



Figure 1. Enhanced institutional framework on SWM in Nairobi City County.

computed using a sampling formula which gave the sample size for the three sub-counties, Kibra, Embakasi, and Lavington. Additionally, transect walk used to narrow down on Ngomongo for case illustration where satellite images used using Digital Globe satellite image website to upload the shape-file of NCC illustrating the growing illegal dumpsites for the period of 2003-2017. The study used institutional and capacity building theories to expound on the institutional lapses in solid waste management. Institutional theory elucidates how institutions operate and how the different actors interact either together or incoherent for an effective institutional structure (Delbridge & Edwards, 2013; Wilson et al., 2013; Wilson & Velis, 2015). Capacity building theory comprises empowering institutions, individuals, and communities to execute functions and solve problems to attain the progress of their goals satisfactorily (UNEP, 2002; UNEP and ISAWA, 2015; Kaza et al., 2018). Ngomongo is in Nairobi City County, located between middle and low-income households in terms of social-economic status, depicting the face of the city. It is densely populated, with no proper reliable waste infrastructure that is why Ngomongo was instrumental in discussing institutional lapses in SWM in Nairobi City (Nairobi Metro 2030, 2008; Ozoike-Dennis et al., 2019).

3. Results

1) Lapses in Institutional Frameworks for SWM for case study of Ngomongo, Nairobi County in 2003

In **Figure 2**, the data indicates that there were only two dumpsites in Ngomongo area in the 2003 where waste generated was better managed.

In **Figure 3**, the dumpsite that were only two in 2003 have increased size and doubled in size in 2017 after 14 year period.

2) Impacts of Institutional Frameworks on SWM in Nairobi City County

Majority of the respondents agreed that the impacts of lapses in institutional frameworks for SWM have huge impact on the personal and environmental health as illustrated in **Figure 4**. The impacts range from mushrooming illegal dumping sites to blocked drains and busted sewers due to improper waste disposal and collection in Nairobi County.

3) Enhanced SWM Institutional Frameworks Increase Coordination and Enforcement in Nairobi City County

In **Figure 5**, majority of the respondents agreed that enhanced institutional frameworks lead to positive coordination of SWM stakeholders as well as enforcement of the SWM policies in Nairobi City council. Results indicate opportunity to enhance SWM coordination in Nairobi City County and the significance of improving institutional frameworks through capacity building, training and financial prudence.

4. Discussions

The case of Ngomongo supports the ideology that there are lapses in the institutional



Figure 2. Lapses in institutional frameworks for SWM for the case study of Ngomongo, Nairobi County. Ngomongo in 2003 (Data source: Digital Globe).



Figure 3. Evidential effects of institutional frameworks for SWM for case study of Ngomongo, Nairobi County in 2017. Ngomongo in 2017 (Data source: Digital Globe).



Impacts of SWM Institutional Framework Lapses

Figure 4. Impacts of institutional frameworks on SWM in Nairobi City County.



Figure 5. Enhanced SWM institutional frameworks increase coordination and enforcement in Nairobi City County.

framework in Nairobi City County. Rapid population growth with minimal substantial waste infrastructure impacts in institutions responsible for SWM. Hence, there are inadequacies in terms of capacity, collection and disposal equipment, funding, skilled personnel, coordination of the SWM actors for collection and disposal, stakeholders' involvement, compliance to the policies and regulations for WM, which is visible in most developing countries (Bundhoo, 2018; Ogutu, 2019; Kathambi & Ogutu, 2021).

The majority of the respondents agreed that the impacts of SW institutional lapses arrays from uncontrolled dumping sites due to improper disposal and collection of waste, contaminated water surfaces, increased dumping of waste along with water sources, for instance, Nairobi River and Ngong River as supported in **Figure 5**. The improper removal of waste within the Nairobi City has devastating effects on the environment and public health (Waweru & Kanda, 2012; Guerrero et al., 2013; NEMA, 2014; UNEP, 2015; Rodić & Wilson, 2017).

Waste generation in developing countries is predominately organic, with only a small percentage recycled, as witnessed in Nairobi City, Kenya. NCC has unlimited illegible dumpsites, evident in the case of Ngomongo as highlighted in Figure 2 where the dumpsite doubled in size (UN-HABITAT, 2009; Buniamin et al., 2016; Ogutu et al., 2019b; Kathambi & Ogutu, 2021). Importantly, waste recycled to reduce the pollution on the environment, provide job opportunities, as evident in developed countries, to address the challenges of SWM (Wilson et al., 2013; Harir et al., 2015; Kathambi & Ogutu, 2021). There is an institutional framework lapse in the recycling of waste, no mechanism for separating waste, no capacity at source, and the household level, no waste separation. Overlapping coordination results in failed frameworks for SW in Nairobi City, which is mostly done by informal waste pickers who have minimal technological capacity. Formal recyclers are insufficient, and source recovery is at 10%, operating costs are unrecovered (NEMA, 2016; Kaza et al., 2018; Oduro-Appiah et al., 2019). The majority of the respondents agreed that enhanced institutional frameworks would significantly improve institutional structures through capacity building, training, and financial sustainability (Nairobi City Council, 2015; NEMA, 2016; Ozoike-Dennis et al., 2019).

Evidential effects of institutional frameworks for SWM, the case of Ngomongo, illustrate the lapse, conflicting regulations with overlapping mandates. The actors, the public, civil society, NCC, NEMA, and ministries of environment and Natural resources and Water Resource Authority, all have impacts varying on their influence in SWM as explicated in **Figure 4** (Haregu et al., 2017; Ogutu et al., 2019a; Kathambi & Ogutu, 2021). Indiscriminate disposal by the public shows the absence of public education on SWM focusing on critical areas, for instance, proper waste disposal, waste reduction, and environmental stewardship (Harir et al., 2015; Haregu et al., 2017). Also, insufficient institutional, financial capacities, and management systems affect performance, restraining the interpretation of policy and legislation on SWM in practice (Wilson, 2007; Scheinberg et al., 2010; UNEP, 2015; Ogutu et al., 2018).

The majority of the respondents noted that enhanced institutional frameworks as the most critical component of sustainable solid waste management in NCC through capacity building, training, and financial sustainability (Khatib, 2011; Butu et al., 2013). The case of Ngomongo illustrates the absence of SWM with monitoring and evaluation, coordination, and enhanced SWM infrastructure, which is an impediment to SWM policy enforcement (NEMA, 2016; TISA, 2016; Kaza et al., 2018; Kathambi & Ogutu, 2021). Ngomongo underscores the lapses in solid waste institutional frameworks in Nairobi City County which further complicate the health aspects of the residents of Nairobi City.

5. Conclusion

The findings demonstrate that effective institutional frameworks in any context are of critical importance and constitute the single most crucial component of sustainable SWM. The research further shows the significance of Capacity Buildings, technological upgrades, financial prudence, and stakeholder engagement in SW institutional frameworks are fundamental. Ngomongo in Nairobi City explicates the lapses and effects of SWM, which impacts the environment and enhances unsustainable waste management.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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