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Rapid Urbanization, a Solid Waste Management Challenge in Micro, Small and Medium Enterprises in Kenya: A Case Study of Kawangware Ward in Nairobi

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Abstract

The aim of this study was to establish rapid urbanization as a solid waste management challenge in MSMEs in Kawangware ward in Nairobi. This study is anchored on Lee's Theory of Migration. The study employed descriptive research design. Stratified random sampling technique was used to pinpoint the target population of 370 MSMEs business owners in Kawangware Ward, out of which 302 respondents participated. Based on the research objectives, the study provided a comprehensive literature review and analysis and formed a conceptual framework. Questionnaires were used to collect data and were researcher administered to comply with WHO and MOH guidelines of Covid-19. Research ethics were observed throughout the study. Statistical Package for Social Science (SPSS) version 26 software was used to analyze data and the summarized data were presented using percentages, figures, graphs, charts, and frequency tables. To determine the influence of rapid urbanization on solid waste management, multiple logistics regression analysis was used. The study findings showed that there was a negative significance between rapid urbanization and solid waste management (β=-0.57, p=0.030, α=0.05). This showed that a unitary rise of rapid urbanization leads to a fall by 0.57 units in solid waste management. The null hypothesis that rapid urbanization has no significant influence on solid waste management was thus rejected. The findings implied that the higher the rapid urbanization, the more we can expect poor solid waste management. The study recommends the startups of MSMEs in rural areas to reduce rapid urbanization and to promote the 4R of waste management (refuse, reduce, reuse, and recycle), and introduce community clean-up campaigns involving all the citizens to clean their respective environments.

Keywords: *Rapid Urbanization, Solid Waste Management, Challenge, Micro, Small and Medium Enterprises*

1.1 Introduction

Rapid urbanization

Bodo (2019), describes urbanization as a continuous movement of people from rural to urban areas. Vij (2012), describes urbanization as an index of change from traditional rural economies to a modern industrial one. Urbanization is the share of the urban population in the total population of a Country. Statistics show that a total of 27.51% of Kenya's population in 2019 lived in urban areas and cities from 23.18% in 2009. A growth rate of 4.33% in the last decade, (O'Neill, 2021). The more the population grows, the more waste is generated. According to Kenya Population and Housing Census (KPHC, 2019), Kenya's population has grown from 37.7 million in 2009 to 47.6 million in 2019. According to Bodo (2019), urbanization is a phenomenon that is presently visiting every country in the world and not just common to a particular region or country. In the '60s, the world's total urban population was about 34%, in the 90's it raised to about 43%, and by the year 2014 it shot up to 54% of the world's total and according to UNDESA 2016, it is predicted to reach 66% by the year 2050.

Every single person in the world is affected by solid waste management issues. Urgent action is required at all levels of society to deal with unmanaged and inadequately managed waste from decades of economic growth. Rapid urbanization and population growth are directly linked to an increase in the per capita generation of waste, The World Bank (2021). The World's contaminated oceans, flooding, clogged drains, the transmission of diseases through breeding vectors, and increased respiratory problems are all due to poorly managed waste. Consequently, this affects economic development such as through diminished tourism, The World Bank (2021). National Waste Management Strategy (NWMS), (2019), states that South Africa and like many African countries face SWM challenges due to high population growth rates; urbanization; globalization; industrialization; backlog of waste services; poor policy and regulatory legislations; absence of recycling infrastructure; outdated infrastructure and public habits.

According to a study done by Haregu, Ziraba, Aboderin, Amugsi, Muindi, and Mberu (2017), on an assessment of the evolution of Kenya's solid waste management policies and their implementation in Nairobi and Mombasa, they found that Kenya is keen to accelerate the pace of industrial development. However, development has its consequences, which include increased population, changing consumption patterns, changing income, economic development, urbanization, and industrialization, which all contribute to the increased generation of waste.

Profile of Kawangware Ward

Kenya has 47 devolved counties, Nairobi as the capital city has 17 Parliamentary constituencies. Dagoretti North Constituency is amongst the 17 electoral constituencies of Nairobi County, which has 5 Wards, namely Kilimani, Kawangware, Gatina, Kileleshwa, and Kabiro. According to KPHC (2019), Nairobi city has a population count of 4,397,073 people, with Dagoretti North Constituency having a population of around 434,208 residents in a land area of 29.1 sq. Km.

Kawangware is, situated just some 15 km from Nairobi Central Business District (NCBD). It spans approximately 3km, with a population of over 100,000 people, 65% of whom are children and youth, and approximately 5,000 people who come to trade every day, KPHC (2019). Most parts of Kawangware have limited or no waste collection strategies, thus the MSMEs are forced

to throw their rubbish in open dumpsites. The dumped waste is either burned, which contributes to the greenhouse gases that affect climate change or left to accumulate and end up being an eyesore, creating foul smells and a health hazard.

1.2 Statement of the Problem

Solid Waste management affects everyone in the world, and as stated by NEMA (2015), Kenya is facing an ever-growing SWM crisis, which is impacting human, animal, and environmental health. Constant population growth and increased urbanization are compounded by growing industrialization that has attracted a huge population to urban centers, which has consequently increased waste generation.

2.1 Theoretical Literature Review

Lee's theory of migration also known as the Push and Pull theory states that certain factors make people migrate from a place of origin to another region or destination. Everett Spurgeon Lee first proposed the Theory of Migration in 1965, following the contributions of Ernst Georg Ravenstein, on 'Laws of Migration', established in the 1880s. Lee hypothesized four factors associated with the procedure of migration as well as the decision to migrate: (i) issues related to the area of origin; (ii) influences in the area of destination; (iii) prevailing obstacles; and (iv) personal reasons.

Divisha (2017), states that Lee's four categories show that in each area, there are numerous sets of positive and negative factors. Push factors, being the negative or unfavourable factors, drive people away from areas of origin, these factors include; unemployment, war, poverty, pollution, or even lack of amenities like hospitals and schools. The positive or Pull factors, on the other hand, attract people or hold the people in the area, e.g. employment opportunities, better health care, and schooling, a better environment, and even better living conditions. Finally, Lee's migration factors, show that many personal factors promote or hinder migration with some being more constant throughout an individual's lifespan, while others varying over time, e.g. awareness, children to move closer to schools, or even illnesses forcing people to move closer to hospitals. This theory proves that push and pull factors contribute to the variable of rapid urbanization, which increases the population growth in urban areas and the sprouting of MSMEs and thus contributes to more waste generation.

2.2 Empirical Literature Review

Rapid urbanization and solid waste management

Rapid urbanization is directly linked with the increase in waste generation. According to a publication by Hoornweg, Bhada-Tata, and Kennedy (2013), on the environment, in the 1900s, the world had 13% of its population living in urban areas and producing less than 300,000 tonnes of waste per day. In the year 2000, 49% of the world's population generated more than 3 million tonnes of solid waste per day and by the year 2025, it is predicted we will produce twice as much. They continue to say that solid waste is an urban phenomenon as city residents produce twice as much waste as their rural counterparts because of less food waste, less packaged products, and different lifestyles. Therefore, as rapid urbanization increases around the world, solid waste generation is accelerated.

Lee's 'Push and Pull' theory of migration is always selective and highly influenced by pull-push factors. Areas that have positive or enticing factors such as job opportunities, security, and better living standards, pull people to urban areas. Lee's thoughts on migration, are that the volume of migration varies with the state of progression in an area or country and unless severe checks are imposed by governments, both the volume and rate of migration will increase with time, Divisha (2017).

A publication by Behzad, Ahmad, Pirasteh, and Shamshiry (2011), on the challenges of solid waste in Malaysia, states that the population increase in Malaysia has increased waste generation, which in turn has increased the cost of managing the waste by the municipalities. The authors opine that the environmental impacts in Malaysia linked to improper SWM include and are not limited to air, water, and land pollution, damage of biodiversity as well as loss and damage of environmental aesthetics. The local government authorities are said to spend an average of half of their operating budget on MSWM, in the acquisition of all the necessary equipment and infrastructure, which is costly.

According to Vij (2012), urbanization and solid waste management in India opine that the unexpected migration in developing nations has rapidly and inevitably caused the mushrooming of slums and informal housing in cities in India. Urbanization contributes directly to waste generation and poor SWM practices cause health hazards and urban environmental degradation. Therefore, the rapid population growth rate has overwhelmed the capacity of municipal authorities in most developing nations, to provide basic services. He continues to say that, despite efforts by Civics bodies in India, MSW management remains one of the most neglected areas of urban development. Piles of garbage and littered wastes becoming a common sight in urban areas.

Song, Li, and Zeng (2014) investigated minimizing the increasing solid waste through a zero-waste strategy, assert that solid waste has become one of the pressing global environmental issues. The significantly accelerated waste generation around the world is due to booming economies, rapid urbanization and population increase, and the rise or increase in community living standards. Urban settlements generate larger quantities of solid waste in our everyday activities due to the high human population. There is an urgent need for suitable and effective waste management, as impacts of poor SWM within urban settlements, especially in big cities can be disastrous if not properly managed to protect human health, the environment, and its aesthetics, NEMA (2015).

In Africa, solid waste generation, and rapid urbanization are closely related, opines Haregu, Ziraba, and Mberu (2016). Urban centers being the engine for economic growth is symbiotic to high waste generation and the urban areas have to bear with the burden of ill health as well as environmental degradation due to poor waste management. In countries like China and India, there are serious health risks directly related to the increasing volumes of waste and poor management practices due to rapid economic development and rapid urbanization.

Kenya's urban population increase is projected to be growing at a much faster rate than that of the country's general population. According to Haregu et al (2017), who investigated the 'Evolution of Kenya's Solid Waste Management Policies and their Implementation', they found that the increase in solid waste generation by industrial and domestic activities amongst many others, is all associated with population growth due to increase in urbanization, the rise of incomes, raise in standards of living, change of consumption patterns and rapid development.

Waweru and Kanda (2012), in their study on 'Municipal Solid Waste Management in Kenya: A Comparison of Middle Income and Slum Areas'; they deduced that the Kenyan urban population had been growing rapidly over the last decade, due to an increase in population and industrial development, and consequently there has been a tremendous increase in the generation of liquid, solid and gaseous waste. Refuse left to rot in the streets attracts rodents and insects which are associated with various diseases such as cholera, plague, amongst others. Therefore uncollected waste is both a health and environmental hazard, Waweru et al (2012).

Based on the above statements from various studies, there was a relation between rapid urbanization and an increase in solid waste generation. This review was relevant to my study as it helped to investigate how solid waste management challenges in MSMEs are affected by rapid urbanization in Kawagware ward.

2.3 Conceptual Framework

The conceptual framework (figure 1) is composed of a diagram that represents the foundation or the connection between rapid urbanization and solid waste management in MSMEs.

Conceptual Framework

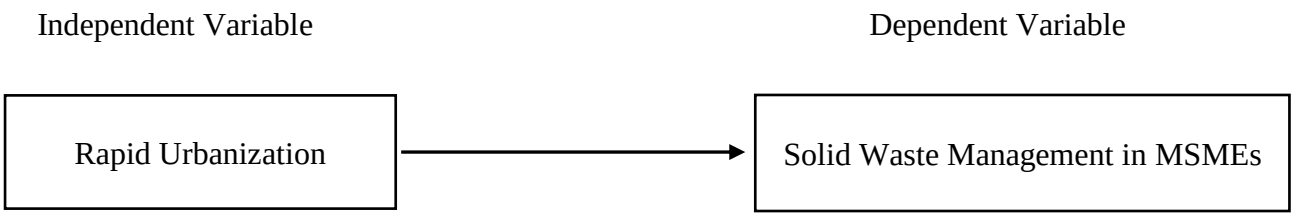

Figure 1: Conceptual Framework

3.0 Research Methodology

Qualitative research design was adopted to identify the case study of solid waste management challenges in MSMEs in the Kawangware ward. Descriptive research design was used to define the existing conditions and attitudes through observation. Primary data from a sample size population through structured questionnaires on the problem of the study and secondary data via literature review from previous studies, journals, and archival methods which include electronic records. The target population consists of 5,018 MSMEs business owners in different sectors within the Kawangware ward. These are some of the stakeholders who are affected by poor waste management, they include hawkers, kiosks, market vendors, tailors, fruit stalls, electronic repair shops, hair salons, hardware shops, and cafeterias.

Table 1: Target Population

Population Category	Target Population	Percentage
Hawkers	3000	60%
Kiosks	500	10%
Market Vendors	518	10%
Tailors	60	1%
Fruit stalls	300	6%
Electronic repair shop	120	2%
Hair Salons	140	3%
Hardware shops	180	4%
Cafeterias	200	4%
TOTAL	**5018**	**100%**

According to Martínez-Mesa, González-Chica, Duquia, Bonamigo, and Bastos (2016), a sample is a finite part or subset of participants drawn from the target population, whose characteristics are of interest to the researcher. In descriptive studies, 10% of subjects drawn from the sampling frame is considered an adequate sample size for the generalization of findings, Kimalu and Marimba (2014). Therefore, to acquire the appropriate sample size, stratified random sampling method was employed to select 370 Micro, Small, and Medium Enterprises (MSMEs) business owners in Kawangware ward, who formed the sample size by dividing the population into strata's. The method was preferred as the population under study got the same chance to be part of the sample.

The study sample was calculated using stratified sample that adopted the Taro Yamane method of:

$$n = \frac{N}{1+N(e)2}$$

Whereby:

n = sample size

N = population size

e = the level of precision (0.05)

1 = constant

This method accepts a 95% confidence level and a level of precision of 5%.

n = 5018/ (1+5018(0.05)2)

n = 5018/ (1+5018(0.0025)

n = 5018/ (1+12.55)

n = 5018/13.55

n = 370

Table 2: Sample Size Determination

Population Category	**Target Population**	**Sample population**
Hawkers	3000	221
Kiosks	500	37
Market Vendors	518	38
Tailors	60	4
Fruit stalls	300	22
Electronic repair shop	120	9
Hair Salons	140	10
Hardware shops	180	13
Cafeterias	200	15
TOTAL	**5018**	**370**

Structured questionnaires were used as the primary data collection tool, which was researcher administered. The questionnaires had close-ended questions on a 5 (five) point Likert scale to measure the level of the respondent's agreement ranging from strongly disagree to strongly agree. Secondary data was collected through literature reviews from journals and articles. Statistical Package for Social Science (SPSS version 26.0) to manage and analyze the data. Suitable tables, figures, and charts were used to summarize the descriptive data. Regression analysis was used to establish the relationships between the dependent variable and the independent variables. Given the structure of the data, logistic regression was determined to be the most appropriate.

4.0 Results and Findings

4.1 Response Rate

A total of 302 out of 370 MSME's business owners, who were the target respondents participated in the study. The overall response rate for the study was 81.60% and the remaining 18% were unresponsive.

4.3 Descriptive Statistics

Rapid Urbanization

The study established the challenges of rapid urbanization on solid waste management in the Kawangware ward. The respondents were requested to offer their opinion on a 5 Likert questionnaire and the responses are presented in Table 3.

Table 3: Rapid Urbanization

Statement	N	Mean	Std. Deviation
There is rapid population growth in your area	302	4.73	0.701
Population increase has increased solid waste	302	4.19	1.112
People's lifestyles affect solid waste management	302	4.07	1.079
Population increase strains available solid waste management facilities	302	3.95	1.094
There is illegal dumping of solid waste	302	4.33	1.043

The respondents were asked to show their level of agreement on the statements relating to rapid urbanization challenges on solid waste management. The findings as depicted in Table 3, state that a majority of the respondents strongly agreed that there is rapid population growth in their area, represented by (M= 4.73; SD=0.701). The findings agree with Haregu et al (2017), who state that the increase in solid waste generation by industrial and domestic activities amongst many others, is all associated with population growth due to an increase in urbanization.

The majority of the respondents indicated by (M=4.19; SD=1.112) strongly agree that population increase has increased solid waste. The findings concur with a study by Njoroge, Kimani, and Ndunge (2014), who found that in Nairobi City, there has been a major concern about the public health and environment due to increased waste generation from population growth, rapid urbanization, and industrialization.

Most respondents strongly agree on whether people's lifestyles affect solid waste management, represented by (M=4.07; SD=1.079). The findings coincide with the Al-Khateeb, Al-Sari, Al-

Khatib, and Anyah (2017), who in their study of factors affecting the sustainability of solid waste management systems in Palestine. Though Al-Khateeb et al study is based on household-level and not commercial level, it found that the higher the income, the more negative attitudes towards waste separation as the residents of high income do not look at saving in cost of living through waste sorting or reusing.

Population increase strains available solid waste management facilities, a majority of the respondents, represented by (M= 3.95; SD=1.094) agreed with this statement. The findings agree with Vij (2012), who stated that the rapid population growth rate has overwhelmed the capacity of municipal authorities in most developing nations, to provide basic services, which is the case in Kawangware Ward. On whether there is illegal dumping of solid waste in Kawangware ward, the majority of the respondents denoted by (M=4.33; SD=1.043) strongly agree.

Solid Waste Management

The last goal of the study was to observe the degree to which several features affect solid waste management. The responses are indicated in Table 4.

Table 4: Solid Waste Management

Statement	N	Mean	Std. Deviation
Solid waste within Kawangware ward is sorted, separated, and collected in the right way before being transported.	302	2.72	1.202
Solid waste that cannot be recycled is compost or destroyed using environmentally friendly technology.	302	2.78	1.003
Solid waste generated in your business is transferred in time to dumping sites.	302	2.62	1.116
Solid waste management needs more priority in society.	302	4.14	0.799
The Solid and recyclable waste is taken in time from the dumpsite by recycling companies.	302	2.32	1.065
Solid waste can be converted to a usable product through recycling.	302	4.15	0.791

Table 4 shows the responses from respondents, a majority of whom are shown by (M=2.72; SD=1.202), agree with the statement that solid waste within Kawangware ward is sorted, separated, and collected in the right way before being transported. On whether solid waste that cannot be recycled is compost or destroyed using environmentally friendly technology, a large number of the respondents disagree with the statement, shown by (M=2.78; SD=1.003). Respondents were asked their level of agreement on the statement that solid waste generated in their business is transferred in time to dumping sites, a large number shown by (M=2.62; SD=1.116) disagree. On the statement whether solid waste management needs more priority in society, a majority of the respondents agree, portrayed by (M=4.14; SD=0.799). The results agree with the statement from NEMA (2015) who state that the entire waste management cycle

(collection, transportation, and disposal) is hampered by lack of prioritization of waste management in most counties and turn has led to poor budgetary allocation.

The respondent's level of agreement on the statement that the solid waste that is recyclable is taken in time from the dumpsite by recycling companies is shown by (M=2.32; SD=1.065) disagreed with the statement. Lastly, on whether solid waste can be converted to a usable product through recycling, illustrated by (M= 4.15; SD=0.791), a majority agree.

4.4 Correlation Analysis

To compute the association between the main variables, inferential analysis using Karl Pearson's coefficient of correlation was conducted. Pearson correlation coefficient is a linear correlation that is given by the letter (r). Correlation ranges from (-1.0 to +1.0). A strong negative correlation between two variables is shown as -1, results of +1 means there is a strong positive correlation between two variables, and 0 represents no connection between the variables, Laerd Statistics (2018).

Table 5: Correlation Matrix

		Rapid Urbanization	Solid Waste Management
Rapid Urbanization	Pearson Correlation	1	-.417**
	Sig. (1-tailed)		0.000
	N	302	302
Solid Waste Management	Pearson Correlation	-.417**	1
	Sig. (1-tailed)	0.000	
	N	302	302

**. Correlation is significant at the 0.01 level (1-tailed).

Results from Table 5 indicate that there was a significantly strong negative correlation between rapid urbanization and solid waste management (r = -0.417, p= 0.000). This shows that rapid population growth affects solid waste management.

A multiple logistic regression model was applied to identify the effects of rapid urbanization, on solid waste management in MSMEs.

Table 6: Regression Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	0.691	0.142		4.853	0.000
	Rapid Urbanization	-0.057	0.026	-0.045	-2.183	0.030

a. Dependent Variable: Y

The results from Table 6 shows that rapid urbanization has a significant negative influence on solid waste management ($\beta 1$ = -0.57, t = -2.183, p-value = 0.03 < 0.05). The null hypothesis that rapid urbanization has no significant influence on solid waste management is thus rejected.

Rapid urbanization was negatively significantly correlated with solid waste management (β=-0.57, p=0.030, α=0.05). This shows that a unitary rise of rapid urbanization leads to a fall by 0.57 units in solid waste management. The findings imply that the higher the rapid urbanization, the more we can expect poor solid waste management. The results are reinforced by a study by Njoroge et al (2014), who concluded that rapid population growth rate, increased urbanization, and current changing lifestyles of the Nairobi residents, result in the growth estimates of waste generation rates as well as the depiction of the wastes produced.

5.0 Conclusion

The study concludes that rapid urbanization does increase the waste produced thus it becomes a challenge in regards to solid waste management. MSMEs are coming up every day, people trying to make a better living, thus moving closer to urban centres. Therefore the city council together with the ministry of environment and forestry should provide sustainable waste separation, collection, transportation, and disposal systems in support of MSMEs for better solid waste management.

6.0 Recommendations

The research study suggests the following recommendations to enable better and sustainable solid waste management practices. Urbanization is inevitable as people throughout the world are searching for better jobs or businesses and better living standards. The government should encourage startups of MSMEs in rural areas and support their businesses by giving incentives, especially for the youth. Make it easier to register companies or businesses without having to bribe anyone or be harassed by the council; market their local produce nationally as well as internationally to boost not only their morale but their businesses as well. This will not only reduce the migration from a rural setting to urban areas but will also encourage the growth of entrepreneurs in rural areas as well. The reduction of rapid urbanization will also reduce waste generation within urban areas. This in turn will help the municipalities cope with solid waste produced by a reduced population.

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