



Influence of Solid Waste Recycling on Entrepreneurial Creativity and Innovation within Federal Capital Territory, Nigeria

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Abstract

Waste recycling is a frontline issue for most cities because the volume and type of waste keeps increasing due to increasing population. Despite the problem arising from this, entrepreneurs consider the situation a source of wealth. In the current research the Influence of solid waste recycling on entrepreneurial creativity and innovation within federal capital territory was investigated. Two hypotheses were proposed and appropriate questionnaire developed using standard methods. Data generated from a total of 361 professionals of waste recycling including entrepreneurs was subjected to hypothesis testing using statistical tools. Results revealed that solid waste recycling enhanced fertilizer, gas production, energy generation and other valuable raw materials. With an -value of 22.625 at significant level of 0.002 it was inferred that solid waste recycling has significant influence on the entrepreneur's creativity and innovations in Abuja Nigeria.

Keywords: Business, Municipality, Management, Waste to Wealth, Waste Disposal.

INTRODUCTION

At present, there is no strategy or formal waste recycling programmes for the City of Abuja. No material recovery facility exists in the city. Consequently, materials re-use and recycling activities throughout the Municipality are limited to household reuse and scavenging activities of the urban poor (Asani, 2006; Igoru et al., 2007). Wastes recycling at households in low-income areas begin with the re-use of plastics, bottles, paper, cardboards and cans for domestic purposes. These materials are disposed of only when they are no longer of any use to their owners. Elsewhere, including high income neighbourhoods, scavengers directly take out valuable items such as metals, paper and plastics from refuse bins and dumps or buy them from domestic helps for resale to middlemen (Amed and Ali 2004; Adama 2007, Daniel and Perinaz , 2012).

The failure of resource recovery implies that presently, nearly the entire waste stream in the city has to be disposed of at dump sites. Current waste disposal methods in the city are limited to burning and open dumping since there are no engineered, or sanitary, landfills within the city. All waste collected are taken to the Gosa solid waste dump site in the Idu Industrial Layout for disposal (Nwofe, 2015; Odunfa, 2015). The present practice of USW disposed at dumpsites in Abuja, the open dumping practice is a very unsustainable disposal method, as a result of the adverse environmental impacts (Afoburuku et al., 2016).

Current waste disposal methods are limited to burning and dumping since there are no engineered or sanitary landfills within the city, while recycling in Nigeria is largely an informal sector business involving scavengers who make a living by reducing the volume of solid waste disposed in open dump grounds (Tende and Nimfa 2015). The inter-linkages between the economy and the environment is a whole web of relationships that can be conceptualized as a system of 'transaction' between two basic sectors namely 'business' and 'household' (Eleje et al., 2017). The economy and the

natural environment are linked to each other in major ways. First, the environment supplies material and energy resources inputs to business or the economy. Second, it serves as receptor and act in a waste assimilative capacity to business. These inter-linkages are dynamic, in that they are continually changing. The first and second laws of thermodynamics partially govern these inter-relationships, although scholars are divided as to how important the two laws are in terms of their implications for future economic activity (Kadafa et al., 2013). Statistics have also shown that, in the 1990s and early years of the first decade of the new millennium, Nigeria's economy had shrunk and was on the verge of collapse with a growth rate of about 2.5 per cent between 2003 and 2006 (World Bank, 2012, Jones and Spodafora 2014). However, over the last ten years, Nigeria's economy experienced a turnaround of remarkable proportion with an average annual growth of 7 per cent which has enabled the creation of 1.6 million new jobs per year. Yet there is not enough to offer jobs to the 1.8 million young people that enter the labour market each year. This huge challenge has for a while engaged experts and are at pains trying to identify ways out of the woods (May and Farouk, 2016).

Solid Waste management in Abuja is still in its infancy. Institutional and policy frameworks, where they exist, are not in line with global best practices (Ezeah C, and Roberts CL (2012), Abu and Ogachi 2014). City specific data on waste necessary for planning are also not readily available (Akoni, 2007). This research is therefore motivated by the need to fill above gaps in knowledge by generating empirically tested data on effect of solid waste management on entrepreneurship development and job creation in Abuja that could underpin future waste management strategies and policies in the City.

The current initiative of Abuja Environmental Protection Board of involving private operators in the management of solid waste in the FCT must be acknowledge. However such initiative is ad hoc as it was not evidence based, and there is the need to empirically examine the various private sector led alternatives open to big cities like Abuja, and the most suited arrangement for the FCT is based on a thorough study of the perception and practices of solid waste management by the general public and agencies assigned with the responsibility of coordinating such an activity in the FCT. Also of note is to examine the factors motivating the investing public in the FCT to take business risks and investment initiatives, as well as willingness to invest in solid waste management in the FCT.

This study sought to answer the questions, how has solid waste recycling influenced entrepreneurial creativity and innovation in FCT? Therefore, the main objective of this study evaluates the effect of environmental solid waste recycling on development of entrepreneurial opportunities in Federal Capital Territory, Abuja. The specific objectives are to determine how solid waste recycling has influenced entrepreneurial creativity and innovation in FCT.

Based on the research questions and specific objectives, the following null hypotheses are here posited to be tested for the purpose of this research study: Solid waste recycling has no effect on entrepreneurial creativity and innovation in Abuja Municipal Area Council. This research is significant to many people who have interest in converting solid waste to wealth. In this light, the study is relevant because it seeks to provide waste managers a window to transform wastes to wealth which will lead to effective attainment entrepreneurial objectives in terms of sustainable growth and reduction of unemployment in the FCT and the country at large.

The study is also of relevance to students and future researchers who may wish to carryout research work on Solid Waste management and entrepreneurship development. More so, the study points out areas of further research which act as a guide to the aforementioned prospective researchers.

This research is on solid waste management and entrepreneurship development in the Federal capital territory, Abuja has been limited largely to the Municipal Area council, AMAC, being the city centre; hence, the findings and recommendation provide background information for decision makers, especially the Federal Capital Development Authorities and the Abuja Environment Protection Board, entrepreneurs and other stakeholders, to make informed decisions when making plans for more efficient and effective solid waste management systems in the FCT and other satellite towns with Abuja. The study is about the problem and management (collection, disposal and processing) of waste. Though it may be more intellectually illuminating to take Nigeria as a case study, this study however covers solid waste management in the Federal Capital Territory, Abuja, being the nation's seat of power and the increasing rural-urban migration of the populace in search of better economic opportunity.

RESEARCH METHODOLOGY

Research Design

The method of logical inquiry was adopted for this study because of the nature of the study as well as the approach adopted in similar extant studies. In this study, no pre-existing data was gathered; instead, fresh data on effect of environmental solid waste management on development of entrepreneurial opportunities in Federal Capital Territory, Abuja, Nigeria was gathered. Based on this, survey (descriptive) research design approach was used for this study. Since the data was not collected from one group of the population but across registered Solid waste formal and non-

formal business with the Association of Solid Waste Managers in Abuja, the study adopted the cross-sectional survey descriptive research design.

Population, Sample Size and Sampling Techniques

The population targeted by this study includes all the Solid waste formal and non-formal business in Municipal Area Council in Abuja. The total population of registered Solid waste formal and non-formal business with the Association of Solid Waste Managers in Abuja is estimated at 3685 and sample was drawn across Municipal Area Council in Abuja, from the total population. The sample size for this research study was determined using the Taro Yamane (1967) formula. (18) This formula is used where the population size for the study is known.

The formula is stated as:

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

Where:

n = Sample size

N = Total Population estimated to be 3685

e = Margin of tolerable error (0.05)

Substituting into equation 1, n = 361

A sample size of three hundred and sixty-one (361) registered Solid waste formal and non-formal businesses with the Association of Solid Waste Managers in Abuja is employed as the sample. 361 questionnaires were administered using random sampling technique and two hundred and eighty nine returned and found good for the data analysis; hence the sample size for this study is three hundred and seventy five (361).

Methods of Data Collection

The method of data collection for this research study is the primary method for quantitative data through a structured research instrument (questionnaire) administered to registered Solid waste formal and non-formal businesses with the Association of Solid Waste Managers in Municipal Area Council in Abuja. The questionnaire being the instrument of data collection was based on stated research questions, structured in close-ended five-point Likert scale, sub-divided into five main sections.

Procedure for Data Analysis and Model Specification

All the demographic data variables (gender, age, marital status & years of being in business) were presented in simple percentage distribution tables. Furthermore, analysis and interpretation of the data in these tables were based on the frequency of each data. The researcher utilized simple average and frequency table to present the results of the questionnaire. The primary data obtained from the questionnaire were presented in percentage. Test proportion was used to analyze the responses to the questions and was also used to test the hypotheses.

The questionnaire was the main data collection instrument to test each of the hypotheses formulated. The responses of the respondents in relation to the raised questions in the questionnaires were put in the data figure to test the hypotheses. The Linear Regression Analysis was used to test hypotheses two and four, while the Z-test was used to test the hypotheses one and three. Statistical Packages for Social Sciences (SPSS) was used to aid the data analysis (Ezeah and Roberts, 2014).

Model specification

The model specification, equation 2, the general formula for the Regression Analysis is:

$$Y = a + \beta X + e \quad (2)$$

Where; Y = Dependent Variable
X = Independent Variable
a = constant
 β = coefficient of X
e = error margin

The model to be estimated is functionally stated as

SWM = f(WMG, WCN, WCO, WRC)

EOP = f(ERP, EID, EEC, ECI)

SWM = f(WMG* ERP, WCN* EID, WCO*EEC, WRC*ECI)

This can be stated in econometric form as

$$\begin{array}{lcl}
 \text{ERP} = \alpha_1 + \beta \text{WMG} + e_1 & - & - & - & - & 3 \\
 \text{EID} = \alpha_2 + \beta \text{WCN} + e_2 & - & - & - & - & 4 \\
 \text{EEC} = \alpha_3 + \beta \text{WCO} + e_3 & - & - & - & - & 5 \\
 \text{ECI} = \alpha_4 + \beta \text{WRC} + e_4 & - & - & - & - & 6
 \end{array}$$

WMG* ERP = Interaction effect of solid waste management and entrepreneurial risk propensity

WCN* EID = Interaction effect of solid waste conversion and entrepreneurial investment decision

WCO*EEC = Interaction effect of solid waste collection and entrepreneurial employment creation

WRC*ECI = Interaction effect of solid waste recycling and entrepreneurial creativity and innovation

Where

SWM = Solid waste management

WMG = Waste management

WCN = Waste conversion

WCO = Waste collection

WRC = Waste recycling

EOP = Entrepreneurial Opportunities

ERP = Entrepreneurial risk propensity

EID = Entrepreneurial investment decision

EEC = Entrepreneurial employment creation

ECI = Entrepreneurial creativity and Innovation

Reject H_0 where $|p| < 0.05|$ given the computed value of the coefficient β for each of the independent variables in the model (19)

The formula for Z-test is;

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} \quad (7)$$

Where; $\bar{x}$ = population mean

μ = sample mean

σ = standard deviation

n = sample size

Reject H_0 if $|p| < 0.05|$ given the computed value of Z. Otherwise, accept it.

Validity and Reliability of Research Instrument

The instrument was subjected to face and content validity by the research supervisor, who is an expert in this field of study. A sample questionnaire was submitted alongside objectives and research questions. After evaluation and corrections, the research instrument was certified valid.

In determining the internal consistency of the instrument, the Cronbach Alpha reliability test was used. The reliability of the instrument was determined by a pilot test of the instrument administered on 5 managers of other commercial banks not selected for the study in Abuja. The reliability coefficient yielded a grand alpha (coefficient) of 0.75 which implied that the instrument had a very high degree of internal consistency and was reliable to be used for empirical purpose. On the whole, 375 copies of the questionnaire were duly completed and found useable for data analysis. The percentage of questionnaire retrieved is 86.6%.

Analysis of Research Question

How has solid waste recycling affected entrepreneurial creativity and innovation in FCT?

Table 1: How solid waste recycling has affected entrepreneurial creativity and innovation

Variables	Items	SA (%)	A (%)	UD (%)	D (%)	SD (%)
Solid waste recycling and entrepreneurial creativity and innovation	Production of natural fertilizer through waste composting	9%	13%	11%	47%	20%
	Turning of solid waste materials into valuable resources (raw materials)	27%	38%	5%	21%	9%
	Reduction of environmental wastes and hazards	29%	41%	4%	15%	11%
	Conversion of solid waste materials into	11%	15%	5%	44%	25%

	solid, liquid and gas products					
	Production of energy and reduction of greenhouse gas emissions	4%	14%	22%	37%	23%

Table 1 shows the analysis of respondents' opinion on how solid waste recycling affects entrepreneurial creativity and innovation. On whether solid waste recycling influences entrepreneurial creativity and innovation towards production of natural fertilizer through waste composting, the analysis indicates that 9% and 13% of the sample size strongly agreed and agreed with the statement, 11% of the sample size remained undecided; however, 47% and 20% of the sample size disagreed and strongly disagreed respectively. This implies that, an aggregate of 251 respondents representing 67% of the sample size disagreed and are of the opinion that, solid waste recycling has not influenced entrepreneurial creativity and innovation towards production of natural fertilizer through waste composting.

On whether solid recycling influences entrepreneurial creativity and innovation towards turning of solid waste materials into valuable resources (raw materials), the analysis indicates that 27% and 38% of the sample size strongly agreed and agreed respectively with the statement, 5% of the sample size remained undecided, while 21% and 9% of the sample size disagreed and strongly disagreed respectively. This analysis implies that an aggregate of 244 respondents representing 65% of the sample size agreed and are of the opinion that solid waste recycling influences entrepreneurial creativity and innovation towards turning of solid waste materials into valuable resources (raw materials).

On whether solid waste recycling influences entrepreneurial creativity and innovation towards reduction of environmental wastes and hazards, the analysis indicates that 29% and 41% of the sample size strongly agreed and agreed with the statement; 4% of the sample size remained undecided, while 15% and 11% of the sample size disagreed and strongly disagreed respectively. This analysis implies that, an aggregate of 263 respondents representing 70% of the sample size agreed that solid waste recycling influences entrepreneurial creativity and innovation towards reduction of environmental wastes and hazards.

Furthermore, on whether solid waste recycling influences entrepreneurial creativity and innovation towards conversion of solid waste materials into solid, liquid and gas products, the analysis indicates that 11% and 15% of the sample size strongly agreed and agreed with the statement, 5% of the sample size remained undecided, while 44% and 25% of the sample size disagreed and strongly disagreed respectively. This implies that, an aggregate of 259 respondents representing 69% of the sample size disagreed and are of the opinion that solid waste recycling has not influenced entrepreneurial creativity and innovation towards conversion of solid waste materials into solid, liquid and gas products.

Finally, on whether solid waste recycling influences entrepreneurial creativity and innovation towards production of energy and reduction of greenhouse gas emissions, the analysis indicates that 4% and 14% of the sample size strongly agreed and agreed with the statement, 22% of the sample size remained undecided, while 37% and 23% of the sample size disagreed and strongly disagreed respectively. This implies that, an aggregate of 225 respondents representing 60% of the sample size disagreed and are of the opinion that, solid waste recycling has not influenced entrepreneurial creativity and innovation towards production of energy and reduction of greenhouse gas emissions.

Test of Hypothesis

H₀: Solid waste recycling has no effect on entrepreneurial creativity and innovation in FCT

Regression model: $Y = \alpha + \beta X + \mu \dots$ (For all observations $i = 1, 2 \dots n$)

Where Y = Entrepreneurial creativity and innovation

X = Solid waste recycling

μ = error term of random variable

α = a constant amount

β = effect of X hypothesized to be positive

Hence, the regression (predict) equation will be $Y = 116.031 + 1.964X$

Table .1a: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.918 ^a	.891	.842	30.46883

a. Predictors: (Constant), Solid waste recycling

Table 1b: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	20670.151	1	20670.151	22.265	.002 ^a
	Residual	2785.049	374	928.350		
	Total	23455.200	375			

- a. Predictors: (Constant), Solid waste recycling
 b. Dependent Variable: Entrepreneurial creativity and innovation

Table 1c: Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	116.031	47.849		2.215	.003
	SWR	1.964	.416	.939	4.619	.008

- a. Dependent Variable: Entrepreneurial creativity and innovation

Table 1a, b and c above reveal the results of tested hypothesis four. Data utilised from the structured questionnaire for the test of hypothesis two were extracted from Table 1, rows 1 to 5. The test indicates that solid waste recycling's effect on entrepreneurial creativity and innovation. The F-value is calculated as the Mean Square Regression (20670.151), which is divided by the Mean Square Residual (928.350), resulting to $F=22.265$. From the results, analysis in the table is statistically significant ($Sig = 0.002$). The analysis indicated that solid waste conversion accounted for 89.1% increase in entrepreneurial creativity and innovation ($R = .0891$, $F(1, 698) = 22.265$, $p < .05$).

From the results of the ANOVA in table 1b which indicates a significant level of 0.002, and F value of 22.265 being greater, this gives a good reason to reject the null hypothesis; hence we conclude that Solid waste recycling has a significant effect on entrepreneurial creativity and innovation in FCT.

DISCUSSION

Finally, the finding of hypothesis four indicated a significant level of 0.002, and F value of 22.265 being greater, this gave a good reason to reject the null hypothesis; hence concluding that solid waste recycling has a significant effect on entrepreneurial creativity and innovation in FCT. This finding is in agreement with the studies of Chen, Tai, Wu, Tsai and Srimanus (2018), whose results indicated that there were an increasing number of owners of waste recycling businesses developing and adapting to new business models; Oni (2018), who's finding indicated that there is a positive relationship between entrepreneurship creativity and waste utilization; and the findings of Agbaeze, Onwuka and Agbo (2014), which established that the solid waste management system as practice in the Enugu state were unscientific, unsustainable and at the prerogative of people in power, owing that it had no room for waste recovery, reuse and recycling, hence encouraging the need for creative and innovative ways of solid waste management, Ozoemene, Obienusi, & Ezenwaji, (2014).

This research evaluated the effect of environmental solid waste recycling on development of entrepreneurial opportunities in Federal Capital Territory, Abuja, with specific objectives which focused on extent of how solid waste recycling has influenced entrepreneurial creativity and innovation in FCT. The summary of the finding indicated that, there are inherent opportunities in solid waste recycle.

For objective four, on how solid waste recycling affects entrepreneurial creativity and innovation; respondents' opinion indicated that solid waste recycling influences entrepreneurial creativity and innovation towards turning of solid waste materials into valuable resources (raw materials); and influences entrepreneurial creativity and innovation towards reduction of environmental wastes and hazards. However, respondents were of the opinion that, solid waste recycling has not influenced entrepreneurial creativity and innovation towards production of natural fertilizer through waste composting; has not influenced entrepreneurial creativity and innovation towards conversion of solid waste materials into solid, liquid and gas products; and has not influenced entrepreneurial creativity and innovation towards production of energy and reduction of greenhouse gas emissions in FCT Nigeria.

CONCLUSION

This research on effect of environmental solid waste management on development of entrepreneurial opportunities in Federal Capital Territory, Abuja, concludes that solid waste recycling has a significant effect on entrepreneurial creativity

and innovation in FCT. Based on the findings of this research therefore, is an urgent need for a shift from the current practices to more concrete approach for sustainable solid waste should be converted to wealth in Municipal Area Council in Abuja. Furthermore, in order to achieve the specific objectives of this study, it is recommended that, entrepreneurial risk propensity in solid waste management should be an appropriate instrument for the sustenance of solid waste management owing to the vast opportunities inherent in solid waste management, premised on the increasing rate of urbanisation of the Federal capital Territory, Abuja. Finally, since the findings indicates that solid waste recycling influences entrepreneurial creativity and innovation, it is therefore recommended that, the Municipal Area Council should create opportunities for participation of creative and innovative entrepreneurs with ideas on how to recycle increasing solid wastes into green energy, fertilizers, raw material and other bye products in the solid waste management in Abuja.

REFERENCES

1. Igoni, A.H., M.J. Ayotamuno, S.O.T. Ogaji, and S.D. Probert, (2007) Municipal solid-waste in Port Harcourt, Nigeria. *Applied Energy*, 84 (6), 664-670.
2. Asnani PU (2006) Solid Waste Management: India Infrastructure Report 2006.
3. Adama, O. (2007) Governing from above: solid waste management in Nigeria's new capital city of Abuja. Stockholm: Acta Universitatis Stockholmiensis.
4. Daniel H, Perinaz BT (2012) What a Waste: A Global Review of Solid Waste Management. World Bank's Urban Development Series.
5. Ahmed, S.A. & Ali, M. 2004. Partnerships for solid waste management in developing countries: linking theories to realities. *Habitat International* 28:467–479.
6. Ofobruku, A.S. Okafor, C.N. Agbaeze, E. K. & Obi-Anike, H.O. (2016) Entrepreneurial Potentials of Solid Waste Management in the Federal Capital Territory Abuja, Nigeria: *Nigerian Journal of Social Sciences*, 12(2), pp, 1-15.
7. Tende, S.B.A. & Nimfa, D. (2015) Can entrepreneurship education in universities lead to business start-ups? Evidence from Nasarawa State, Nigeria; *KASU Journal of Management Sciences*: 6(1), 56.
8. Kadafa, A.A, Manaf, A., Sabrina, A.H & Azmin, S.W.N. (2013). Application of an Integrative approach for municipal solid waste management assessment: Towards adopting a conceptual model for efficient and sustainable solid waste management. *Journal of environmental and earth sciences* 3(7): 39-50.
9. Zaynab Ahmad Belel and Hijab Mahmoud (2013). Survey of municipal solid waste in Jimeta-Yola, Northeastern Nigeria. *International Journal of Scientific & Engineering Research* Volume 4, Issue 1, 1-8.
10. Nwofe (2015) Management and Disposal of Municipal Solid Wastes in Abakaliki Metropolis, Ebonyi State, Nigeria. *International Journal of Scientific Research in Environmental Sciences*, 3(3), pp. 0107-0118, 2015 Available online at <http://www.ijrpub.com/ijrsres>. Accessed 8/28/2015.
11. Abur, B.T. & Oguche, E.E. (2014). Characterization of Municipal Solid Waste in the Federal Capital Abuja, Nigeria, *Global Journal of Science Frontier Research: H Environment & Earth Science* 14(2):1-6.
12. Ezeah C, and Roberts CL (2012). Analysis of barriers and success factors affecting the adoption of sustainable management of municipal solid waste in Nigeria. *Journal of environmental management*, 103: 9-14.
13. World Bank (2012). World Bank Report, What a Waste: A Global Review of Solid Waste Management. <<http://documents.worldbank.org/curated/en/2012/03/16537275/waste-global-review-solid-waste-management>> (13.01.13).
14. Burmamu, B.R, Law, P.L, Aliyu, H.H, & Ibrahim, Y. (2014) Environmental Impacts and Management Strategies of Solid Waste Disposal in Jimeta-Yola, Nigeria: *International Journal of Environmental Engineering Science and Technology Research* 2: 1-8.
15. Radwan, N. & Mangi, S.A. (2019) Municipal Solid Waste Management Practices and Opportunities in Saudi Arabia: *Engineering, Technology & Applied Science Research* Vol. 9, No. 4, 2019, 4516-4519.
16. Alzate, S. Cuestas, B.R. & Duque, A.J. (2019) Municipal Solid Waste as a Source of Electric Power Generation in Colombia: A Techno-Economic Evaluation under Different Scenarios: *MDPI Journal Resources*; 3(5), pp, 1-16.
17. Jones, G. & Spadafora, A. (2014) Waste, Recycling and Entrepreneurship in Central and Northern Europe, 1870-1940: Harvard Business School Working Paper 14-084.
18. May M, & Farouk M (2016) Guide to Municipal Solid Waste Management: American University of Beirut.
19. Eleje, E.O. Anienwelu, P.C. & Adebayo, G.A. (2017) Financial and Economic Implications of Solid Waste Management in Nigeria: *JORIND* 15(1) June, 2017. ISSN 1596-8303. www.transcampus.org/journal; www.ajol.info/journals/jorind.
20. Maryam KG, and Rosnah MY (2016) Advantages and Disadvantages of Healthcare Waste Treatment and Disposal Alternatives: Malaysian Scenario. *Pol J Environ Stud* 25: 17-25.
21. Oyegunle, A.O. (2016) Solid Waste Management Practices in Two Northern Manitoba First Nations Communities: Community Perspectives on the Issues and Solutions; A Master's Thesis submitted to the Faculty of Graduate Studies of The University of Manitoba,

22. Oteng-Ababio, M. (2011) The role of the informal sector in solid waste management in the Gama, Ghana: Challenges and Opportunities; Tijdschriftvoor Economische en Sociale Geografie – 2012, DOI:10.1111/j.1467-9663.2011.00690.x, Vol. 103, No. 4, pp. 412–425.
23. Ezeah, C., C.L. Roberts, G. Watkin, P.S. Philips, and A. Odunfa, (2009) Analysis of barriers affecting the adoption of a sustainable municipal solid waste management system in Nigeria. Proceedings: of the 24th International conference on solid waste technology and management: 15th-19th March 2009, Widener University, Philadelphia, USA, 1418-1429, edited by, Mersky, R.L.
24. Ezeah C, and Roberts CL (2014). Waste governance agenda in Nigerian cities: A comparative analysis *Habitat international* volume 41,(1) page 121-128.
25. Chen, X. Tai, C.T, Wu, L. Tsai, F.S. & Srimanus, K. (2018) Business Models for Social Innovation of Municipal Solid Waste Recycling Companies: Comparison of Two Business Cases in Thailand and Taiwan; *Sustainability*, 10, 1009; doi:10.3390/su10041009 www.mdpi.com/journal/sustainability.
26. Jones, G. (2013), “Debating the Responsibility of Capitalism in Historical and Global Perspective,” Harvard Business School Working Paper, No. 14-004.
27. Oni, F.E. (2018) Effect of entrepreneurship creativity on waste utilization (A case study of Padson Industries limited, Ilorin, Kwara State); *International Journal of Entrepreneurship and Business Innovation*; 1(1), pp, 1-14.
28. Nzeadibe, C. (2009). Solid waste reforms and informal recycling in Enugu urban area, Nigeria *Habitat International* 33 (2009) 93–99.
29. Ochuko M.O. (2014) Solid Waste Management in Obantoko Area of Abeokuta, Nigeria: *Journal of Emerging Trends in Engineering and Applied Sciences* 5:111-115.
30. Onyelowe KC (2017) Solid Wastes Management (SWM) in Nigeria and their Utilization in the Environmental Geotechnics as an Entrepreneurial Service Innovation (ESI) for Sustainable Development: *International Journal Waste Resources* 7: 282. doi:10.4172/2252-5211.1000282.
31. Onyelowe KC, Ubachukwu OA (2015) Stabilization of Olokoro-Umuahia Lateritic Soil with Palm Bunch Ash as Admixture. *Umudike Journal of Technology* 2: 67-77.
32. Onyeniyi, B.A (2011) Waste Management in Contemporary Nigeria: The Abuja Example. *International Journal of Politics and Good Governance* 2: 1-18.
33. Ozoemene, M.L, Obienusi, E.A, & Ezenwaji, E.E (2014) Evaluation of Domestic Solid Waste Disposal in Two Selected Housing Estates in Awka, Anambra State (Case Study of Udoka and Real Estates). *Journal of Environment and Earth Science* 4: 102-108.