

# Waste Management and Sustainable Development in Nigeria: A Study of Anambra State Waste Management Agency

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## Abstract

The study was conducted to investigate waste management and sustainable development in Nigeria with particular reference to Anambra State Waste Management Agency (ASWAMA). Survey research design was adopted and the major instrument used for data collection was questionnaire which was structured utilizing five-point likert scale. Pearson product Moment Correlation coefficient and one-sample Kolmogorov Smirnov Test were employed to analyze the data generated. The findings revealed that waste management practice has a significant impact on environmental sustainability in Anambra State. It was recommended that Government should establish stringent legal and regulatory framework that will enhance efficient and appropriate collection and disposal of waste by Anambra State Waste Management Agency. This will ensure environmentally sound waste management system that prevents damage to the Earth's ecosystems and maintain a high quality of life for the inhabitants of the State. Also, Government should pump sufficient funds into the agency to enable them dispose waste generated appropriately since hygiene and health of the citizens are very essential. This is pivotal because improperly stored waste can cause health, safety and economic problems which are detrimental to human existence.

**Keywords:** Waste, waste management, sustainability development.

## INTRODUCTION

### 1.1 BACKGROUND OF THE STUDY

Waste management is a serious issue due to its human health and environmental sustainability implications. It is really a pressing issue the world is facing today, since a high percentage of waste is currently disposed of by open dumping (Schiopu, Apostol, Hodoreanu, and Gavrilesu, 2007; Abdelnaser, and Gavrilesu 2008; Abdelnaser, EI-Amrouni, Latifa, Pakir, Ramli, and Aziz, 2009; Narayana, 2009). To buttress this assertion (Zamorano, Molerob, Grindlayb, Rodriguezc, Hurtadoa & Calvo, 2009; Jalil, 2010; Adekunle, Adebola, Aderonke, Pius and Toyin, 2011) posit that Waste Management is a globally challenging issue especially in developing countries, due to its adverse environmental effects. Mankind naturally depends on the environment to sustain their lives but solid waste is one of the three major environmental problems in Nigeria, many other developing and even the developed countries are threatened by this. It plays a significant role in the ability of nature to sustain life within its capacity.

Domestic waste management, collection and disposal have always been a universal issue. This is because efficient and appropriate collection and disposal of solid waste has been recognized as essential to the hygiene and health of urban societies-since the nineteenth century. Over the course of the first half of the twentieth century, sanitary engineers and the broader public also came to understand that the inappropriate treatment of waste could cause major environmental degradation, while recycling could contribute significantly to environmental sustainability.

Waste management is imperative because improperly stored refuse can cause health, safety and economic problems. All living organisms create waste, but humans create far more waste than other species. To prevent damaging the Earth's ecosystems and maintain a high quality of life for the planet's inhabitants, humans must manage and store their waste efficiently and safely.

In addition, the problem of municipal waste has also turned into a global challenge because of an exponentially increased population, rapid urbanization, and worldwide industrialization and limited resources (Narayana 2009; Hazra, & Goel 2009). Also, developing countries are facing some typical problems when municipal solid waste management (MSWM) is discussed, which envisage poor and inefficient coverage and operation of services, inadequate or missing recycling strategies and activities, limited or unproductive management of hazardous waste etc, (Blight, and Mbande 1998; Henry, Yongsheng, and Jun, 2006; Abdelnaser, & Gavrilesu 2008). The major problem caused by wastes to the environment is pollution characterized by

various types of solid wastes which include paper, textile plastic, metals, glass, bone, wood, vegetal matter and food remnant of multiple consistency. According to studies, it was noted that for years, the major problem in Israel (especially in Ramat Hovav) was the accumulation of tens of thousands of tons of organic wastes. Also in the U.S until the 1970's, Federal Agencies had little authority to regulate hazardous and solid disposal in an unsafe manner at landfills or in inclined lagoons, with some wastes simply dumped on the ground or in surface waters. Today, solid waste management becomes a complex and multidisciplinary problem, needed to be approached from technical, economic, social points of view in order to ensure its sustainability, since the concept of environmental sustainability is a key criterion to design waste management systems, (Manfredi & Christensen 2009).

There are three components of sustainable development: economic development, social development and environmental protection. Sustainable development ensures a developed world with secured and healthy environment for all; human beings, animals and plants. Since the primary function of solid waste management is to ensure public health protection together with environmental quality and sustainable development, national and local authorities must adopt sustainable solid waste management systems in a tight partnership with both the public and private sector. Since poor waste disposal habit of the people, corruption, weak government regulation, poor work attitude, insufficient fund, inadequate facilities such as plants and equipment among others are factors militating against effective waste management towards sustainable development in Nigeria as a whole. Therefore, if there is to be sustainable development in waste management in Nigeria, the availability of land (for landfill), human resources, adequate funds, plant and equipment and other tools must be readily available. We need to protect future for the next generation by cleaning up our environment of all types of waste, taking into consideration both physical and population development of the state. Generally, waste management is defined as the collection, keeping, treatment, disposal and recycling of wastes in such a way as to render it harmless to human and animal life, the ecology in particular and the environment in general. Despite this laudable attention, collection, disposal, processing, treatment, recycling and utilization have defied solution. At present, private sector waste disposal operators diligently visit homes and carry away refuse bags, load them into waiting trucks and cart them away for final disposal.

Recognizing the importance of waste management as an instrument of achieving sustainable development in Anambra State, government has intensified efforts to create wealth and job opportunities for the teeming unemployed youths in the state, a sizeable portion of land has been acquired in Silas Works, Fegge area in Onitsha, by the state government to establish a recycling plant.

The recycling plant at Onitsha will be transferred through a transfer system to Awka, Nnewi and other major cities in the state to recycle and decompose waste that comes from these major cities. The Managing Director, Anambra State Waste Management Agency (ASWAMA), Mrs. Oraedum Njide, said that the plant which would soon start will generate wealth to the state, but expressed fear that Anambra State may not have enough waste to accommodate the plant if established. Recycling of waste generates wealth to states. This will in turn ensure sustainable development in the state. ASWAMA in collaboration with the Ministry of Local Government in the state have been moving round to see to these problems and very soon, they will start house to house inspection because we need to nurture and groom our environment like a baby. They have been trying to sensitize our people on the need to keep our environment clean. It is under the auspices of the foregoing that the study sets out to ascertain the effect of waste management on sustainable development in Nigeria.

## **1.2 STATEMENT OF THE PROBLEM**

Improper waste handling and management pose serious threats to the environment and public health. In Nigeria, the commonly practiced waste management option in Nigeria, basically involves the collection of mixed waste materials and subsequent dumping at designated dumpsites. It is not a practice to separate waste materials at source or any point during its management (Adekunle et al, 2011). Development is needed to enhance the quality of the lives of citizens in a country since developmental projects affect the environment, ecology etc. Therefore, for the past few decades people have been talking about sustainable development. There are three components of sustainable development: economic development, social development and environmental protection. There are as well, many factors that contribute to the degradation of environmental quality. One of the factors that contribute seriously to the degradation of environmental quality is household and industrial waste. Sustainable development requires meeting the major needs of all people and extending opportunity to satisfy their aspirations for a better life. During the past decade, the concept of sustainable development attracted significant attention from researchers, governments of different countries and international environmental organizations. The reason is lucid, that is, the increased rate of environmental pollution and degradation. Since poor waste disposal habit of the people, corruption, weak government regulation, poor work attitude, lack of fund, inadequate facilities such as plants and equipment among others are factors militating against effective waste management towards sustainable development in Nigeria as a whole. Therefore, if there is to be sustainable development in waste management in Nigeria, the availability of land (for landfill), human resources, adequate funds, plant and

equipment and other tools must be readily available.

### **1.3 OBJECTIVES OF THE STUDY**

The broad objective of this study is to examine the effect of waste management on sustainable development in Nigeria. The specific objectives of the study are:

- \*To determine whether improper disposal and handling of waste has any significant impact on environmental sustainability in Anambra State.
- \*To ascertain the nature of the relationship between environmental protection and waste management system in Anambra State.
- \*To examine the effect of waste generation on socio-economic development in Anambra State.

### **1.4 RESEARCH QUESTIONS**

The following research questions would guide this work:

- \*To what extent does improper disposal and handling of waste impact on environmental sustainability in Anambra State?
- \*What is the nature of relationship between environmental protection and waste management system in Anambra State?
- \*To what extent does waste generation impact on socio-economic development in Anambra State?

### **1.5 Research Hypotheses:**

Based on the research questions formulated above the following hypotheses. guided the study:

#### **Hypothesis 1**

There is a significant relationship between improper disposal and handling of waste and environmental sustainability in Anambra State.

#### **Hypothesis 11**

There is a significant relationship between Environmental protection and waste management systems in Anambra State.

#### **Hypothesis 111**

Waste generation affects socio-economic development in Anambra State.

### **1.6 Significance of the study**

The general public, government and waste management agencies stand to benefit from this study. Empirically, the outcome of this research will enable the general public and government to grasp deeply the hazardous effect of reckless disposal of waste along every nook and cranny of the nation and factors that impede/hamper the implementation of waste management in Anambra State. Also, this study will equally strengthen government efforts towards the release of funds for waste evacuations and prompt payment of salaries to employees of these various agencies having vividly understood the import of poor waste management via extensive work done on this write-up.

Theoretically, this study will make a useful contribution in the field of management as it will serve as another source of knowledge in the management of waste and material resources of the various establishments in Nigeria.

### **1.7 SCOPE OF THE STUDY**

This research focused on waste management and sustainable development in Nigeria with particular emphasis on Anambra State Waste Management Agency.

### **1.8 Limitations of the study**

Myriads of factors constitute impediments towards the successful completion of this work. One of the factors is availability of many relevant materials which the research found very tedious to articulate and coordinate. The researcher's speed in executing this work was also hampered by her nature of job and family responsibilities. In addition, the investigator also encountered problems in eliciting vital information from the top personnel of the organization under study. But despite these hurdles, the researcher made frantic efforts to ensure the successful completion of the work.

## **REVIEW OF RELATED LITERATURE**

### **2.1 Conceptual review**

#### **2.1.2 Meaning of waste management**

Waste management according to Adewole (2009) is the collection, keeping, treatment and disposal of wastes in such a way as to render it harmless to human and animal life, the ecology and the environment generally. This

definition is very crucial because the import of waste management is to protect human lives in particular and the environment in general.

United Nation's (UN) (2008) defines sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own need. The principle of sustainable development seeks to achieve societal and environmental equity while in pursuit of economic gain. From the point of view of sustainable development, waste can be interpreted broadly or narrowly. Broadly it might be construed as including various forms of pollution, ranging from discharges of toxins into the commons, or of emissions into the atmosphere. A narrow interpretation on the other hand, can be characterized as those by-products of production and consumption that are the subject of specific waste control programs. Sustainable development is an implied development without destruction, it is the judicious use of non-renewable resources for the present and future generations, which are non-renewable resources, which must be used at a judicious rate, neither too fast nor too slow and to ensure that the natural wealth that they represent is converted into long-term wealth as they are used Adewole (2009). In Nigeria, we succinctly put it as sustainable development without jeopardizing future development, meaning that in our efforts to explore and exploit the natural resources to serve us, there is an obvious paradox evident in the need to ensure economic development, while protecting the environment. It is important to note that there must be a balance between levels of development and the stock of natural resources, that is, development must be at a level that can be sustained without prejudice to the natural environment or to future generations.

A quick look at definitions of waste in media and printed documents reveal that waste is considered an unwanted good that is no longer useful or desirable. In the German Waste Act of August (1993) waste is defined as "a portable object that has been abandoned by the owner" and also as an "orderly disposal garbage" Bilitewski et al (1994). The Framework Directive on Waste in the United Kingdom states posit that waste is a substance and/or object that is discarded by its owners. This statement is followed by 16 waste categories that are currently in force Porteous,(2000).

Citing Udocha and Uchegbu (2002), waste is defined as those materials which are generated as a result of normal operations over which we have control in terms of their production, disposal or discharge. Waste could be seen as any substance or object which the producer or holder discards or intends or is required to discard.

Wright (2005), sees waste as the total of all the materials thrown away from homes and commercial establishments and collected by local governments. It encompasses food wastes, household waste, containers and product packaging, dirt, demolition and construction wastes and other kinds of inorganic wastes from residential, commercial and institutional sources, the collection and disposal of which are performed by local authorities and which may be in either solid or semi-solid form. Examples of this kind of waste are electronic appliances, newspapers, clothing, food scrapes, boxes, disposable table wares, office and classroom papers, furniture, wood pallets, rubber tyres and restaurant wastes.

The Mexican view on waste, expressed in the General Waste Amendment of October 2003, refers to a material or product that owners or holders discard, which can be found in a solid or semi-solid state, as well as liquid or gas in a container or thrown away and can be revalued, treated or disposed of according to specific regulations (Congreso General de los Estados Unidos Mexicanos,( 2003). Waste is classified in categories such as municipal solid waste (MSW), agricultural and animal refuse, industrial residues, extraction and mining waste, construction and demolition debris and sewage sludge among others.

According to Bilitewski et al (1994) waste management incorporates "the collection, transport, storage, treatment, recovery and disposal of waste. Both definitions concur with Mexican scholars who view waste management as the body of actions related to waste characterization and classification, waste selection, storage and transportation, as well as its transfer, treatment and final disposal. Waste management is the collection, transportation, processing, managing, and monitoring of waste materials. These materials can be solid, liquid, or gaseous substances.

## 2.2 Theoretical framework

This work is anchored on Cradle to cradle theory developed by William McDonough (2002}. It is designed to stop the cycle of use-waste-pollute, which suggests that certain products could be reused endlessly to make similar products (cradle to cradle), rather than recycled into lower-grade products until the last stop is a landfill (cradle to grave). This means that products can be used, recycled, and used again without losing any material quality-in cradle to cradle cycles. Therefore, it could be the good way for reducing the waste from the raw materials of the products instead of using more and more virgin materials. Besides, considering from the waste hierarchy, it also increases the proportion of the waste reuse. Hence, when we face the problems of municipal solid waste, this theory can bring us the possibility for the breakthrough. All in all, "cradle to cradle" plays an important role to develop the China's waste treatment hierarchy and implement the China's waste management system.

### 2.3 Empirical review

There is no known documented research on waste management and sustainable development in Nigeria with particular emphasis on Anambra State Waste Management Agency. However, some research similar to that undertaken by this Paper includes, For example, KadafaAdatiAyuba, et al (2013) that examined the current Status of Municipal Solid Waste Management Practice in FCT Abuja. The study aims at identifying the current challenges and areas requiring improvement in FCT Abuja. The data collection was in stages, using an integrative approach via semi- structured interview and field observations. The qualitative data was analyzed descriptively, while the quantitative data was analyzed using basic statistics. Based on the findings, it was concluded that municipal solid waste management is a serious issue due to its human health and environmental sustainability implications that are yet to be properly addressed within the FCT Abuja.

Jan Steins (2002) conducts a study that focused on Industrial Waste Management Models. His objective was to determine the commonly known business economic models, tools, methods and organizational theories as well as the Pollute-Pay-Principle that can be applied in waste management. System theory was adopted in order to get a clear picture of the model societal context; the economic model methods are studied and modified from a waste management point of view. It was concluded that theoretical findings point at the fruitful possibility to modify commonly used cost- revenue methods including the Pollute-Pay-Principle in an industry.

Oberluri Solomon Aisa et al (2011) investigated the role of households in Solid Waste Management in East Africa Capital Cities. His focus was on the technical and social aspects of domestic solid wastes and the role of householders in producing and handling these wastes.

Ning (2011) in his extensive research examined challenges of sustainable urban planning: The case of Municipal Solid Waste Management. With anticipated increases in population and associated waste generation, timely and effective waste management highlights one of the most critical challenges of sustainable development, which calls for meeting "the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). Waste management in urban areas plays a particularly important role, given that waste generated from urban areas are often exported out of the region for processing and treatment, and the impacts of waste disposal activities may pass on to the other jurisdictions, and even to the next generations. An urban system cannot be sustainable if it requires more resources than it can produce on its own and generates more wastes than the environment can assimilate. The study revealed that, with successful implementation of strategic policy design, Waste generation and its associated impacts can be decoupled from population and urban growth. Good lessons about waste reduction programs can be learned from different Communities. Meanwhile, this study also reveals various challenges facing communities with heterogeneous characteristics, such as housing density, building age, and income.

Accordingly, the work recommended potential opportunities for planners to contribute to community-specific waste management programs, the prospect of transforming waste management practice from a cost burden to a long-term economic development strategy, and the need to incorporate waste management into the sustainable urban planning agenda.

In another study, Eunomia, et al (2009) assessed International Review of Waste Management Policy. They advocated that in respect of waste management, there are some increasingly strong markers provided in the policy development. Also, the revised directive suggests that policy would do well to take heed of the requirements below:

- Ensure that mechanisms are in places which lead to the separate collection of Glass, metals, paper and plastic (where appropriate), again pre-empting the WFD requirements;
- Implement measures designed to lead to separate collection of bio-waste;
- Implement policies or mechanisms that encourage the use of products of Bio-waste management;
- Ensure that where incineration or co-incineration are employed, permits should not be issued unless the recovery of energy takes place with a high level of energy efficiency Apply the polluter- pays-principle; and
- Give substance to the concept of resource efficiency;

Similar work by Collins (2008) investigated Environmental Responsibility and Firm Performance. Using a field survey methodology, a sample of sixty manufacturing companies in Nigeria was studied. The firms were categorized into two groups, environmentally 'responsible' and 'irresponsible' firms. An investigation was undertaken into the relationship between firm performance and three selected indicators of sustainable business practice: employee health and safety (EHS), waste management (WM), and community development (CD), common within the 30 'responsible' firms. Findings from empirical results reveal that the sustainable practices of the 'responsible' firms are significantly related with firm performance. In addition, sustainable practices are inversely related with fines and penalties. The paper concludes that, within the Nigerian setting at least, sustainability affects corporate performance and sustainability may be a possible tool for corporate conflict resolution as evidenced in the reduction of fines, penalties and compensations. The paper therefore recommends research into the relationship between sustainability and conflict management.

Omrán (2011) focused on municipal solid waste management in Bani Walid City, Libya. He identified some problems associated with municipal solid wastes in Bani Walid city (Libya) such as the significant needs in relations to existing capacity and the continued growth of urban areas and industrial development. Environmentally acceptable management of solid waste is a challenge mainly due to limited resources and inadequate management and technical skills within municipality authorities. It was concluded that, without undertaking the appropriate measures to establish effective handling, treatment, and disposal systems, the growing quantities of waste can have various impacts from increased health risks to environmental degradation. In order for Bani Walid city to develop and implement municipal solid waste management an effectively and efficiently, the study recommended Improved public information on MSW management and enhancing social acceptability of waste disposal and treatment.

In another study, Adewole (2009) carried out research on Waste management towards sustainable development in Nigeria with emphasis on Lagos State. The researcher did a conceptual work that pinpointed major effects of waste management on quality of life and he also outlined perceived causes of intractable waste problems. He recommended that expanding recycling programmes can help reduce solid waste pollution but the key to solving severe solid waste problems lies in reducing the amount of waste generated.

In a related study, Beatrice Abila and Jussi Kantola (2013) assessed Municipal Solid Waste Management Problems in Nigeria. The paper attempts a synthesis of problems relating to municipal waste management in Nigeria and proposes a conceptual knowledge management approach for tackling municipal waste problems in cities across Nigeria. The application of knowledge management approach and strategy is crucial for inculcating a change of attitude towards improving the management of waste. The inefficient management of waste by individuals, households, consumers and waste management companies can be attributed to inadequate information on waste management benefits, lack of producers' involvement in waste management as well as poor implementation of government policies. The paper presents an alternative approach providing solutions promoting efficient municipal waste management. The paper concluded that cultural belief is a major barrier to efficient waste management in Nigeria. Other barriers includes packaging and product manufacturers' involvement and interventions in curbing waste management, ineffective communication, poor personnel morale, absence of centralized waste collection containers, limited collaboration with international organization. It was recommended that the focus of municipal solid waste management should not only be technology centered strategies but also people centered.

Muhammed (2009) conducts a study that focused on sustainable Development in Malaysia. The study exposes theoretical framework and flowchart models for sustainable waste management in Malaysia, These include household waste collection, disposal of household waste to designated lands, using worm to decompose the organic waste rapidly, Vermicomposte is produced within three to four Weeks, Vermicompost can be used as environment friendly manure, Vermicompost may minimize environmental degradation, Vermicompost may promote a clean, fresh, and healthy environment in Malaysia.

Modebe, I.; Onyeonoro, U. O (2008) examine Household Solid Waste Management in Awka, Anambra State. The study aimed at ascertaining the waste handling practice among household in Awka, Anambra state. A Descriptive Research Design was employed using cross-sectional data. A total population of 200 households was selected using a multi-staged sampling technique and questionnaires administered. Data collected were analyzed, relevant proportions and test significance done. Findings revealed that the bulk of waste generated was organic waste and nylon bags. Most of them (85%) stores the waste generated in a closed container outside the house. About 70% of the respondents dispose their waste through the government waste management agency, while 27% of them dump their waste in unauthorized places and the remaining patronize the mobile cart pushers, most waste is not sorted prior to disposal. Despite very good knowledge of waste recycling only 18% of the residents practice it. More than half of the respondents expressed dissatisfaction with the level of government involvement and wish that it could do more. Great government involvement, community participation and possible involvement tribe private sector as practiced in some places, appears to be the way out of the sanctuary quagmire faced by the residents of Awka.

Englande and Guang (2003) studied application of biotechnology in waste management for sustainable development. The paper presents an overall view of industrial waste management practices as pertaining to substantiality of resources with emphasis on biodegradation of industrial pollutants. Methodologies employing biotechnology and striving towards the goal of sustainable development/production are discussed and particular attention is given to: regulatory consideration and trends; characterization of toxics for resource reuse; eco toxicological assessment evaluations; treatment trends and innovative techniques, residual management. Findings revealed that Biotechnology is an important component needed to successfully achieve the goal of sustainability.

In a similar study, Otti (2011) investigated a model for solid waste management in Anambra State. Moreover, his study aimed to determine which type of integrated solid waste management option or programme will be used to implement minimized cost and maximized benefit (benefit cost ratio) over a long period of

planning period. The optimization system is adopted which is an optimal solution and a feasible solution. The most favorable value of the objective function is the largest value for maximum environmental benefit (Benefit cost Ratio) and smallest value for a minimization problem of cost of maintenance. This model presented here illustrates mix basic solution integrated planning of state and some Local Government Solid Waste Management System in Anambra State. The optimization model was developed with the objective of allowing the Board of Anambra State Environmental Protection Agency (ANSEPA) to capture practically all aspect of waste management and it is planning problem (All integrated into, personnel sundry, equipment maintenance and purchase). It contains many innovative features and removes many limitation frequently encountered in often existing optimization modeling for waste management. Moreover financial constraint causes delay in the models effectiveness and efficiency. As in the Nigeria factor, financial resources are usually difficult to access, in that model goals can be delayed overhead waste collection, disposal and planning management, and a whole lot could be disrupted. When the complexity of solid waste management planning increases, system engineering tools can assist municipal and local decision makers in handling the complex planning situation.

Many related literature reviews on waste management and sustainability development have been carried out in some States in Nigeria and other countries like (Otti 2011 in Anambra, Nigeria; Modebe, I.; and Onyeonoro, U. O. 2008 in Anambra, Nigeria; Mohammed 2009 in Malaysia; Beatrice Abila and JussiKantola 2013 in Nigeria; Omran 2011 in Bani Walid City, Libya ). Actually tremendous results were achieved as a result of their in-depth studies but no research has been conducted on waste management and sustainability development in Anambra State.

#### **2.4 WASTE MANAGEMENT AND SUSTAINABLE DEVELOPMENT IN NIGERIA.**

Today, with a world population approaching seven billion that produces more than ten million metric tons of waste per day, questions of the impact of waste and how to manage it all, have emerged once again. Offered as the ultimate solution, 'zero waste' goals have been adopted by communities in New Zealand, Japan, the United Kingdom, North America and beyond While the term 'zero waste' is used widely and enthusiastically applauded as a positive, yet often deemed impossible goal, no definite definition of the term exists. Examination of the concept reveals significant and opposing differences between theoretical and practical interpretations. The practical implementation of zero waste bears little relation to the foundational elements of zero waste theory and serves more to reinforce the status quo of unsustainable waste production and facilitate the 'throwaway society' than working towards waste elimination. Waste management is the collective process of sorting, storing, collecting, transporting, processing, resource recovering, recycling and disposal of waste. In Nigeria, wastes are usually dumped on roadsides, available open pits, flowing gully water and drainage channels. The indiscriminate disposal of waste is increasingly a prominent habit in most urban cities of Nigeria. Unlike urban cities, in rural communities municipal solid waste quantity are less and managed in household backyards by burning, composting, as feeds to animals and occasionally disposed at dump sites. In Nigeria, the processes involved in the management of waste are, storage, collection, transportation and disposal at dumpsites. Moreover, recycling which is an environmentally friendly option is not yet fully adopted. There are no formal recycling sectors in Nigeria. Wastes are recycled informally by scavengers who buy un-use valuables from People and also go to legal and illegal dumpsites in search of materials that can be re-used and recycled.

Since there is a continuous increase of waste production by households, educational institutions, commercial institutions etc. That is why the Report of the United Nations Conference on Environment and Development (UNCED, 1992), and also in Agenda 21 of the United Nations General Assembly which affirmed that environmentally sound management of wastes was among the environmental issues of major concern in maintaining the quality of the Earth's environment and especially in achieving environmentally sound and sustainable development in all countries." In the fifth European Community environment programme towards sustainability, problems of waste management - in particular the increasing amounts of domestic and industrial waste and the non-optimal use of recycling and reuse options - are referred to as being at the same level of urgency as climatic changes and aquatic pollution are in being basic environmental problems that need to be solved if a sustainable development is to be achieved. However, during recent years' interest in industrial waste as an important source of energy use and material recovery has increased considerably. Today, most factories are in need of a detailed analysis of their waste management at all stages of production. Factory owners who have already studied waste streams within the company and the possibilities of recovery and resource saving usually find that there are large economic as well as environmental benefits if adequate waste management is implemented (IEA Bioenergy, 1996).

The benefits of successful industrial waste management programs aiming at minimization of wastes frequently result in significant reductions in manufacturing and production costs, more efficient use of valuable resources, improvements in process and product quality and reductions in waste generation, treatment and disposal costs. Additional benefits of industrial waste minimization programs may include a reduction in a generator's long-term liability for any hazardous wastes produced and the potential for positive publicity for

being proactive and doing the right thing" Childers, (1998). A commonly suggested way to cope with the pollution aspect of the waste problem is to let the polluter carry all the costs of preventing and controlling any pollution that he originates. This principle, the Polluter-Pays Principle, (PPP) GECD {1992L is however not without Problem either. Nevertheless, it is commonly regarded that the Polluter-Pays Principle instrument represents the common view of today regarding how to finance environmental societal policy. Effective management of waste enhances the competitiveness of a firm as well as the material welfare of the members of the society. Waste management is to prevent waste from causing harm to human health and the environment and promote resource use optimization. Timely and effective waste management is one of the most critical challenges of sustainable development that needs to meet "the needs of the present without compromising the ability of future generations to meet their own needs WCED (1987). In the U.S, 80% of the population, 81 % of firms and 85% of employment is located in metropolitan regions (U.S. Census, 2000 & 2002). Urban regions are the "keys to the delivery of sustainable development due to the considerable opportunity for increased quality of life through economic, political and social progress" (Low et al., 2000; Walton, 2005). The significant and growing fraction of population, material and energy flows are associated with the use and disposal of products and materials worldwide (Leigh et al., 2008, 2010). A city cannot be sustainable if it generates more waste than it can assimilate; waste reduction is more critical than waste disposal management as the end problem. Hart (1997) added that the achievement of sustainability would require a blending of product stewardship, green technology and pollution prevention.

## **METHODOLOGY**

### **3.1 RESEARCH DESIGN**

This study adopted survey research design whose purpose according to Ezeani (1998) is to collect detailed and factual information that describes an existing phenomenon. Research design is a plan of investigation that specifies the sources and types of information relevant to the research problem.

### **3.2 POPULATION OF THE STUDY**

The element of the population includes all the staff of Anambra State Waste Management Agency which comprises 160 personnel. The purpose of the research is to ascertain the effect of waste management on sustainable development. Copies of questionnaires were administered to accomplish the objectives of the study and analyzed by scoring the responses using 5-point Likert scale—strongly agree, Agree, Disagree, undecided and strongly disagree. The researcher utilized the entire population because the population was small i.e. complete enumeration.

### **3.3 SOURCES OF DATA**

Data were collected from both primary and secondary sources. The primary data were collected by means of questionnaire while the information from secondary sources was obtained from the library, journal articles, textbooks and other documented materials relevant to the research work.

### **3.4 METHOD OF DATA COLLECTION**

Data for the research was collected through the instrumentality of questionnaire. The investigator personally distributed the copies of questionnaire to the respondents to ensure prompt response from them. Distributed questionnaires were personally retrieved by the researcher after completion.

### **3.5 INSTRUMENT FOR DATA ANALYSIS**

The researcher utilized both descriptive and analytical approaches in the treatment of data. Descriptive technique employed included simple percentages and the analytical tools adopted to test the hypotheses include the Pearson Product Moment Correlation Coefficient and Kolmogorov Smirnov Test.

### **3.6 RELIABILITY OF THE INSTRUMENT**

#### **A. Reliability Test**

This was done utilizing Cronbach Alpha at 5% level of significance. Cronbach Alpha is the most common measure of internal consistency ("reliabilityJJ). It is most commonly used in determining if the scale is reliable.

<b>Reliability statistics</b>	
Cronbach's Alpha	N of item
.765	12

**Source: SPSS Ver. 22**

From the reliability test, the measuring instrument measures what it is purported to measure at an alpha value of .765 (for 140 participants) which is a strong indicator of the consistency of the questionnaire in measurement.



#### 4.1 Data presentation and analysis

This chapter is dedicated to the presentation, analysis and interpretation of data obtained by the researcher in the conduct of this research. Primary data was obtained from questionnaire administered to a total of one hundred and sixty respondents. Information was presented using tables to aid easy understanding. Section 4.1.1 presents the bio-social information of the respondents; Section 4.1.2 presents the descriptive statistics of the questionnaire; and finally, 4.1.3 presents the hypotheses test results.

##### 4.1.1 BIO-SOCIAL PROFILE OF PARTICIPANTS

**Table 4.1**

No of questionnaire administered	questionnaire returned	No of not retrieve
160	140	20

From table 4.1.1 above, 140 copies of questionnaire were returned representing 87.5% success rate, which is considered quite sufficient and employed in the study.

**TABLE 4.1.2: GENDER DISTRIBUTION OF RESPONDENTS**

Valid	Frequency	Percent	Valid percent	Cumulative
Male	103	73.6	73.6	73.6
Female	37	26.4	26.4	100.0
<b>Total</b>	<b>140</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: Field Survey (2015)

From table 4.1.1 above (Gender Distribution of Respondents), most of our respondents were males representing 73.6% of the entire respondents. 37% of the respondents are however females, the total respondents observed in the study was 140 (100%).

**TABLE 4.1.3: ACADEMIC QUALIFICATION OF RESPONDENTS**

Valid	Frequency	Percent	Valid percent	Cumulative
WAEC/GCE	68	48.6	48.6	48.6
BSc/HND	48	34.3	34.3	82.9
PhD	1	.7	.7	100.0
<b>TOTAL</b>	<b>140</b>	<b>100.0</b>	<b>100.0</b>	

Source: Field Survey (2015)

**TABLE 4.1.4: WORKING EXPERIENCE OF RESPONDENTS**

Valid	Frequency	Percent	Valid percent	Cumulative percent
1-5 years	67	47.9	47.9	47.9
6-10 years	47	33.6	33.6	81.4
11-15 years	16	11.4	11.4	92.9
16 years and above	10	7.1	7.1	100.0
<b>Total</b>	<b>140</b>	<b>100.0</b>	<b>100.0</b>	

Source: field survey (2015)

From table 4.1.4 above (Working Experience of Respondents), 47.9 percent of our respondents had experience between 1 - 5years; 33.6 percent had experience between 6 - 10 years; 11.4 percent of the respondents had experience of 11 - 15years; while approximately 7.1 percent of the total respondents had worked for over 16 years.

#### 4.2 Test of hypotheses:

##### Hypothesis One

Ho: Waste management practice has no significant impact on environmental sustainability in Anambra State.

**Table 4.4.1: One-Sample Kolmogorov-Smirnov Test**

		Environment Sustainable
N		140
Normal parameters <sup>a-b</sup>	Mean	8.1214
	Standard deviation	1.96175
Most Extreme Different	Positive	.237
	Negative	.169
	Two-tailed	.237
	Asymp. sig. (2-tailed)	.000 <sup>c</sup>
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance correction		

Since the p-value < .05, we therefore reject the null and accept the alternate, thus Waste management practice has a significant impact on environmental sustainability in Anambra State. This implies that waste management contributes to environmental sustainability.

**Hypothesis Two**

Ho: There is no relationship between environmental protection and waste management system in Anambra State.

		WMS	EP
WMS	Pearson correlation	1	.204*
	Sig. (2 tailed)		.016
	N	140	140
EP	Pearson correlation	.204*	1
	Sig. (2 tailed)	.016	
	N	140	140

\*. Correlation is significant at the 0.05 level (2-tailed).

Source: SPSS Ver. 22

Key

WMS: - Waste Management Systems

EP: - Environmental Protection

**Decision Rule:**

Reject the null and accept the alternate if p-value < .05; if otherwise, accept the null.

**Interpreting Pearson r result:**

A positive correlation means that as one variable increases in value, the second variable also increases in value. Similarly, as one variable decreases in value, the second variable also decreases in value. Likewise, a negative correlation means that as one variable increases in value, the second decreases in value.

**Hypothesis Three**

Ho: Waste generation has no effect on socio-economic development in Anambra State

**Table 4.4.3: One-Sample Kolmogorov-Smirnov Test**

		Socio-Economic development
N		140
Normal parameters	Mean	13.7357
	Std. deviation	1.56679
Most extreme differences	Absolute	.276
	Position	.210
	Negation	-.276
Test statistic		.276
Asymp. Sig. (2-tailed)		.000 <sup>c</sup>
a.	Test distribution is Normal	
b.	Calculated from data	
c.	Lilliefors Significance Correction	

Since the p-value < .05, we therefore reject the null hypothesis and accept the alternate, thus Waste generation has an effect on socio-economic development in Anambra State.

**SUMMARY OF FINDINGS:**

1. Improper disposal and handling of waste has a significant impact on environmental sustainability in Anambra State.
2. There is a positive relationship between environmental protection and waste management systems in Anambra State.
3. Waste generation has an effect on socio-economic development in Anambra State.

**DISCUSSION OF FINDINGS:**

1. Respondents perceived that improper disposal and handling of waste is harmful to the environment. According to Adewole {2009} major environmental effects include air pollution, which includes odour, smoke, noise, dust, etc. waste pollution pollution from disposal site via flooding causes blocked drains and land degradation. Consequent upon this, respondents favored question 9 in the questionnaire, thus, appropriate collection and disposal of waste prevents diseases.
2. There is a significant positive relationship between environmental protection and waste management systems in Anambra State. This depicts that the whole essence of managing waste is to ensure environmental protection by mitigating its negative effects on the environment. This is in tandem with Adewole's {2009} perception of waste management as the collection, keeping, treatment and disposal of wastes in such a way as to render it harmless to human and animal lives, the ecology in particular and the environment in general.
3. Waste generation has a significant effect on socio-economic development in Anambra State. The achievement of sustainable development would require effective management of waste, and is thus a critical issue that demands urgent attention. This is because sustainable development would ensure a developed world with secured and healthy environment where waste generation will be minimal. This is why Hart {1997} added that the achievement of sustainability would require a blending of product stewardship, green technology and pollution prevention. This simply means that a city cannot be sustainable if it generates more waste than it can assimilate. This assertion is in sync with the concept of environmental sustainability as a key criterion to design waste management systems Manfredi and Christensen (2009).

**CONCLUSION**

Waste management is a critical issue confronting practically every state in Nigeria because of its human and environmental sustainability implications. As human beings naturally depend on the environment to sustain their lives, proactive measures have to be taken into cognizance towards managing waste in order to achieve economic, social and environmental protection which form the basic components of sustainability development. Waste management encompasses the whole process of generating, keeping; treatment; handling and disposal of wastes in such a way as render it harmless to humans, animals, ecology and the environment. This calls for timely and effective management of waste which highlights one of the most critical challenges of sustainable development which demands meeting the needs of the present without compromising the ability of future generations to meet their own needs.

**RECOMMENDATIONS**

Based on the findings, the following recommendations are made:

1. Government should establish stringent legal and regulatory framework that will enhance efficient and

- appropriate collection and disposal of waste by Anambra State Waste Management Agency. This will ensure environmentally sound waste management system that prevents damage to the Earth's ecosystems and maintain a high quality of life for the inhabitants of the State.
2. Government should set up a formal recycling sector where wastes of all kinds will be recycling instead of informal recycling which scavengers adopt who buy unused valuables from people and go to legal and illegal dumpsites in search of materials that can be reused and recycled. The implication is that formal recycling of waste will ensure friendly environment as well as effective waste management practice. However, formal recycling of waste will generate wealth to the state. This will contribute significantly to sustainable development in the state.
  3. Government should effectively and sincerely implement and keep the terms of agreement with ASWAMA, this will boost their morale, increase their level of commitment towards their duties.
  4. Government should pump sufficient funds into the agency to enable them dispose waste generated appropriately since hygiene and health of the citizens are very essential. This is pivotal because improperly stored waste can cause health, safety and economic problems.

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