ENVIRONMENTAL LITERACY AND WASTE DISPOSAL BEHAVIOUR OF UNIVERSITY UNDERGRADUATES IN ENUGU STATE, NIGERIA.

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ANAMBRA STATE

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A DISSERTATION PRESENTED TO THE DEPARTMENT OF MARKETING IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF PHILOSOPHY (Ph D) DEGREE IN MARKETING

DEPARTMENT OF MARKETING,
FACULTY OF MANAGEMENT SCIENCES,
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FEBRUARY, 2021

DECLARATION

I, Nwankwo, Christian with Registration Number **2013447005P** do hereby declare that this dissertation titled "Environmental Literacy and Waste Disposal Behaviour of University Undergraduates in Enugu State" is my original work and it has not been submitted in part or full for any other degree or diploma in this or any other University.

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APPROVAL

This dissertation has been approved for the award of degree of Doctor of Philosophy (Ph D) in Marketing, Faculty of Management Sciences, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria.

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DEDICATION

This dissertation is dedicated to God Almighty and my children, Chidera, Eberechi and Chinazaekpere Nwankwo for their patience.

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ABSTRACT

This study was on environmental literacy and waste disposal behaviour of university undergraduates in Enugu State, Nigeria. Fundamentally, environmental literacy refers to an understanding and interactions of human beings and their natural environment with regard to both living and non-living things. The main objective of this study was to investigate environmental literacy and waste disposal behaviour of university undergraduates in Enugu State, Nigeria. To achieve this, the study hypothesized that despite the intensifying environmental education efforts and the spread of environmental literacy concept, there is still a growing discourse in literature on whether and how environmental literacy influences waste disposal behaviour of university undergraduates in Enugu State, Nigeria. This study used survey research design and was based on a statistically determined sample of 400 respondents. Of this number, 368 copies of questionnaire representing 92% response rate were returned as duly filled and usable. Questionnaire was the major instrument for primary data collection. Confirmatory factor analysis was applied to check reliability analysis with respect to internal consistency. Tables and percentages were used to answer the research questions while structural equation modeling was used to test the hypotheses at .05 margin of error. Statistical package for social science SPSS version 23.0 software was used for analysis. Results showed that there was no positive relationship between environmental knowledge and waste disposal behaviour of university undergraduates with a p-value .060 > .05 margin of error. There was a positive relationship between locus of control with a p-value .000 < .05 margin of error. Similarly, there was also a positive relationship between environmental curiosity and waste disposal behaviour of university undergraduates with a p-value .000 < .05 margin of error. This study concluded that in order to balance human demand upon the earth's natural resources sustainably, students who are environmentally knowledgeable, with locus of control, curious about the environment, concerned about the environment and sensitive to the environment are needed to manage the impact of human excesses on the environment. This study recommended among others that since there was no positive relationship between environmental knowledge and waste disposal behaviour of students, that the environmental programmes be integrated into the academic curriculum for university undergraduates to enable them to fully appreciate these environmental issues in other to stimulate action among them.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Environmental literacy as a human discourse refers to an understanding and interactions of human beings and the natural environment with regard to both living and non-living things. It has also been referred to as the capacity of individual to perceive the relative health of environmental systems and take appropriate action to maintain, restore or improve the health of the systems (Roth 1992; Roth & Disinger 1992; Kostadinova 2013). The interaction implies what human beings put into the environment and how the environment affects human beings. Today, humanity faces a number of social, economic and environmental challenges resulting from the interactions humans have with the global ecosystem. Evindently, challenges such as global climate change, loss of biodiversity, pollution, indiscriminate waste disposal and food scarcity are highly complex and disputed among researchers (Walsh & Maclahan 2014, Moorefield, 2016). If there is any hope for the necessary societal changes to occur which would lower these impacts, then we must strive to adopt environmentally responsible behaviours. This can only be achieved by development of an environmentally literate society (Stroves, 2013).

The environment provides the materials and energy required to meet the basic needs and desires of individuals and society. All sustainable human activities depend on robust, healthy and productive environment (Nkamnebe 2017; Ofori, Welbeck, Kwakye & Owusu 2017; Roth 1992). Decisions that are made daily by individuals, corporations and society in, at least, one of the several activities they pursue affect the health and the productivity of the environment either positively or negatively.

In addition, environmental degradation, pollution, growing population and ‘decreasing life expectancy’ based on the context of the previous discussion (Rowe, 2007) are the negative consequences of unsustainable human activities on the environment are prominent and visible in the society at present. This means that there is significant increase in demands for natural resources and many resources are being extracted at

levels that will inhibit future generations from satisfying their own needs (Hoffman 2008, Johnnsdottir 2009). These major environmental problems such as defrostration, loss of biodiversity, ozone layer depletion cause destructive impact on the health of the people and other living organisms (Shamugnathan, 2015). Literature suggests that as a solution or to curb the emerging destructive environmental problems, the society needs to be environmentally literate (Hsu & Roth 1996; Olson & Roth King 1991; Wike 1995; Erdogan et al 2009). This is because environmentally literate citizens will behave in more responsible way in protecting the environment and tend to perform more responsible environmental behaviours (Stevenson 2007).

Currently, organizations, universities included are under pressure to protect, regreen the already degreened environment for sustainable livelihood and increased productivity. The care for the environment will reduce environmental costs incurred by organizations and enhance their corporate image (Nkamnebe 2017; Anyanwu & Inyanga 2006).

To effectively protect and sustain the environment, there is need for university undergraduates and workers to be adequately aware of environmental issues and the effects of their activities on the environment. Attaining a sustainable future environment requires a holistic change in attitude, beliefs and habits. This behavioural change and action can be achieved when there is adequate knowledge about the environment. This is premised on models and theories that suggest that increased knowledge of a phenomenon will result in affirmative attitudinal and behavioural change towards it (Ramsey & Rickson 1978; Hungerford & Volk 1980). As Hungerford and Volk (1990) posit.

> *... if we make human beings more knowledgeable, they will in turn, become more aware of the environment and its problems and thus, be more motivated toward the environment in more responsible way.* (P. 88)

Consequently, environmental literacy has become a topical issue with growing importance among academic researchers. They argue that knowledge level of an individual and his appreciation of environmental issues and concepts are crucial determinants of his willingness to participate in environmental related activities and to engage in actual activities that are necessary for sustaining the environment for future

generations (Williams 2017; Ofori et al 2016). The need to educate students on sustaining the environment is more than paramount currently, and stakeholders across the globe have recognized the key role of institutions of higher learning in cultivating the environmental literacy of their students (Arnon et al; 2014).

Undeniably, a major purpose of education is to provide people with the relevant knowledge and skills to enable them to live successful, productive life and to function as responsible citizens with the society (Roth, 1992). Thus, education has been suggested as key to a transformational change towards the environment (Frisk & Larson, 2011). In line with this belief, Goldman, Yavetz & Pe'er (2006) argue that achieving a sustainable environment may be dependent on the environmental literacy level of the society. The involvement of academics in environmental education is imperative in this regard and though the call for this is on the ascendency, empirical evidence on the impact of environmental education is still not adequate. More so, studies on environmental literacy have mostly focused on elementary schools (see Okesli, Kaplowitze & Levine 2008, Chu, Lee, Ku, Shin Lee, Mee, & Kang 2007, Cutter 2002, Alp, Ertepinar, Tekkaya & Yilmaz 2008, Chisnal 2017), secondary schools (see Alexander & Poyyamoli 2014, Kulasekara 2007; Hsu 1997; Boyes, Skamp & Stanisstreet 2008; Dove 1996; Khalid 2003; Michail, Stamou & Stamou 2007; Kara and Chaa 1996) and only a few on higher education institutions (see Mathew, Owusu, Kwakye & Welbeck 2017; Williams 2017; Franzen & King 2017).

Evers (2011) asserts that people who are environmentally literate and live sustainably know that the choices they make as consumers have impact on many levels and know how these choices can help or harm the environment. They understand earth's ability to sustain human and other life and they are empowered and motivated-individually or as part of a community to keep the environment healthy and sustain its resources, so people can enjoy a good quality of life for themselves and their children. According to Roth (1992) and Nash (2015) an environmentally literate person is someone who understands the interrelatedness of all living things, recognizes environmental problems, feels an obligation to sustain the earth and regularly takes an action to do so.

Indiscriminate disposal of waste by university students constitute one of the major problems that impede the prospect of the philosophy of environmental education (Okoye et al 2017). Neglecting this aspect of the learning process would dastardly negate the frantic efforts of Nigerian's environmental policy objective which is to achieve sustainable development in the country (Eheazu, 2014; Federal Republic of Nigeria (FGN, 2017). Furthermore, there are large numbers of variables that actually influence waste disposal behaviour of university undergraduates. Berno, Middleton and Meinhdt (2016) and Cartese (2015) summarized these variables to include the following; environmental knowledge, locus of control, environmental curiosity, environmental sensitivity and environmental concern. What informed the opinion of choosing these variables is that they are argued in extant literature (see Jickling 2016; Sanve 2014) to reflect the major variables that play a part in individual's process of pro-environmental adoption.

Put pointedly, literacy about the environment in terms of not only reading and writing, but also an integrative way of how university undergraduates think, talk about, interact and value the environment, dispose waste properly, knowledge awareness of environmental issues are the focus of this study.

1.2 Statement of the Problem

Despite global advocacy on environmental literacy and waste disposal behaviour, our environment continues to be polluted and degraded. Waste disposal still remains a quagmire that virtually affects everybody in Nigeria (Williams, 2017, Nkamnebe, 2018; Luca, Ispass & Landura, 2015). According to United Nations Scientific and Cultural Organization (UNESCO) (2015) there is need to embark on sensitization programmes that would emphasize good environmental culture and catch them young as well as participation in environmental issues.

University undergraduates in Enugu State liters the environment with wastes. These have environmental and health consequences in that it provides a breeding ground for insects and animals which spread diseases such as fever and diarrhea (Davis & Toyama, 2012). The reasons for this behaviour gap have not yet been sufficiently researched. On the other hand, there may be special barriers emanating from anti-pro environmental behaviours which resulted to low environment knowledge, locus of control, environmental curiosity, environmental sensitivity and environmental concern. All these factors especially in promoting environmental literacy complicated proper waste disposal behaviour. It has been noted that higher educational institutions

can play a key role in promoting and teaching of environmental sustainability due to the inherent expertise among staff and students as well as their engagement with a wide range stakeholders (Bailey, 2015). However, despite the intensifying environmental education efforts and the spread of environmental literacy concept, there is still a growly discourse in literature on whether and how environmental literacy influence waste disposal behaviour of university undergraduates in Enugu State, Nigeria.

Several studies have been conducted with respect to environmental literacy and waste disposal behaviour of consumers. For instance, Williams (2017) carried out a study on assessment of environmental literacy among Oklohoma public high school students in the United States of America, Franzen and Kings (2017) conducted a research on environmentally Themed Higher education courses in Turkey. Clores and Nunez (2017) researched on environmental literacy of K – 10 students in Philippines. Kiprop (2008) carried out a study on solid waste disposal and recycling potential at the Catholic University of East Africa. Mwilu (2006) researched on waste disposal in educational institution in Kenya with emphasis towards sustainability. Zhang (2011) examined the greening of higher educational institution through sustainable waste disposal, while Sepetu (2009) evaluated waste disposal practice in public educational institutions of Nwanza, Tanzania. It was apparent that these quantum of researches have contributed to increase students' environmental awareness but did not investigate the relationship between environmental literacy and waste disposal behaviour of university undergraduates in Enugu State. Moreso, these studies are alien to a typical developing nation like Nigeria, therefore it is imperative to conduct Nigeria based research on the subject matter.

This inadequacy of empirical study on environmental literacy and waste disposal behaviour of university undergraduates in Nigeria and western dominance of literature on environmental literacy aroused my research interest hence this empirical investigation.

1.3 Objectives of the Study

The main objective of this study is to investigate environmental literacy and waste disposal behaviour of university undergraduates in Enugu State, Nigeria.

In specific terms, this study sought to:

i. examine how environmental knowledge influences waste disposal behaviour of university undergraduates in Enugu State, Nigeria.
ii. ascertain the effect of locus of control on waste disposal behaviour of university undergraduates in Enugu State, Nigeria.
iii. discuss the relationship between environmental curiosity and waste disposal behaviour of university undergraduates in Enugu State, Nigeria.
iv. identify the relationship between environmental sensitivity and waste disposal behaviour of university undergraduates in Enugu State, Nigeria.
v. explain the relationship between environmental concern and waste disposal behaviour of university undergraduates in Enugu State, Nigeria.

1.4 Research Questions

The following research questions guided this study.

i. What is the relationship between environmental knowledge and waste disposal behaviour of university undergraduates in Enugu State, Nigeria?
ii. What is the effect of locus of control on waste disposal behaviour of university undergraduates in Enugu State, Nigeria?
iii. What is the relationship between environmental curiosity and waste disposal behaviour of university undergraduates in Enugu State, Nigeria?
iv. What is the relationship between environmental sensitivity and waste disposal behaviour of university undergraduates in Enugu State, Nigeria?
v. How does environmental concern relate with waste disposal behaviour of university undergraduates in Enugu State, Nigeria?

1.5 Formulation of Hypotheses

The following hypotheses were tested.

$H1_1$: There is a positive significant relationship between environmental knowledge and waste disposal behaviour of university undergraduates.

$H1_2$: There is a positive significant relationship between locus of control and waste disposal behaviour of university undergraduates.

$H1_3$: There is a positive significant relationship between environmental curiosity and waste disposal behaviour of university undergraduates.

$H1_4$: There is a positive significant relationship between environmental sensitivity and waste disposal behaviour of university undergraduates.

$H1_5$: There is a positive significant relationship between environmental concern and waste disposal behaviour of university undergraduates.

1.6 Scope/Delimitation of the Study

Cresswell (1994) stated that delimitation address how studies can be narrowed down in scope. This study therefore confined itself to empirically investigate environmental literacy and waste disposal behaviour of university undergraduates in Enugu State, Nigeria. The subject scope was marketing and society while the content scope was all the variables under study.

In order to make this research more purposeful and research oriented, this research was delimited to five universities in Enugu State (geographical scope) because of the high academic activities in the area. The lists of these universities are as follows: University of Nigeria Enugu and Nsukka Campuses, Enugu State University of Science and Technology Enugu and Agbani Campuses, Godfrey Okoye University Enugu, Madonna University Akpugo Campus and Caritas University Amorji Nike, Enugu.

The time horizon (period) was from 2017 to 2018. The target population of the study was all undergraduate students of the selected Universities in Enugu State, Nigeria.

1.7 Significance of the Study

Significance of the study refers to the benefits of the study, that is, the benefits to be derived from the study. It is stated in a manner as to show who and who will benefit from the study, how they will benefit and in what form they will benefit (Okeke, Olise & Ezeh 2014). Therefore, this study will benefit the following:

Scholars: The cache of ideas, facts and figures in this study will serve as a reference material for scholars wishing to conduct researches on environmental literacy and

waste disposal behaviour of consumers among university undergraduates at all levels such as Lecturers, undergraduates among others.

Universities and Students: This study will also help the universities play a prominent role in preparing their students to analyze and resolve environmental problems. For instance, Agenda 21 of the 1992 United Nations Earth Summit Conference on Environment and Development (UNCED) created aggressive measures to increase environmental education in universities.

We believe that by exposing the knowledge levels of university students and by implication their attitudes towards the issues of the environment, it will prompt a change in the behaviour of the students towards the environment and motivate them to participate in desirable environmental activities. Again, the outcome of the study could influence a change in environmental education curriculum aimed at enhancing knowledge levels of university students about the environment. Considering the influential roles and positions that university students are likely to play and occupy in the society in future, they could be the starting point of sustained change and action towards the environment.

Non-Governmental Organization (NGOs) in the areas of health and environment will also benefit. This study will guide them in the areas of production and distribution of environmental educational materials to the public.

Government: The study would be utilized by the government at both Federal and the state levels through their various ministries like, Ministry of Environment, Education, Health and Information. It will be beneficial for these ministries in the area of policy formulation, most especially in the area of educating students in the schools and out of school. It will also assist them when formulating laws that will promote human health and protect the environment (Buckle & Smith, 2000).

Consumers: This study will help consumers to be more concerned about their everyday consumption habits and the impact that these can have on the environment (Wong & Stoneman, 1996). Recently, consumers appear to become aware of the fact

that the environment is more fragile than they believed, and that there are limits to the use of natural resources (Sauza, 2004).

To Marketing Practitioners, the study will help them green design for environment. According to Coddington (1994) Design For Environment (DFE) is a philosophy of integrating environmental considerations into the design process of both product and packaging (Rivera, 2007). Additional considerations inherent in DFE are:

- designing for disposal;
- designing for non-disposal (recycling);
- designing for pollution prevention, and
- designing for resource conservation.

Design for environment (DFE) encourages the development of ideas that would incorporate waste reduction into production processes, recycling product and/or packaging, that would make products compostable or that would help facilitate changes in the process of design while adding more benefits than costs to the organization (Maxwell, Rothenberg & Brisioe (1997).

1.8 Overview of Enugu State

Enugu State was created from the former Anambra State in August 27, 1991, under the then military President, General Ibrahim Badamosi Babangida Retired. Enugu State derives its name from two Igbo words Enu and Ugwu meaning "top of the hill" or hill top, denoting the city's hilly geography. The people of Enugu State are of Igbo extraction and their major language is Igbo. One of the main indigenous groups of people in the area is Enugu Ngwo, who live on the hill top with their farmland sprawling all over the valley (Ugwuoke; 2010).

Enugu State is one of the states in the southeast geo-political zone, whose prominence arose as a result of being the first place coal was mined in commercial quantity in Nigeria (1909). It later became the administrative headquarters of Southern and Eastern provinces (1929), Eastern Region (1954 – 1967), defunct state of Biafra during the Nigeria civil war (1967-1970), East Central State (1976 – 1991).

The state is a public sector driven economy. Thus, the state government remains the highest single employer of labour a situation the present administration under the leadership of His Excellency, Right Honourable Ifeanyi Ugwuanyi hope to change soon.

The whole ethnic groups that made up the state is administratively and politically grouped into three Senatorial Zones namely: Enugu East, Enugu North and Enugu West. The state is bounded by Abia State to the South, Anambra State to the West, Kogi State and Benue States to the North and Ebonyi State to the East. It has a population of over three million people.

The state has Seventeen (17) Local Government Area (LGAs) and two systems of government – state and local government administration. The state has three arms – the executive council, the legislative and judiciary, while the local government has executive committee and legislative council. The state has been governed most of the times by military and democratically elected governors – Herbert Eze military (1990 – 1992), Okwesilieze Nwodo elected (1992 – 1993), Temi Ejoor – Military (1993 – 1994), Sule Ahman – Military (1996 – 1998), Adenunmi Agbaje – military (1998 – 1999), Chimaroke Nnamani – elected (1999 – 2007), Sullivan Chime – elected (2007 – 2015), Ifeanyi Ugwuanyi – elected (2015 till date), Wikipedia (2017).

Due to inflow of people to Enugu State for white collar jobs and acquisition of higher education, the city now play host to seven big tertiary institution: University of Nigeria Enugu Campus, Enugu State University of Science and Technology, Caritas University, Amorji Nike, Godfrey Okoye University, Coal City University, College of Education Technical, Institute of Management and Technology and other Certificate awarding institution (Banole & Emeribe 2013) as further cited in Faith (2015).

The city is also home to Our Saviour Institute of Science and Technology and School of Dental Technology. Some notable secondary schools in Enugu include the College of the Immaculate Conception (CIC) built in 1940, Holy Rosary College (HRC) built in 1943, Providence High School, Colliery Comprehensive Secondary School, Federal Government College among others.

1.9 Limitations of the Study

Limitations of the study refer to the problems encountered in the course of a study (Okeke, Olise & Ezeh, 2010). This current research has some limitations.

First, the study is somewhat limited by the area of study. The study intended to cover all the universities in Southeast Nigeria. However, the introduction of operation python dance by the federal government in the Southeast, the Biafra agitation, kidnapping in some parts of Southeast Nigeria at the time of field work forced the research to be restricted to Enugu State. This though did not substantially affect the result of this study, given that some students from the affected states are equally resident in Enugu State. Nonetheless, generalization should be done with caution.

Second, mobility challenges of moving from one university to another in an effort to distribute and collect the filled questionnaire.

Finally, aparthy among respondents in Nigeria towards responding to questionnaire particularly in environment and behaviourial researches, uncooperative attitude of the respondents and mobility. The problem was mitigated by revisiting the students and convincing them on the need to assist in completing the questionnaire. Despite limitations, we finally surmounted them and obtained the data that helped in the completion of the research.

1.10 Definition of Terms

Environmental Attitude: United Nations Education, Scientific and Cultural Organization (UNESCO 1977) defined environmental attitude at Tbilisi Conference as a set of value and feeling of concern for the environment and motivation at actively participating in environmental improvement and problems.

Environmental Knowledge (EK): This refers to a clear and functional understanding of the structure and function of the biophysical environment and its associated problems (Roth, 1992).

Sustainable Environment (SE): Environment that meets the needs of the present generation without comprising the needs of the future generation, National Environment on Education Fund (NEEF, 2015).

Environmental Education (EE): Environmental education is a process aimed at producing citizens that are knowledgeable concerning the biophysical environment and its associated problems, aware of how to solve these problems and motivated to work towards their solution (Zhu, 2009).

Biodiversity: According to the International Convention of Biological Diversity (ICBD, 1992), Biodiversity is defined as consisting of different types of biological elements at different levels that is "the variability among all living organisms from all sources including *inter-alia*, terrestrial, marine and other aquatic ecosystems.

Environmental Sensitivity (ES): An apathetic view of the environment (Hungerford et al 2000) with regard to exposure to, exploration of, appreciation of, respect for and care about the environment (Hsu, 1997).

Environmental Curiosity: In the context of our study, this concept refers to being eager to learn about the ecology, natural environment, environmental problems and issues and to explore natural environment (Erdogan, 2009).

Environmentally Responsible Behaviour (ERB): As defined by Sivek and Hungerford (1989), "this is the behaviour that advocates group or individual sustainable or diminished use of natural resources".

Sustainable Development (SD): This refers to the development that "meets the need of the present generation without compromising the needs of future generations". Sustainable development is a process of change in which the exploitation of resources, the direction of investment, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations (Stark, 1982).

Waste: Any material which the owner discards or intends to discard as useless. (Essuman 2017; Augustino, Bahati & Aletanda 2015).

Dumpsites (DS): According to Pepple and Nwosu (2016) dumpsite refers to places designated for disposal of normally solid or semisolid materials, resulting from human and animal activities that are considered useless, unwanted and hazardous.

Consumer Behaviour (CB): The behaviour that consumers display in searching for, purchasing, using, evaluating and disposing of products, servicing and ideas. It is also those acts of individuals directly involved in obtaining and using economic goods and services, (Carlson et al, 2014, Nwaizugbo, 2004).

Environmentalism: In this context, environmentalism may be defined behaviourally as the propensity to take action with proenvironmental action (Stern, 2000, Inglehart, 1990).

Proenvironmental Behaviour: This study uses pro-environmental behaviour in the same sense as (Jensen 2002, Kollmus &Agyeman 2002; Homburg & Stolberg, 2006) used it to mean a conscious action performed by an individual so as to lessen the negative impact of human activities on the environment or to enhance the quality of the environment.

Literacy: In this study, literacy refers to the ability of individuals to understand, to make informed decisions and to act accordingly in order to address complex environmental issues in the modern society (Roth 1992, Liu et al 2015).

Environment: This is the sum total of our surroundings that includes all of the abiotic factors and biotic factors and all the man-made urban cities (Breman & Withgott 2005).

Waste Disposal: This is the storage and destruction of waste materials in such a way that the impact on the environment and on the society is minimal (Singh & Bharal, 2006).

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

The essence of this review is to help to develop a vivid understanding into relevant previous researches and the trends that have emerged. It is a description and a critical analysis of what other scholars have written. The review will also help us to know the challenges encountered by previous studies so as to know the necessary steps to be taken in addressing such challenges (Saunders, Lewis & Thornhil, 2012, Jarkowitz 2005, Grill & Johnson, 2002). It launches us into the club of experts in the field (Otaha, 2015).

Accordingly, this chapter was arranged thus: conceptual review, theoretical and empirical review. Finally, the chapter presents knowledge gap that the study sought to address as well as summary of the literature reviewed.

2.2 Conceptual Review

2.2.1 Environmental Literacy

Environmental literacy does not have a consensus definition despite the growth in the mainstream literature over the past decades. Nonetheless, the concept has such wide use now that shared understandings are beginning to emerge (Welbeck, Ofori& Kwakye, 2017; Gayford 2002). Traditionally, the knowledge and awareness characterized environmental education and literacy (Moseley, 2000). The focus was to make people more knowledgeable about the environment and its associated issues with the view that being more knowledgeable will lead to change in behaviour.

Providing a different point of view, Elder (2002) states that environmental literacy is the capacity of an individual to act successfully in daily life on a broad understanding of how people and societies relate to each other and to natural systems, and how they might do so sustainably. This requires sufficient awareness, knowledge, skills and attitudes to incorporate appropriate environmentalconsiderations into daily decisions about consumptions, lifestyles, and to engage in individual and collective actions.

In the opinion of Saparnot (2012), environmental literacy is knowledge of thoughtful behaviour and action. He continued, knowledge is necessary for individuals to make informed decisions about adoption of eco-practices and for initiation of actions. In relation to this, Byers (1996) explains that when an individual does not realize what the negative consequences to the environment from a particular decision or a practice (e.g. the individual is lacking knowledge and awareness) this prevents him/her from adopting a more sustainable behaviour.

Environmental literacy is the development of knowledge, attitudes, and skills necessary to make informed decisions concerning the relationships between man and his environment (Price, 2012; Robelen 2012; Colye, 2010).

An environmentally literate person:

- discusses and describes ecological and environmental systems and human impacts on these systems;
- engages in hands-on, outdoor learning experiences that involve discovery, inquiry, and problem solving;
- formulates questions and analyzes information pertaining to his or her surrounding environment; and
- understands how to take actions that respect, restore, protect, and sustain the health and well-being of human communities and environment systems.

Environmental literacy is the knowledge about the working mechanism of the natural environment and the role of man to preserve a sustainable environment. A very dynamic relationship between people and their environment, can be seen from how humans live together, side by side with all components in the vicinity. Environmental literacy is not a new discipline or even a new concept in examining human relationships to the environment, environmental literacy problem has caught the attention of many researchers and scientists an environment education, Meilinda, Pryinto and Karyato (2017).

Other environmental literacy understanding expressed by Shamuganathan (2015) which defines the environmental literacy of people as a person who have basic skills,

understanding and feelings about human relationships with the environment. Then Roth (1992) added that theenvironmental literacy of people understands the link between natural and social systems, the unity of man with nature, how technology influences the decision-making, environmental problems and learning about the environment as a lifelong. Hungerford and Volk (1990) argued that the meaning of environmental literacy has been greatly muddled as a result of its multitude of definitions.

In cohension with Orr (1992) environmental literacy does not only refer to an understanding of environmental issues; environmental literacy refers to an individual's competence in evaluating ecological issues, understanding the needs of the environment, and a willingness to actively participate in the environmental movement, exhibit responsible behaviour. A behaviour is considered responsible for the environment when the actions of individuals or groups advocating the use of sustainable or efficient to natural resources. One of the characteristics of individuals who are environmentally literacy is that he/she care for the environment, as described by Ajzeen (2002) in his Theory of Planned Behaviour. In the theory, he explained that eco-friendly behaviour is influenced by attitudes, norms, behaviours and controls a moral obligation that will affect interest and form behaviour.

However, as there is no precise legitimacy of the linear knowledge-behavioural relationship, Hungerford and Volk (1990) argues that knowledge and awareness alone is not enough for actions. Environmental education, thus, should aim to help students increase knowledge, expand awareness and develop skills, which will allow them to participate in solving environmental problems (Hsu & Roth 1998) cope with environmental needs and contribute to sustainable development.

Williams (2017) defined environmental literacy as an understanding of scientific principles related to ecology, the roles humans play in the ecosystem and the importance of environmentally responsible behaviour.

Norris (2016), Rockcastle (1989) defines environmental literacy as an understanding of the interaction of humans and their natural environment with regard to both living things and non-living things (air, water, soil and rocks). The interaction implies taking

from as well as putting into. It includes what humans do with, to and for plant and animal life, as well as what plant and animal life does in response to human intervention.

Roth (1992) defines environmental literacy as essentially "the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems". He defines the concept in terms of observable environmental behaviours such that people who are environmentally literate should be able to demonstrate in some observable form the knowledge of key concepts, the skills acquired and their disposition towards environment and sustainability issues (Disinger & Roth, 1992). Consequently, Roth (1992) identifies and proposes three different levels of environmental literacy – nominal functional and operational levels.

On the other hand, Hollweg, Taylor and Ruggiero (2016) Erdogan, Kostava and Marcinkowski (2009) defines environmental literacy as basic functional education for all people, which provides them with the elementary knowledge, skills and motives to cope with environmental needs and contribute to sustainable development. Thus, the issue of environmental sustainability cannot be conclusive without linking it to sustainable development. Of course, to achieve sustainable development, the environment must be taken into serious consideration (Farmer 2005 & Opuku 2007).

The goal of environmental sustainability is to minimize the unsustainable extraction of natural resources. Sustainability encourages replenishment of natural resources (Peattie & Beltz 2010).

This study assumes that an environmentally literate individual or society is one that has knowledge about and an attitude towards the environment and its associated issues, has the skills and motivation to work towards resolving environmental problems and is actively involved in working to maintain an active balance between the quality of both life and the environment.

2.2.2 Predictor Variables

a. Environmental Knowledge

According to Chan and Lau (2016) McBride (2013) environmental knowledge is referred to as the amount of knowledge a person has regarding environmental issues. It is also acknowledges of the facts about key relationships that leads to environmental impacts and environmental responsibility of an individual that leads to responsible environmental behaviour (Rivas & Mostata 2016, Hungerford, Marinkowaski, Volk & Meyer, 2008).

Numerous studies (see Laroche & Toffoli 2014; Arman, Haruna & Hussein, 2012) also commented that environmental knowledge is correlated with behaviours towards the environment, that is, if consumers have the knowledge of the environment, it encourages pro-environmental behaviour like proper waste disposal behaviour.

Environmental knowledge can be interpreted as an awareness of and attitude toward solving environmental problems and motivation for environmental responsible behaviour (Roth, 1992). As Spinola (2015) argue, environmental knowledge has been observed to be one of the predictor which explains the variance in responsible behaviour.

The use of environmental knowledge in this current study is premised on models and theories that suggest that increased knowledge of a phenomenon will result positively to attitudinal and behavioural change towards it (see Ofori et al 2017, Hungerford & Volk 1990, Ramsey & Rikson 1976). They further argue that knowledge level of students and their appreciation of environmental issues and concepts are crucial determinants of their willingness to participate in environmental-related activities and to engage in actual activities that are necessary for sustaining the environment for future generations (Rowe 2007, Arnon, Orion & Carmi, 2014).

Further research has it that environmental knowledge as the first component of environmental literacy is a precondition of thoughtful behaviour and action (Disinger & Roth 1992). Therefore, knowledge is necessary for decisions about the adoption of eco-practices and for initiation of action. In relation to this Byers (1996) explains that

when an individual lack knowledge and awareness, this prevents him/her from adopting a sustainable behaviour.

Furthermore, Schahn and Holzt (1990), Salem (2014) distinguished between abstract knowledge and concrete knowledge. Whereas abstract knowledge measures factual knowledge about the environment (example, ecology, harmful effects of phosphate on marine life (Maloney & Ward, 1973). Concrete knowledge measures knowledge about environmental behaviour that can actually be applied to the protection of the environment (example proper waste disposal, consumption of products that is less harmful to the environment, energy and water conservation (Schahn & Holzt 1990).

b. Locus of Control (LOC)

According to Newhouse (1991) as further cited in Kollnus and Agyeman (2017), locus of control referred to students' perception of whether he or she has the ability to bring about change through his or her own behaviour. Students with a strong internal locus of control believe that his or her actions can bring about change in the environment, whereas students with an external locus of control on the other hand, feel that his or her actions are insignificant, and feel that change can only be brought by powerful others. Such students are much less likely to act ecologically, since they feel that it does not make a difference anyway.

In their opinion Ramalingam (2006), and Hill (2016), locus of control refers to a belief about the amount of control a person has over situations in their lives. It has a significant impact on students' lives as their decisions and choices related to health are affected by their perception of control (Shinde & Joshi, 2011). The concept of locus of control has been applied to a wide variety of human endeavours from beliefs after life, to educational settings and environmental behaviour (Mali, 2013, Kutania, Mesci & Ovdun 2011). However, for the purpose of this study the concept of locus of control is linked to students' environmental behaviour.

From a behavioural perspective, Miller, Fitch and Marshal (2003) examined how students who exhibit chronic behaviour problems perceive their control over their environment. The study consisted of 234 students and compared locus of control

between regular and part time students of Murray State University Unites States of America. They found out that part time students had a high mean score on the external locus of control than those in regular school.

Several studies on locus of control (Hwang, Kim & Jeng 2000, Hsu, 2004, Sivek & Hungerford 1990, Ramsey, 1993, Hsu & Roth 1999, Balderjahn 1988) have shown that locus of control is associated with environmental issues. Balderjahn (1988) found that locus of control is positively related to attitudes toward ecological conscious living and environmentally friendly purchase behaviour, and Schweper and Cornwell (1991) reported evidence showing that an internal locus of control is related to the propensity to purchase ecologically packaged products. In a meta-analysis of previous work on environmental behaviour, Hines, Hungerford and Tomers (1987) concluded that an internal locus of control is positively related to environmentally responsible behaviour. Evidently, many studies show that most people have a positive attitude toward the environment. An internal locus of control might provide people with the belief that they can do something to preserve the environment.

c. Environmental Curiosity (EC):

According to Gulten, Yaman, Deringol and Ozsari (2011) environmental curiosity refers to the eagerness to learn about environment and relationship between man and the environment.

It is very important in the field of environmental education which pushes students to learn more about the environment as well (Kashdan & Roberts, 2004; Oresner & Gill, 1999). Curiosity is a concept that influences human behaviour in both positive and negative ways at all stages of the life cycle. It has been identified as a driving force in students development (Stern 1973) and one of the most important spurs to environmental literacy (Day, 1982). Curiosity is accepted as a trigger of learning (Reio 1997, Loewy 1998) and assumed has positive effects on learning (Schmitt & Lahroodi, 2008).

d. Environmental Sensitivity (ES):

This is another variable that appears to be an important precursor to environmental literacy (Hungerford et al 1982). Environmental sensitivity is an empathic notion (Lee, Jan & Yang 2013) or understanding view of the environment and is characterized by the individual who refuses to litter high ways and natural areas, conserve natural resources, works to preserve ecologically important natural areas, strives for a stable and appropriate human population, respect hunting and fishing laws (Marcinkowski, 1987, Sivek & Hungerford 1990).

As another hallmark of environmental literacy in addition to knowledge, Peterson (1982) defined environmental sensitivity as "the expression of caring and positive feelings towards the environment", he also describes it as a "set of positive affective characteristics that result in an individual viewing the environment from an empathic perspective. Environmental sensitivity represents an individual's empathy for the environment (Hungerford & Volk 1990). Some scholars (see Yang, Jan & Lee 2013, Chawla, 1998, Sia, Hungerford & Tomera, 1986) suggested thatenvironmental sensitivity refers to people's interest in learning about the environment, concern for the environment and tendency to act to protect the environment.

Most previous studies that have discussed environmental sensitivity have focused on predicting environmental responsible behaviour (Chen & Yeh 2002; Hungerford & Volk 1990) and exploring and conceptualizing environmental sensitivity (Chatula 1999; Metzger & McEwen, 1999). Environmental sensitivity includes affective and cognitive dimensions (Metzger & McEwen, 1999). People should have environmental knowledge (cognitive) to develop an awareness of their surroundings and develop emotions toward the environment (Mctzger & McEwen, 1999). Chawla (1998) indicated that environmental sensitivity was formed by significant life experiences. These experiences he noted are regarded as exchanges between the external and internal environments. The external environment includes the quality of one's physical settings and social mediators of the meaning of physical world. A person's internal environment comprised his/her needs, abilities, emotions (Chawla, 1998).

Promoting environmental responsible behaviour is regarded as the ultimate goal of environmental education. Sia et al (1986) and Chen and Yen (2002) have suggested that sensitivity to the environment is the best predictor of environmental responsible behaviour (ERB). Environmental sensitivity refers to a person's understanding of environmental problem develop through various experiences such as nature based recreation activities (Hungerford & Volk 1990, Tanner 1980). Consequently, people with greater environmental sensitivity tend to engage in more environmental responsible behaviour.

e. Environmental Concern (EC):

Environmental concern as one of the predictors of environmental literacy refers to the extent which people are aware of environmental issues and their willingness to solve both concrete and abstract environmental problems (Alibeli & Johnson, 2015, Aman, Harun & Hussein, 2012), concrete environmental problems are visible local environmental degradation such as water and air pollution that has an immediate and direct effect on individuals. Abstract environmental problems are less visible and are more global problems which do not cause immediate threat to individuals such as ozone depletion and global warming (Gosken, Adaman & Zenginobuz, 2002, Liebe, Preisendorfer & Meyerchoff 2010). In supportive view, Lee et al (2013) points that environmental concern is the degree of emotional involvement in environmental issues. From a consumer behaviour point of view, involvement is defined as the heightened state of awareness that motivates consumers to seek out, attend to, and think about product information prior to actual purchase (Okeke 2013, Beckman, Lindquist & Sirgy, 1997).

A student is said to be concerned with the environment if one emotionally involved with various environmental issues (Lee & Kriegger, 1990, Almossawi, 2014). Schultz (2013) states that environmental concern holds three interrelated factors: concern for the people, concern for the biosphere, and concern for the self.

Sevil and Yakup (2011) found that consumers in developed countries are more concerned about the environment. Being realistic, an increasing environmental concern is pushing consumers to go green, to be more aware of protecting the

environment and to be responsible and careful in their consumption patterns (Hwang, Kim & Jeng 2000; Hartoyo, Sumarwan & Suharju, 2012). According to Dagher & Itani (2012) the more environmentally concerned consumers are, the greater difference between their usage of green and non-green products. They also found out that consumers who are more concerned about the environment choose green products over non-green ones.

Environmental concern has been treated as an evaluation of, or an attitude towards one's own behaviour or others' behaviour with consequences for the environment (Daudi 2014). It seems them as if environmental concern may refer to both a specific attitude directly determining intentions, or more broadly to a general attitude or value orientation. Stern (1992) as cited by Fransson and Garling (2017) identified four different such value orientations. In the first of these, environmental concern represents a new way of thinking called the New Environmental Paradign (NEP) (Dunlap & Liere 1978). In a second value orientation, environmental concern is tied to anthropocentric altruism; people care about environmental quality mainly because they believe that a degraded environment poses a threat to people's health. Thus, it is not the threat to the environment, but the threat to the well-being of people that is of central concern (Hopper & Nelsen 1991). According to a third value orientation, environmental concern expresses self-interest "not-in-my backyard" attitude (Baldassare & Katz; 1992, Stern, Dietz & Kalot, 1993).

Retrospectively, Stern (1992) identified a view that assumes that environmental concern is a function of some deeper cause such as underlying religious beliefs – "mastery of nature" and "stewardship of nature" (Murdoch; 2012). Environmental concern is measured by the New Environmental Paradigm (Schahn & Holzer 2013). These studies revealed that higher environmental concern is associated with acting more pro-environmentally (Simmons & Widmar; 2012).

In his discourse, Alibeli and Johnson (2015) noted that environmental concern indicates "the degree to which people are aware of problems regarding the environment and support efforts to solving them and or indicate the willingness to contribute personally to their solution. In general, research on environmental concern

includes; (1) attitudinal studies that examine differences in opinions about the environment based on respondents' demographic and socio-economic variables (example, country, social class, income, race, gender and age); (2) Experimental and quasi-experimental surveys that test hypotheses derived from social-psychological theory like norm-activation theory; (3) Applied research on environmental attitudes and behaviours which investigates social factors related to behaviour associated with the environment such as littering, recycling and energy conservation (Karyanto, Pryinto & Meilinda, 2017).

A review of literature indicates country, gender, discipline and education as important factors that affect consumers' awareness of environmental problems, shape their efforts to solve environmental problems, and influence their willingness to contribute to solutions to environmental problems. For example, an empirical cross cultural studies revealed high levels of concern about the environment in both rich and poor countries (Dunlap et al 1993; Inglehart, 1995). These results led Dunlap and associates to critique the validity of the conventional wisdom that 'concern' about the environment is 'limited' to developed and industrialized nations. According to Dunlap and Liere (1993) "environmental problems are salient and important issues in both wealthy and poor nations and residents in poor nations expressed as much concern about environmental quality as do those living in wealthy nations".

Consequently, it was argued that such strong of support for the environment is in fact an indicator of a paradigm shift in the relationship between society and the environment (Bell, 2009). According to Bell (2009), Dunlap, Catton, and colleagues' paradigm shift theory suggests "that in response to discrepancies between evidence of environmental threats and ideologies that do not consider environmental implications, people are slowly but steadily adopting more environmentally aware view of the world". In addition, a paradigm shift theory implies that "people are becoming more aware of the real material effects that industrial life has on the environment, and their ideologies are beginning to change to match this new understanding" (Bell, 2009).
Inglehart (2000) took the issue of strong global support for the environment a little further. Instead of focusing on the levels of support for the environment themselves,

Inglehart examined the nature of environmental support in rich and poor nations and its driving forces. According to Inglehart, public support for the environment in the developing world is an anthropocentric and reactive support that is driven by objective factors like air and water pollution and environmental threat to survival. In contrast, public support for the environment in the developed world is proactive and ecocentric in nature. Based on Inglehart, strong support for the environment in the West is associated with a cultural shift from a materialistic culture focusing on economic and physical security to a post-materialist culture focusing on freedom, self-expression, and quality of life like clean and aesthetic environment. Despite being criticized for associating environmental concern with post-material societies in the West (Bell, 2009), Inglehart was supported, in part, by Tuna's (1998) and Olofsson and Ohman's (2009). Tuna's study on environmentalism in 18 developed and developing countries showed higher levels of anthropocentric (human oriented) environmentalism among less developed countries compared with higher levels of ecocentric environmentalism among the more developed countries. Olofsson and Ohman (2006) reported more concern about the environment among those with post-materialistic and collective beliefs than those with individual materialistic ones across North America and Scandinavia.

In addition to country, gender has been one of the most salient factors predicting environmental behaviour and attitudes. However, literature on the relationship between gender and environmental concern is inconclusive where different studies have yielded different outcomes. For instance, McEvoy (1972), Suki (2014), contended that men are more active, more knowledgeable, and more concerned about the environment than women. On the other hand, Zelezny, Chua & Aldrich (2000), indicated that women are more concerned about the environment than men. In particular, Uyeki and Holland (2000) reported that women are more concerned about the environment, nature, and animals than men. In contrast, Hayes (2001) argued that gender does not influence environmental concern and women "are not more concerned about the environment than men" (657). Finally, Arcury, Scollay & Johnson (2001) played down the effect of gender on environmental concern by stating that no definite conclusion can be drawn about its effect on environmental concern.

Furthermore, the literature associates the middle class with environmentalism and environmental concern, (Mohai, Simoes & Brechim, 2010, Morris, Hastak & Mazis, 1995). Accordingly, the middle class has expressed strong support for the preservation of the environment and the conservation of natural resources. In addition, the middle class has led the environmental movement in its efforts to preserve wilderness, to conserve natural resources, to raise public awareness about environmental problems, and to lobby policy makers to curb air and water pollution. Yet, the literature is not clear as to whether environmentalism is a middle class value or whether class differences in concerns due to the influence of middle class attributes such as education, income, occupation and social activism. According to Buttel and Alibeli (2011), the middle class environmental concern might be due to factors like education, income and occupation rather than to class perse. Furthermore, Mohai et al (2010) argued for an intervening variable, that the link between the middle class and link between the middle class and environmental concern. The middle class's environmental activism is believed to be a result of greater access to resources as well as greater sense of personal efficacy. Hence, those with limited access to resources and low confidence in their ability to influence the political system will be discouraged from taking political action regardless of their environmental concerns (Mohai, et al 2010). Other studies provided interesting results concerning the effect of family income on environmental concern (Arcury, Johnson & Scollay, 2011). Some research indicated higher income people tend to support, fund, and commit to environmental organizations (Arcury, 1990). Other studies pointed out that financial support might reflect individuals' financial ability to pay dues and fees to environmental organizations more than their concern about the environment (Olsen, Lodewick & Dunlap, 1992).

Finally, literature indicates a positive relationship between educational attainment and environmental concern. Consequently, as the level of education increases, so does environmental concern (Arcury, Johnson & Scollay, 2011). Educated people are more likely to show higher levels of environmental concern than the less educated. Furthermore, the history of the environmental movement in the United States

illustrates the importance of the role played by educated people like college students. Since the 1970's, college students have created popular concern about the environment through their large-scale participation in environmental and ecological debates (Dunlap, Gallup & Gallup, 1993).

2.2.3 Concept of Consumer Behaviour

Consumer behaviour is at the very heart of marketing (Peattie & Belz, 2010). This is not far from the fact that consumers constitute the nucleus of every business venture (Rejoice, 2012). The understanding of consumer behaviour can be facilitated if we appreciate its relationship with human behaviour (Anyanwu & Okafor, 1995; Anyanwu, 2000).

According to Schiffman O'cass, Paladino and Carlson (2014), consumer behaviour is the behaviour that consumers display in searching for, purchasing, using, evaluating and disposing of the products and services that they expect will satisfy their needs. Consumer behaviour focuses on how individual consumers, families or households make decisions to spend their available resources (time, money, effort) on consumption related items. That includes what they buy, why they buy it, when they buy it, where they buy it, how often they buy it, how often they use it, how they evaluate it after purchase, the impact of such evaluation on future purchases, and how they dispose of it.

The study of consumer behaviour (Schiffman et al 2014) includes how consumers think (their decision-making processes and decisions), feel (their emotions) and behave (their physical actions that result from those decisions and feelings). Therefore, consumer behaviour as an aspect of human behaviour concerns those human actions involved in the purchase of goods and services from the marketing firm (Anyanwu, 2000).

Boone and Kurtz (2014) defined consumer behaviour as "the acts of individuals in obtaining and using goods and services including the decision process that precede and determine these acts". Consumers are people whose actions positively or negatively impacts on the activities of a marketing organizations. Some of the

marketing stimuli that could be used to elicit favourable responses from consumers include, product attributes like brand name, taste, colour distribution strategies, etc. The ability of a marketer to properly manage these elements goes a long way in determining the success or otherwise of a marketing programme (Anyanwu 2003).

Kotler and Armstrong (2014) defined consumer behaviour as the buying behaviour of final consumers-individuals and households who buy goods and services for personal consumption. Walters and Blaise (1989) as further cited in Ezenyilimba (2014) refersconsumer behaviour to consist of those decisions and related activities of persons involved specifically in buying and using economic goods and services, this also include those problem solving activities of consumers undertaken by a consumer with a view to reducing product related risk while enhancing satisfaction by buying the right goods and services.

This definition simply suggests that every action a consumer takes is calculated carefully towards purchasing the right product that ensures a solution to his/her problems. This is however, not always true given the fact that consumers are not always rational in their thinking and could be propelled by an inner or external force beyond their control. The only thing that happens at the end of the day, is that repeat purchase might not occur assuming the marketer did not employ the tool of promotion to forestall the occurrence of cognitive dissonance or its attendant problems. Infact, consumers could equally be made to buy a particular brand of product at a higher price than it is worth. This one believes, is not in the best interest of the consumer, as the best interest of every consumer is defined by being able to maximize satisfaction from every kobo expended from his/her income.

In the context of this study, consumer buying behaviour will determine the success of failure of new ideas that are marketed on the basis of their sustainability performance (Peattie & Belz, 2010). Because of the role of consumers in determining sustainability impacts during the use and disposal phases of the consumption process, their overall behaviour will also strongly influence the sustainability performance of all goods and services. For sustainability marketers, success is based on understanding consumer behaviour throughout the consumption process so that they can develop a marketing

strategy and mix that will meet consumers' needs more effectively and more sustainably than their competitors.

2.2.4 Waste Disposal Behaviour

According to Fishbein and Ajzen (2008) a behaviour is an "observable action" while a practice is "regularity in activities" or a socially sustained activity" (Gherardi 2009). In other words whereas the term "behaviour" is used to describe an individual act, the existence of a "practice" implies that a particular behaviour is repeated several times, thus becoming customary. However, both terms have very similar meanings, and are used interchangeably with regards to waste disposal both colloquially and in the literature (Gram & Hansen, 2013).

Kinhaman (2015), Seth, Noar and Katharine (2013) seeswaste disposal behaviour as the destruction or storage of waste materials in such a way that the impact on the environment and on the society is minimized.

Students behaviour related to waste which include solid and liquid wastes, sewage systems, and the impact of waste disposal behaviour have been documented with the literature of human health (Kihampa & Kihampa, 2015) from extant literature, the following waste disposal behaviour (WDB) will be discussed.

i. Sorting

Sorting refers to a process of where different materials like glass, paper, wood, metals and plastics are separated from general waste (Viegas, Silva & Viegas 2014). Lehman and Geller (2015) posit that the problem of increasing waste and pollution that threatens the future of this planet is fundamentally caused by human behaviour.

Waste sorting at the source of generation is an easy way and efficient way for solid waste disposal system (Tchoanoglous, et al 1993).

A cursory look at the waste disposal system across the globe, indicates that students that adopted waste sorting system at the source decreased the landfilling drastically and increased the recycling rate (Zyadin, 2015). The aim of sorting is to collect the

recyclable materials from the waste stream to avoid inappropriate burning and landfilling (Rousta & Dahten 2015).

ii. Donation

Donation involves passing items considered as waste such as used clothes, to one's friends, family members, or other acquaintances (Paden & Stell 2008). Donaions are solely made by consumers' public perception and a desire to help the society and in fact, charities and some studies support this claim (Lee 2013, Joung & Poaps 2013, Shim, 1995). Brookshine and Hodges studied "used clothing donation behavour" and found out that consumers donated because of their self-orientation, concerns for environment (Morgan & Birtwistel 2009) and hedonic motivation (Lee, 2013).

iii. Incineration

Tadesse (2004) incineration is a process of burning the combustible components of waste. Disposal of solid waste by incineration can be effectively carried out on a small scale in food service establishments as well as institutions of higher learning. During incineration, moisture in the solid waste gets vapourized and the combustible portion gets oxidized and vapourized. Carbondioxide (Co_2) water vapour, ash and non-combustible residue are the products of incineration.

iv. Dumping of Wastes in Gutters and River Channels

Consumers dump wastes in gutters and river channels. This is a social behavioural problem which caught the attention of the researcher. Various researchers have undertaken to study waste disposal behaviour in Nigeria (see Kayode & Omole 2011) but most of the studies are usually a case study of a particular local government ignoring the behavioural component exhibited by people as reflected in their environmentally responsible behaviour (Femi 2015). For example, the problem of flood in most institutions in Nigeria is partly due to the poor sanitation habits of the students as displayed in their observation of unfavourable waste disposal practices by indiscriminate dumping of wastes in gutters and river channels.

The practice of proper waste disposal behaviour requires the individual to acknowledge the impacts of the waste they generate and then make conscious efforts

to generate less and engage in environmentally responsible actions (Rahman et al, 2015).

The practice of dumping solid waste into the gutter and water channels by ignoring the consequences to the environment is affected by certain factors such as gender, educational attainment and geographic factors such as residential areas and the distance of residential homes to permitted waste disposal facilities (Eric, Eric & Theophile, 2014).

v. Environmental Activism

Activism as a function of pro-environmental behaviour conserving the environment, including the desire to join an environmental organization for a shared cause (Guin, Chantal, Pelletier& Hunsley, 1998) as cited in Adams and Fung (2017). This study draw on Guin et al (1998) definition of activism, and use the term to represent activities aimed at raising awareness about the environment or deliberate campaigns to bring about positive environmental change. In his contribution to this discourse, Torney and Purtra (2008) asserts that activism is often described as an effort by individuals or a group of people to stand to injustice or stand for a cause – whether social, political, or environmental with an ultimate aim to achieve societal change. In other words, activism encompasses a wide range of actions or activities that aim to provoke social change (Sherrod, 2006).

In the context of this study, the university undergraduate students' experience can be an ideal time for them to cultivate and foster pro-environmental behaviour (Adams & Fung, 2017). They argue that university students may end up becoming leaders and policy makers of the future, and therefore should be an important focus of activities aimed at sustainable environmental development (Vincent, Azucuna, Saiuz & Olaizola, 2013). This study is built on similar sentiments and recognizes university as an important time in an individual's life in so far as developing an environmental interest is concern.

Studies that focused on students' activism (see Tonglet, Philips & Read 2004, Read 1999) in central Pennsylvania revealed that subject major can also influence environmental attitudes and behaviours (Lang 2011).

Using a sample of 423 college students among Cornell University in Canada, at a sustainability conference and drawing on the theory of planned behaviour (TPB) (Kose, Gencer, Gezer, Erol & Bilon 2011), discovered that greater student involvement in environmental groups was associated with stronger intentions to engage in environmental activism.

As earlier work has shown, university students are mentally preoccupied with getting a job and making money after school (Levine & Hirsch, 1991). The question then, is what motivates their involvement in extra-curricular activities aimed at protecting the environment?

The answer is not far-fetched, Annie (2013) was of the opinion that the students must anchor on the old adage of "practice what you preach (PWYP)". It reflects how environmentalists and other activists make appropriate and relevant changes in their own lives, to serve as worthy examples (Kemedy, Thomas, Bonita, Farlane & Nadeau, 2009) university students should also "walk the talk" as a big part of their activism. They pay attention to their personal consumption habits and support local businesses. Students also shops at thrift stores rather than regular retail shops to limit their consumption as much as possible.

2.2.5 Levels of Environmental Literacy

As suggested by Hollweg et al (2011), environmental literacy is not binary nature. One is not either literate or illiterate but a continuum (Roth 1992). Roth (1992) and Wood (2013) states that the level of literacy is best measured by observing behaviour. People should be able to demonstrate in some observable form, what they have learned – their knowledge of key concepts, cognitive skills, and affect or disposition towards environmental and sustainability issues (Disinger & Roth 1992). As with scientific literacy, or other literacy for that matter, varying degrees of proficiency can be observed along the continuum from lack of competency to high level competency.

As a result, Roth (1992, Williams 2017) identified three levels of environmental literacy thus: nominal, functional and operational environmental literacy.

i. Nominal environmental literacy implies that an individual has basic cognitive awareness of natural system (Williams 2017). The nominally literate person can demonstrate some environmentally responsible behaviours and will show a familiarity with some majorenvironmental organizations. Persons of this level are developing an awareness and sensitivity towards the environment and with an attitude of respect for nature and magnitude of human impacts on them.

ii. Functional environmental literacy refers to an individual with the knowledge and skills to analyze, synthesize and evaluate information about environmental issues. The functionally literate individual will feel a sense of concern for the environment and exhibit environmentally responsible behaviours based on the current available knowledge and may participate in group actions.

iii. Operational environmental literacy involves an individual exhibiting strong skills in each of the components identified by North American Association for Environmental Education (NAAEE, 2016) including locus of control. The individual has moved beyond nominal and functional literacy in both breath and depth of understanding including the skills to routinely evaluate the actions that sustain and enhance a healthy environment. Such person demonstrate a strong ongoing sense of investment in and responsibility for preventing of remediating environmental degradation both personally and collectively and are likely to act at several levels both locally and globally.

2.2.6 Components of Environmental Literacy (EL)

Environmental literacy (EL) is an evolving concept in the developing world literature (Erdogan, Turkiye Kostora & Marcinkowski, 2009). Environmental literacy is conceived as the capacity to perceive and interprets the relative health of environmental systems and to take appropriate action to maintain, restore or improve the health of those systems (Roth & Disinger, 1992; Williams 2017).

Based upon an evolving understanding of environmental literacy (Yang & Lee 2013; Hadi, Hadiyato & Sawith 2014; Roth, 1992), environmental literacy includes six main

components, namely; ecological knowledge, socio-political knowledge, knowledge of environmental issues, affect, cognitive skills and environmental responsible behaviour (Simmons, 1995; Volk & McBeth, 1997). On the bases of these researchers' contributions, these components of environmental literacy are discussed as follows:

i. **Ecological Knowledge:** This refers to the knowledge and understanding of major ecological concepts, principles and theories as well as an understanding of how natural systems work. An ability to communicate and apply major ecological concepts including those focusing on individuals, species, populations, communities, ecosystems, and biogeochemical cycles. An understanding of energy production and transfer and the concepts of interdependence, niche, adaptation, succession, homeostasis, limiting factors, and humans as ecological variables, (Williams, 2017).

ii. **Socio-Political Knowledge:** This is a clear awareness of economic, social, political and ecological interdependence in urban and rural areas that is, how human cultural activity influences the environment from an ecological perspective. An understanding of the basic structure and scale of societal systems and of the relationships between beliefs, political structures and environmental values of various cultures. Geographic understanding at local, federal and global levels and recognition of patterns of change in society and culture. It is often referred to as cultural literacy comprising knowledge of environmental action strategies (Yang & Lee, 2013).

iii. **Knowledge of Environmental Issues:** According to Simmons (1995) and as further noted by Hadi, et al., (2014), this concept refers to an understanding of the various environmental related problems and issues caused as a result of human interaction with the environment and how they are influenced by political, educational, economic and governmental institutions. Understanding of air quality, water quality and quantity, soil quality and quantity, land use and management for wildlife habitat, and human population, health and waste.

iv. **Affect:** Is an environmental sensitivity or appreciation, in terms of responsible attitude toward pollution, technology, economics, conservation and environmental action, and a willingness to recognize and chose among

differing value perspectives associated with problems and issues. Motivation to actively participate in environmental improvement and protection, desire to clarity one's own values, and confidence to make decisions and judgments about environmental issues according to one's sense of morality, (Adams, 2006).

v. **Cognitive Skills:** These are those abilities required to identify, define analyzed, synthesize and evaluate information about environmental problems using both primary and secondary sources as well as one's personal values. Abilities for selecting appropriate action strategies and creating, evaluating, and implementing action plans. Abilities to conduct scientific inquiry and basic risk analysis, think in terms of systems, and to forecast ahead, and man, (Simmons, 1989).

vi. **Environmental Responsible Behaviours:** This is active participation aimed at problem solving and issues resolution. Action through selected life style activities, including environmentally sound consumer purchasing, using methods for conserving resources, assisting with the enforcement of environmental regulations, using personal and interpersonal means to encourage environmentally sound practices, and supporting environmentally sound policies and legislative initiatives. Categories of environmental responsible (ERB) actions are persuasion, consumer action, eco-management (rock & McBeth, 1997, Erdogan & Marankowski, 2007b).

2.2.7 Interdisciplinary Nature of Environmental Literacy

Many scholars acknowledged the eclectic nature of environmental literacy because environmental issues cut across all disciplinary lines (Wolfe, 2001). Following this notion, many researchers encourage holistic learning through knowledge and understanding of the intersection and interconnectedness between different disciplines, thus facilitating students' ability to generate new ideas and solutions to environmental problems. Many Universities in Nigeria offer multidisciplinary environmental courses; however, these courses tend to be concentrated within the physical sciences rather than management and social sciences. Traditionally, scholars have assumed that "environmental literacy is equivalent to, or a subset of, scientific literacy" and

therefore environmental education has been primarily treated as an enrichment of science programme (Disinger & Roth, 1992, Moody 2006; Simmons, 1989, National Wildlife Foundation (NWF) (2001).

Disciplinary underpinnings of environmental issues into management sciences curriculum rather than just offering a single elective course become glaring, "most business operations and decision makers lack management tools and problem-solving methods…. involving the environment (Benton, 1993).

2.2.8 Biodiversity Protection in Nigeria

The protection of biodiversity has been identified as the major pathways to environmental sustainability (Lin & Huang, 2014, Siegel 2006). According to the International Convention of Biological Diversity (1992) in Uchegbu (2002), biodiversity refers to the variability among living organisms from all sources including, inter-alia, terrestrial, marine and other aquatic ecosystem". The accelerating decline in biodiversity because of human activities is one of the most urgent environmental issues (Ernest & Kenneth, 2011).

Biodiversity is important in the preservation of the environment. The physical environment is very fragile and needs protection from the plants to protect it from a lot of flooding and erosional forces. The loss of plants has been partially responsible for cases of desertification, drought, wind and soil erosion in different parts of the world. Indications are that all plants species have been adversely tampered with through agriculture, search for fuel wood, bush burning and animal grazing (Uchegbu, 2002).

Biodiversity protection is capable of improving the medication of people. Despite tremendous advances in the field of orthodox medicine, it is now acknowledged that plants and animals which abound in our environment can be used in mechicare and overall health care development globally.

In Nigeria and Southeastern states, a lot of recreational centres based on biodiversity presence have emerged. Examples include the Yankari Games Reserve in Bauch State, the Borsu Games Reserve in Kwara State. Other natural environment induced states are the Obudu Ranch Tourist Area in Cross River State, the Ogbunike Cave and

Agulu-Nanka Erosional Site Tourist Area (Anambra State), the Nike Lake Tourist Area in Enugu State among others.

2.2.9 Benefits from Biodiversity Protection

The word biodiversity comes from two words 'bio' (which means living organisms or tissues) and 'diversity' (which means the condition of being different). Therefore joining the two words literally (bio-diversity) it means the variety of life and its processes, and it all forms of life ranging from fungi, protozoa, bacteria to plants, insects, fishes, animals and mammals. It equally includes millions of processes, pathways and cycles that link living organisms into population, ecosystem, and ultimately the entire biosphere that is the planet earth (Okereke, 1995) in Uchegbu (2002).

As an elaboration on the benefits from protecting the biodiversity, we would attempt to outline some of the benefits. As already mentioned, 'biodiversity is the very foundation of human existence". Despite interpretational differences of the concept of biodiversity and priorities for action, there is a growing understanding of interdependencies and responsibilities and of the need for sustainable use of the natural resources (Europe Environmental Agency (EEA) (1995. It goes without saying that the preservation of our plant and animal resources would yield a lot of benefits for man. Let us look at these benefits in turn;

i. The preservation of our biodiversity contributes to the development of recreational and sports activities. As a matter of facts, nature preservation is a potential facilitator of tourism and tourist activities. Anywhere on the globe, preserved environment attract tourists. And tourism, apart from contributing to the relaxation of the mind and contributing to enhanced life span, is now a major contributor to economic development of some countries in different parts of the world.

ii. The natural environment encourages outdoor recreation which is essential to the enhancement of our health. According to Environmental News (2008), "biodiversity supports numerous outdoor activities from hunting and fishing to bird watching and spelunking" – the practice or hobby of exploring

underground caverns, caving. It adds that "infact outfitting for camping, canoeing biking and related nature study has emerged as one of our fattest growing industries".

iii. In Nigeria, grasses and plants have been used to control soil erosion as in Agulu – Nanka Area of Anambra State, Ngwo Area in Enugu State among others. They are equally useful in the minimization of flooding hazards as in the Ogunpa flooding area and other flood areas in Oyo and Osun States of Nigeria. There is equally tremendous benefits from plants through their use in controlling wind erosion in some Northern parts of Nigeria, such as Kano and Kaduna where the North East trade wind is prevalent.

iv. Trees and grasses are useful in landscaping and aesthetic decoration of places in different parts of the world. The natural vegetation including artificial landscaping contributes to the beauty of our environment. In the developed countries, important places are adorned with scanty trees and grasses, fine coloured flowers, grasses that protect against harmful reptiles, like snakes, herbaceous plants are properly planted to add to the beauty of the environment. In Nigeria, some state capitals which bears elements of modern planning are landscaped with appropriate trees and grasses. In Enugu metropolis for example, the Independence Layout together with areas near the Government House are beautified with trees, flowers and grasses thus improving the aesthetic nature of the environment.

v. As for the microorganism components of biodiversity, they help to build and maintain the soil fertility for continuous and improved crop yields for man's subsistence and economic development. The fungi and bacteria all help in the breakdown of wastes into manure, while organisms like the earthworms, crickets, etc, help in the aeration (the process by which air is circulated through or mixed with a substance such as soil or a liquid) contributing to soil fertility (Uchegbu 2000).

2.2.10 Problems Militating Against Proper Biodiversity Protection and Possible Remedies.

Despite the numerous benefits from biodiversity and the dire need for biodiversity protection, a lot of problems and practices still hamper biodiversity protection throughout the world, but especially in developing countries.

The problems are both natural and man-made. The natural causes of biodiversity loss include catastrophes like earthquakes, volcanic activities, landslides, flooding and human causes such as deforestation, desertification, pollution, bush burning, overgrazing and hunting.

The man-made/induced problems of biodiversity protection are discussed briefly.

i. Deforestation:

Deforestation means the cutting down of trees without replacement. Deforestation is made for a variety of purposes. Forest clearance on a massive scale are usually made for agricultural and economic development, urban growth, domestic use industrial expansion and general pressure from increasing population (Uchegbu, 1998). According to FAO (1990) deforestation destroys reforestation efforts of about 250 hectares a year but replenishes just about 4 of the loss.

As a matter of fact, deforestation has adversely affected biodiversity. In Nigeria, this has caused the near extinction or total extinction of some species of plants and animals. Deforestation manifests itself in many other aspects such as bush burning. In bush burning, the vegetation is burnt mainly for the agricultural practice of clearing the land. When the vegetation is burnt, a lot of trees, grasses, animals and micro organisms are affected adversely: trees are killed, soil microorganisms die due to heat; grasses are burnt; some animals are killed, while others may migrate out. At other times, the bush is burnt for the purposes of hunting of wild animals. In some remote villages in parts of Nigeria such as eastern parts of Nigeria, hunting is a full occupation for villagers. Strategies are normally adopted to improve hunting which includes bush burning. Deforestation is also manifested in overgrazing of vegetation by ruminant and other herbivores such as cattle and goat. The natural deforestation sources equally cause a tremendous loss of biodiversity for example earthquakes and

landslides. The remedial measures include adequate disaster predictions and adjustments of possible remedial measures against man-made causes. According toUchegbu (1988) they include “tree planting campaign that should be backed up with public awareness campaigns and government enforcement of appropriate laws and regulations that should deter the general public from contributing to the loss of vegetation and wild life”.

ii. Desertification:

According to Ukpong (1994) desertification is the process where the lands are reduced to desert-like condition. Just like deforestation, desertification is caused by natural and manmade sources. The natural causes are climatic in nature and include short rainfall duration and longer dry season. The manmade causes are deforestation, overgrazing and bush burning. Desertification results in biodiversity loss and other aspects of environmental degradation.

In Nigeria, desertification is manifested in semi-arid zones and the savanna areas of the country. Affected areas suffer from loss of vegetation and animals. One of the chief causes of desertification is deforestation which as Odiette (1994) stated “results in soil erosion and infertility, desertification, wildlife extinction, and loss of genetic diversity”.

Remedial measures against desertification for the preservation of biodiversity include re-afforestation and afforestation, improved agricultural practices and the exercise of restraint in tempering with vegetational cover. The planting of xerophytic plants, such as lactic, thorny plants would help to check the menace.

iii. Pollution:

Pollution, especially water pollution, affects aquatic life and vegetation adversely. Water pollution means the contamination of the water body by the discharge of harmful substances into it. Water pollution may be caused through domestic and industrial discharge of waste and effluents into the water body. The general effect is the loss of biodiversity.

Another significant water pollutant is oil. Oil pollution, caused by oil spills and others, at times easily finds its way into water bodies and polluting same. This results in the loss of biodiversity.

Control of water and oil pollution are to be practiced by households and industries. This includes promulgation of legislations and their enforcement on water and oil pollution to save our environment and our biodiversity from extinction.

Cases of water pollution in Nigeria are predominant in industrial cities of Lagos, Aba, Ibadan, Enugu to mention but a few. Cases of sewage discharge into water bodied are equally serious in these cities.

From the above discourse, it is clear that the benefits from the preservation and protection of our biodiversity are immense. These benefits should be noted and sustained. Unfortunately certain human-induced activities threaten the sustenance of this biodiversity. Thus, the major solution to the issue of environmental abuse which affects biodiversity is the adoption of the practice of sustainable environment and development. While one may define sustainable environment as the careful exploitation and use of natural resources without undue negative effects, sustainable development may be seen as the development (which may include natural resources exploitation for enhanced development) that meets the needs of the present without compromising the ability of future generations to meet their needs (U.N. 1990). Achievement of sustainable development, Odiette (1994) states "involves a judicious use of natural resources such that the carrying capacity and the productive capacity are not over exploited".

In different parts of the world, strategies are in place or are being put in place to conserve biodiversity. Again, a large number of international initiatives contribute to the conservation of natural biodiversity such as the Convention on Biological Diversity (CBD), United Nations Convention on the Law of the Sea (UN), (UNCLOS); Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), with its regional agreements; convention concerning the

protection of the world cultural and natural heritage (World Heritage Convention); and the Man and Biosphere reserves UNESCO, (MAB), (EEA 1998).

In Nigeria, the legal enforcement of these international agreements on the preservation of biodiversity lies with the Federal Ministry of Environment. It is our hope that in Nigeria the objective of setting up these global biodiversity preservation agencies would be achieved by the efforts of the Ministry of Environment, including nongovernmental organization (NGO's) interested in the biodiversity preservation such as the NigerianEnvironmental Society (NES), Centre for Environment and Population Activities (CEPA), etc.

The efforts of the Ministry of Environment should be geared towards achieving sustainable environment and development in Nigeria. The strategies for success should be properly worked out and executed so that we can protect our biodiversity for the benefit of all in this new millennium and beyond.

2.2.11 Environmental Literacy and Educational System

A major purpose of education is to provide people with the relevant knowledge and skills to allow for successful and productive living and to enable them function as responsible citizens within the society. Environmental education, with its main goal of developing environmental literacy among people, can foster productive and responsible environmental behaviour of citizens to result in quality and sustainable environment. Distinger and Roth (1992) as cited by Ofori et al (2017) opined that although the development of the requisite knowledge and skills about the environment do not directly compel changes in individual and societal environmental behaviour, knowledge about a phenomenon is a necessary pre-condition for thoughtful behaviour and action. Environmental education is crucial to achieving sustainable development and creating an environmentally literate society (Goldman, Yaretz & Peier 2006) as it can directly address the cognitive constituents (i.e. knowledge and skills) of environmental literacy (Hsu& Roth 1998). They, therefore, argues that environmental education (both formal and non-formal) that ensures environmental literacy among

people will improve their integration of environmental and sustainability issues in the decision-making process.

Academic institutions and schools, as part of the education system, have as one of their major objectives to prepare students to be productive and responsible citizens in our society (Roth 1992). Although they are only a fraction of the overall education system, these institutions play a significant role in empowering people with the requisite knowledge and skills to make individual and societal decisions to influence individual lifestyle and societal actions.

Coopey (2003) assumes that academic institutions have an essential role to play in ensuring that business performs their economic activitiesin a more responsible way, as educational system ensure the efficient and effective acquisition of knowledge and skills related to a subject matter. Implicitly, academic institutions may not actively encourage the anticipatory development of responsible environmental behaviour, because of their limited objective of knowledge and skill acquisition, but their role will ensure that the human resources they are training for the market are well abreast of environmental and sustainability issues.

The focus of environmental literacy in schools is, probably because education is considered to be the best learning phase to foster environmental awareness (Liu, Yeh, Liang, Fang & Tsai, 2015). Society on the other hand, expects higher education system to use suitable methods to achieve sustainable development, growth in environmental education and institutionalize environmental knowledge, values and skills among its constituents (Omran, Yarnohammadian & Keshiaraynacis, 2014).

2.2.12 Concept of Environment

When environmental literacy (EL) is discussed, it is pertinent to clarify the meaning of one of its root words, environment. The word environment suggests different things to various groups or scholars, due to its complexity and multiple perspectives through which it may be viewed. Several definitions are proffered for the word environment. The picture of outdoors and nature quickly comes to mind when the word environment

is mentioned, but environment connotes more than the outdoors and nature although these two components are part of it.

According to Breman and Withgott (2005) as further cited in Igbokwe (2012), the word environment is from the French environner meaning to surround. It is the sum total of our surroundings that include all of the abiotic factors (non living things) and the biotic factors (living things) that include the built environment and all the man-made urban cities. While considering the environment in its most inclusive sense, Breman and Withgott (2005) highlighted that it "consists of the complex web of scientific, ethical, political, economical and social relations that shape our daily lives. Similar to Breman and Withgott's definition is that proffered by Raven and Berg (2006). They defined the environment as "all the external conditions, both abiotic and biotic, that affect an organism or group of organisms".

Botkin and Keller (2003) defined it as "all factors (living and non living), that actually affect an individual organism or population at any point in the life cycle". It could be sometimes be used "to denote a certain set of circumstances surrounding a particular occurrence".

Interestingly, from all the definitions, a pattern begins to emerge. It could be deduced that the environment can be either a tangible or an intangible phenomenon, sometimes palpable yet insubstantial at times. Also declinable from these definitions is the fact that the environment is complex and comprise a set of systems that interacts with and influences one another. Another interesting observation from these arrays of definitions is that as living beings, humans dwell in within an environment.

2.2.13 Concept of Literacy

The term literacy came up in the late 1800s, and interestingly was predated by the word illiteracy by several hundred years (Ibitz 2017, Venezky 1987), while the original term literacy mainly referred to the ability to read and write, the term has evolved significantly over the last centuries, particularly during the Industrial Revolution with its far-reaching social and economic changes (example mandatory elementary public education).

As of now, dictionaries show two definitions of the term literacy: first, the ability to read and write, and second, the knowledge or capability in a particular field. Thus, being literate in the broadest sense means to have knowledge or competence in a certain area (Stevenson & Peterson, 2014).

Orr (1992) as cited by OECD (2016) puts it: literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society". The concept of literacy has been extended to cover the ability to understand, to make informal decisions, and to act accordingly in order to address complex issues of modern society (Roth 1992, Scholz & Binder, 2011, Tsai; Fang, Liang, Yeh & Liu, 2015).

2.2.14 Concept of Environmentalism

Environmentalism may be defined behaviourally as the propensity to take actions with pro-environmentalintent. Some theories treat environmentalism as a matter of worldview. Perhaps the most prominent example in social psychology is the idea that it flows from adopting a New Environmental (or Ecological) Paradigm, within which human activity and a fragile biosphere are seen as inextricably interconnected (Stern, 2000). Another worldview theory explains environmentalism in terms of an egalitarian "cultural bias" or "orienting disposition" (Dake, 1991; Douglas & Wildavsky, 1982; Steg & Sievers, 2000). Recently, some researchers have begun to explore affective influences on environmental concern and behaviour, including sympathy for others (Allen & Ferrand, 1999), "emotional affinity" towards nature (Kals, Schumacher & Montada, 1999), and empathy with wild animals (Schultz, Zelenzy & Dalrymple, 2000).

Some theories look at values as the basis of environmentalism. Inglehart (1990) suggests that it is an expression of post-materialist values of quality of life and self-expression that emerge as a result of increasing affluence and security in the developed countries. Some accounts emphasize religious values, arguing either that certain Judaeo-Christian beliefs predispose adherents to devalue the environment (Schultz, Zelezny & Dalrymple, 2000, Murdoch, 2017) or that beliefs that the environment is sacred enhance environmental concern (see Dietz 1998; Greeley, 1993;

Kempton, Boster, & Hartley, 1995). Others have linked environmental concern and behaviour to general theories of values (see Schwartz, 1994) and have found that values those that focus concern beyond a person's immediate social circle (values called self-transcendent or altruistic) are stronger among people who engage in pro-environmental activities (see Dietz 1998; Karp, 1996; Stern & Dietz, 1994; Stern, Dietz, Kalof & Guagnano, 1995). A related line of research finds greater evidence of environmental concern among individuals with "pro-social" rather than individualistic or competitive social value orientations (see Joireman, Lasane, Bennett, Richards, & Solaimani, 2008; Vugt & Samuelson, 1998).

Theories of altruistic behaviour have also been used to explain environmentalism. This approach, first articulated by Heberlein (1972), presumes that because environmental quality is a public good, altruistic motives are a necessary for an individual to contribute to it in a significant way. The best developed example of this approach builds on Schwartz (1977) moral norm-activation theory of altruism. The theory holds that altruistic (including pro-environmental) behaviour occurs in response to personal moral norms that are activated in individuals who believe that particular conditions pose threats to others (awareness of adverse consequences, or AC) and that actions they could initiate could avert those consequences (ascription of responsibility to self, or AR). Substantial evidence supporting the theory's applicability to a range of environmental issues has accumulated over two decades (see Black 1985; Guagnano, Stern & Dietz, 1995; Schultz & Zelezny, 1999; Widegren, 1998).

2.2.15 Pro Environmental Behaviour

Scholars have usually adopted various terms to describe behaviours that protect the environment, such as environmentally concerned behaviours, environmentally significant behaviours, environmentally responsible beviours, and pro-environmentalbehaviour (Lee, Jan & Yang; 2013). Since these concepts are synonymous, this study refers pro-environmental behaviour as a conscious actions performed by an individual so as to lessen the negative impact of human activities on the environment or and to enhance the quality of the environment (Jensen 2002, Kollmus & Agyeman, 2002). According to Homburg and Stolberg (2006), examples

of pro-environmental behaviour include environmental activism (example active involvement in environmental organizations), non-activist behaviour in the public sphere (example, petitioning on environmental issues), private sphere environmental (example saving energy, purchasing recycled goods), and behaviour in organization (example product design).

Kimmer (2007) as cited by Hadiyanto and Sawitri (2015) argued that pro-environmental behaviour is a special type of pro-social behaviour (example, a behaviour that is directed toward and performed with the intention of promoting the welfare of an individual, group, or organization). Caprara and Steia (2007) asserted the existence of pro-social agency through which people tend to perform behaviours of sharing, helping or looking after others. A growing awareness into the harmful impact of human lifestyles practiced in modern societies on the environment widens the focus of applied environmental psychology to pro-environmentalbehaviour change (Jackson, 2005).

2.2.16 Evolution of Environmental Literacy

Charles Roth's (1992) monograph on environmental literacy reviews the origin and evolution of the term. Environmental literacy was first used in an article in Massachesetts Audubon article written by Charles Roth in 1968 and later reprinted in part in the New York Times (Faust 1969) as cited by Todt (1995). Environmental literacy was picked by politicians in describing the goal of environmental education. Roth reports that Richard Nixton used the term in several speeches related to the passage of the first National Environmental Education Act in 1970. At the same time that environmental literacy was gaining use in the vocabulary of environmental educators, the term science literacy was receiving widespread use and attention in the larger society.

More recently, Bybee (1979) have introduced biological literacy as a subset of scientific literacy. They argue that biological literacy is a continuum that is not attained through one course or experience, but is constantly developing through a person's life.

Roth (1992) notes the broadening of the use of the term literacy to mean more than reading and writing has occurred in the last two decades. In modern society, particularly the large portion of the society that is separated from day-to-day contact with the natural environment, an individual may need to be literate in the traditional use of the term before we can expect environmental literacy.

2.2.17 Factors Affecting Environmental Literacy

There are several factors affecting environmental literacy. In this section of the study, gender, course of study, age, socio-economic status, and residential differences were handed with relevant empirical studies.

i. Gender

Kendra (2013) defined gender as personal sexual identity of an individual, regardless of the person's biological and outward sex. Review of the related literature revealed gender as one of the most important environmental literacy determinants. Several studies were conducted on the effects of gender on different environmental literacy components.

One of the studies conducted on the effect of gender on environmental literacy (EL) was performed by Tikka, Kuitunen, and Tynys (2000). They studied with 464 students who had completed comprehensive school from central Finland. They showed that female students have more positive attitudes towards nature and theenvironment than male students. Female and male students, on the other hand, had approximately the same quantity of nature-related activities but the types of hobbies were different. Men go hunting and fishing, as their ancestors have done. A surprising finding exposed by the study was that gender had an even greater impact on knowledge than the educational establishment or the major subject being studied. A similar study was conducted in Lebanon (Makki, Khalick and Boujaoude, 2003). The researchers worked with 660 Lebanese secondary school students from 10^{th} and 11^{th} grades. They found that the mean total knowledge scores for females and males were not significantly different. On the other hand, the scores showed that grade 10 females had significantly higher knowledge and attitude scores than males. Similarly, Yilmaz and Anderson (2004) investigated the effect of gender on support for environmental

issues and found that elementary and middle school Turkish female students exhibited more support for environmental issues than male students did. Moreover, Taskin (2004), investigated the high school students' pro-environmental attitudes with respect to their demographic variables in Turkey. Results displayed that females have more pro-environmental attitudes than males. Effect of gender on EL was pointed by the result of another study (Tuncer, Ertepinar, Tekkaya, and Sungur, 2005). Tuncer et al., investigated the environmental concern of secondary and high school students and found that girls are more environmentally active and conscious. Tuncer, Tekkaya and Sungur (2006) were also investigated the effect of gender on EL of students from three different departments (Early Childhood Education, Elementary Mathematics Education and Elementary Science Education). 334 students enrolled the study and results supported the effect of gender. They found that girls are more conscious about sustainable development than boys are. Similarly, the study of Fernandez, Rodriquez and Carrasquer (2007) showed that female university students have higher scores on attitude scale and they tend to display a higher level of commitment and responsibility than males. As a result of the study with senior high school students, Taskin (2008) also supported the higher positive effect of females on environmentally consciousness than males have.

Although many studies pointed a significant correlation between EL levels of students and their gender, there are some other studies (e.g. Mosothwane, 1991; Akbas, 2007; Okesli, 2008; Pauw, & Petegem, 2010), indicating the ineffectiveness of gender or the difference in favour of males. For instance Akbas (2007) conducted a study with science students and supported the view that gender does not make a difference on the environmental and ecological knowledge of the participants. Likewise, Ak (2008) also advocates the same point. Ak's study was conducted with primary school pupils and indicated that generally gender does not make significant differences on environmental consciousness but in some subgroups made small differences in favour of male. Another study on the fifth grade students' affective dispositions toward the environment was conducted by Erdogan (2009) and indicated the same irrelevance that there was not a significant difference between environmentally responsible behaviour on males and females.

In summary, there are many researches supporting that gender has an effect on environmental literacy levels of individuals. Most of the studies indicated that females display higher level of environmental literacy especially for the attitude, use, and concern components than males do but males are more active on their environmental actions than females and do better on environmental knowledge tests than their counterparts.

ii. Course of Study

The effects of course of study of students are seen as another important determinant of environmental literacy.

In this section, several studies related with this issue are listed. One of the studies on the issue was conducted by McMillan (2003). The researcher investigated the impact of an introductory environmental studies class on the environmental values of university students. The evaluation was based on a triangulation of method used questionnaires, interviews, and observations. Through questionnaires, interviews and observations it was determined that Dalhousie University's introductory environmental studies class was an effective environmental studies class that helped students' environmental values develop over the course of the year. The class was found to be value based and interdisciplinary and it taught critical-thinking skills and tried to engender an internal locus of control, satisfying the main points of an effective environmental education class, as called for in the literature.

Akbas (2007) performed an interesting study with first and fourth year students of science teaching department in Erzurum, Turkey. The result revealed that taking environmental related course before the university do not have any effect on conceptual knowledge but their university education made a significant effect on their environmental knowledge. An environmental course was designed by Pande (2001) in Indian central Himalayas. Pande designed an experimental environmental education coursed in rural schools. The course was designed to introduce environmental and livelihood issues into mainstream curriculum. This practical course focused on land degradation, which was the region's major environmental problem. Students learned how to manage their village ecosystem to ensure maximum sustainable productivity.

Results showed that a separate course on EE is feasible. A 16-week course web-based (28 participants) versus in-class (58 participants) learning environments was conducted by Wright (2008). The aim of the study was to explore how instructional methods influence postsecondary students' environmental literacy. Web-based versus in-class learning environments indicated that student's environmental knowledge, beliefs, opinions, and self-perceptions were equivalent prior to participating in an introductory environmental science course. However, by the end of the 16-week course, students from the in-class group had significantly improved their environmental knowledge and expressed more environmentally friendly opinions compared with students from the web-based group. Results indicated the need for the improvements of web-based environmental education.

The source of environmental knowledge is another point on which several studies conducted so far. One of the studies was realized with students by Barraza and Cuaron (2004). They planned a study and investigated the source of environmental information of 246 third grade children from England and Mexico. They focused on several environmental concepts and the source of their knowledge that participants used. The concepts in research were habitat, pollution, recycling, global warming, extinction, solar energy, endangered species, deforestation, nuclear power station, and ozone layer. According to the data obtained, in general the most popular information sources are school, television and parent. Interestingly, participants stated the "publication" as the least frequently used information source. A study on the fifth grade students' affective dispositions toward the environment was conducted by Erdogan (2009) also investigated the students' source of environmental knowledge and found that they obtain their environmental knowledge from school, family, internet, television, books, magazines, and encyclopedias. Another study conducted with the participation of eight grade public school students by Varish (2009). Varish investigated the source of environmental information and its effect on EL of eight grade public school students. Results indicated that television, school and journals were the main source for the participants to obtain information about environment.

Another finding of the study was that, there was not a statistically significant effect of source of information about environment on students'environmental literacy.

In summary, although there are several studies indicating the effect of having environmental related course on EL, many other researches pointed the ineffectiveness or no relationship of the courses on EL. This thought provoking results point out the need for well-developed environmental related programmes and courses so as to have environmentally literate students.

iii. Age

Many researchers conducted studies on the effects of students' age on environmental literacy. The following section attempts to review the impact of age difference on the environmental literacy in general terms. One of the such studies was realized by Tikka, Kuitunen, and Tynys (2000). The researchers studied with students from Finland, and dealt with the effect of participants' age on EL. Results indicated that the older the students, the more active and aware on biological and environmental facts.

Another study on environmental attitude dimension of EL was conducted by Negev, Sagy, Garb, Salzberg and Tal (2008). The researcher studied with the elementary high school studnts. According to the results, younger high school students were found to be better in terms of their environmental behaviour and attitudes than the older ones.

In summary, research related to effect of age difference on EL displayed no particular pattern. While several studies indicated a higher level of EL in favour of younger students, some others support the reverse; older ages with high level of EL. Those difference points the need of further detailed studies distinguishing the causes underlying these differences among the results. Therefore, it is necessary to conduct more research to further evaluate the effect of age on environmental literacy.

iv. Socio-Economic Status

Another determinant of EL investigated by the environmental education researchers is socioeconomic status to understand whether there is a difference on EL of individuals from several socio-economic status or not. Yilmaz and Anderson (2004) worked with 4 – 8 gradestudents to identify the intensity of Turkish students' views with regard to

environmental issues presented in the national curriculum and to determine how these views differ by several demographic characteristics. Socio-economic status is one of the characteristics investigated during the study. Results revealed that students with high family income displayed more positive attitudes toward environmental issues. Uzun and Saglam (2005) also investigated the effects of socio-economic factors on environmental awareness and environmental academic success. The study realized by means of implementing two scales titled "Scale for Environment Awareness" and "Scale for Environment Academic Success" to 258 students from high schools in Ankara. Differences among the groups regarding their environmental awareness and environmental academic success were investigated in the study. The results pointed that there was a significant difference in the average environmental consciousness between the "middle socio-economic group" showing more consciousness. However, no significant difference was observed between other two groups. Students with high socioeconomic backgrounds, on the other hand, were more successful compared to the others in terms of their environmental academic success. Tecer (2007) obtained different results from the research conducted with primary and elementary school students. A questionnaire designed by researcher on "Environmental Consciousness and Active Participative Scale (ECAPS) was used and it was concluded that the ECAPS score of the students whose parents had higher socio-economic status were higher than other students. Coertjens (2010) worked on the Flemish data of Organization for Economic Co-operation and Development's programme for International Student Assessment (PISA) 2006. They worked on several determinants and revealed that high income, well educated, city dwelling, politically liberals have more pro-environmental attitudes. Taskin (2008), on the other hand, worked with high school students and used a scale titled "The General Environmental Attitudes and Perceptions (GAP)" The results indicated that middle and lower middle class students had the highest scores on the GAP. Another similar result was obtained from the study of Negev, Sagy, Garb, Salzberg, and Tal (2008). Sixth and twelfth grade students participated to their study and both groups answered grade specific surveys. Participants in the middle socioeconomic group got higher scores compared to the children in the low or high group. Whereas, the results of Erdogan's (2009) study on

the fifth grade students; affective dispositions toward the environment indicated that there was not a significant difference between environmentally responsible behaviours of participants from different socioeconomic status.

In summary, research on the effect of socioeconomic status on EL pointed out similar results with few exceptions. Most of the studies indicated that participants from middle or high socioeconomic status have higher level of EL with respect to participants from lower socioeconomic status. Thus, designing studies that focus on the underlined reasons of this difference may enhance the understanding of EL.

v. Residential Differences

Residential differences have been investigated as a factor that potentially affects the level of EL. The researches on the effect of residential differences on EL have been focused on both the region that participants live currently and the region in which they were grown up. One of the studies on the effect of residential difference was conducted by Tikka, Kuitunen and Tynys (2000). They studied with students from Finland. Results indicated that the most positive attitudes were found among students coming from the metropolitan area in southern Finland, where population levels are the densest. At the end of the study, Tikka et al (2000) concluded that, "as a rule, people coming from the most densely crowded regions seem to be the most worried about the state of theenvironment; whereas students who grew up on farms spend the greatest proportion of their time on nature-related activities and therefore they are not worried about the state of the environment". Taskin (2008) reached a similar conclusion by his study realized with more than 900 high school students from several geographical region. He found as a result that, students who live in shantytowns were more aware of environmental problems than the other students. Tuncer, Sungur, Tekkaya and Ertepinar (2004) conducted an interesting study with 138 sixth grade students. Results indicated that, students from urban area seemed to be much more aware of the economical and academic aspects of the environmental problems. The students from the urban area, on the other hand, were found to be strongly against the economical growth and industrialization, whereas rural area students were mostly unsure. Another study indicating the effect of residential area on environmental

knowledge was conducted by Gokdere (2005). A case study approach was used in Gokdere's study (2005) and data gathered from sixth, seventh, and eighth-grade students from six different schools. The purpose of the study was to detect the effects of environmental factors (geographical factors) on environmental knowledge level of primary students in Turkey. The results indicated that environmental factors in the living area had an effect on children's environmental knowledge level. Moreover, Goldman, Yavets and Pe'er (2006) investigated the level of environmental behaviour of students in Israel and looked for the relationship between behaviours and background factors. 765 incoming students from three different teacher training collages of Israel were participated the study. Results showed that students who grew up in an urban environment were less active in most of the behaviour categories (i.e. environmental consumerism, nature-related leisure activities, citizenship action, and environmental activism) as compared with students who grew up in a rural environment. Teksoz, Tekkaya and Erbas (2009) analyzed the data which was obtained from the Programme for International Student Assessment (PISA) 2006. The data of PISA 2006 covered 78 provinces and 7 geographical regions. The results of the study provided some evidence that the place where students live had an effect on their environmental awareness, concern, optimism and responsibility for sustainable development.

2.2.18 A Tale of Two Environmental Paradigm

Every scientific discipline has an underlying paradigm, often inherited and shared with related discipline(s). A paradigm is a model, theory, a way of examining social phenomenon, or set of beliefs and assumptions shared by a community of scientists, that guides the questions they study and the methods used (Saunders, Lewis & Thornhill, 2012). This study will discuss two paradigms thus:

a. Dominant Social Paradigm (DSP):

The Dominant Social Paradigm (DSP) was proposed by Pirages and Ehrlich (1974). It postulates that humans are superior to all other species, the earth provides unlimited resources for humans, and that progress is an inherent part of human history. In other words, DSPcharacterized a society that thinks the world's objectives were aimed

towards a society of abundance, progress, limits to growth, faith in science and technology, and a steady-state economy. The dominant social paradigm is linked to the interpretations of the protagonists in Genesis 1:28

God blessed them and said to them, "Be fruitful and increase in number: fill the earth and subdue it. Rule over the fish of the sea and the birds of the air and over every living creature that moves on the ground" (Gen. 1:28 GNB 2005).

The interpretation of these words generally sets the tone for its relationship with the natural world. The phrase "be fruitful and increase in numbers" is often interpreted as having to do with procreation of the human race, but this phrase has also been interpreted to mean having humans be good managers of the natural world God created. A group of Judeo-Christian scholars who published the Cornwall Declaration on Environmental Stewardship proposed that the phrase deals with humans and God making "provision for our temporal well-being and enhancing the beauty and fruitfulness of the rest of the earth" (Barkey, 2000). Consequently, the phrase could be interpreted as a proclamation by God to Christians requiring them to take an active role in practicing good stewardship of the natural world.

In the context of environmental values, the topology of value outlined by Thompson and Barton (1994) is adopted. Thompson and Barton distinguished between anthropocentric and ecocentric ones. Anthropocentric values are developed by an anthropocentric vision based on the idea of primacy and dominance of man on nature. He can take and exploit whatever resources. In addition, the human system functions independently of nature (Ibtissen, 2010). The anthropocentric perception may even lead to an excessive exploitation of nature. The logic admits that the pollution and exhaustion of natural resources are the natural consequences of economic progress (Kaufman & Franz, 1993).

b. New Environmental Paradigm (NEP):

Dunlap and Van Liere (1978) in response to the ostensible anti-environmental foundations of our society's dominant social paradigm, came up with what they conceptualized as a "New Environmental Paradigm" (NEP) that described a changing

relationship with the environment and a view that human actions have substantial adverse effects on the fragile biosphere (Dunlap et al 1992). This school of thought reflects a society that considers limits to growth, preserving a balanced nature and the rejection of an anthropocentric society (Albrecht, Bultena, Hoiberg & Nowak, 1982). New environmental paradigm is in congruency with the work of Judeo Christian scholars who published the Cornwall Declaration on Environmental Stewardship that interpret the phase "fill the earth and subdue it", (Barkey, 2000).

> *"Fill the earth and subdue it" does not have to be interpreted to mean giving humanity permission to abuse the environment; instead, it can be interpreted to mean using the earth's resources wisely, (P. 27).*

Barkey (2000) comments insightfully in his book, Environmental Stewardship in the Judeo-Christian Tradition:

> *The Hebrew for conquering or subduing (i.e. "koveish") clearly distinguishes between annihilating and conquering. The former is a verb for utterly destroying one's enemy. The latter refers to leaving one's enemy's resources and abilities intact and even enhancing them, but redirecting them for one's own end. That is what we are told to do with the natural world. We may not destroy, but we may use them in every possible beneficial manner, (Barkey, 2000 p. 34).*

Barkey's implication is that Christians are to avail themselves of the world without causing harm to it. God expects humans to take care of the earth, which He created for them. Thus, after He created humans in His image, God told them to rule over the earth:

> *Then God said, "Let us make man in our image, in our likeness, and let them rule over the fish of the sea and the birds of the air, over the livestock, over all the earth, and over all the creatures that move along the ground". (Gen. 1:26, GNB 2005).*

The concept of "ruling over" as related to this text in the Bible is described by Wenham (1987) as "to rule nature as a benevolent king, acting as God's representative over them and therefore treating them in the same way as God who created them". A benevolent king takes care of his subjects. Thus humans, who are made in the image of God, are to take care of the environment God, the benevolent king, has given us. Barkey (2000) warns that "if man executes dominion in a way that ultimately destroys

nature's creative potential or denies the human family the fruits of creation, such actions constitute an offense against God's original plan of creation".

Isaiah 45:18 makes it clear that the world was made to be inhabited. The Bible also says, "The Lord God took the man and put him in the Garden of Eden to work it and take care of it" (Gen. 2:15, GNB 2005).

From this perspective, human rule over creation consequently has human welfare as the focus, and the well-being of the world resources as a top priority. If we are going to have the world take care of us, we need to take care of it. Interdependence is vital, (Murdock, 2012).

Researchers have also examined the relationship between religious affiliation and environmental attitudes by conducting analyses across several religious groups at once, rather than focusing on a specific religious culture (Boyd, 1999; Eckberg & Blocker, 1996; Kanagy & Nelsen, 1995; Kearns, 1996; Schultz, Zelenzy, & Dalrymple 2000). In a number of these studies, differences inenvironmental concerns were linked with specific religious denominations and traditions (Boyd, 1999; Hand & Van Liere, 1984).

The conflict over "master of nature" versus "stewardship of nature" could have a direct bearing on environmental literacy. A "master of nature" belief system would lead to a lower environmental literacy, whereas a "stewardship of nature" belief system would lead to a higher environmental literacy.

In line with the ecocentric (NEP) value, ecocentric identify man as part of a whole, i.e. naturesubmissive to all natural laws in the same way as whatever entity on earth (Kaufman & Franz 1999). This approach presupposes the respect of nature and suggests that man has to learn to live in harmony with the environment. "The ecocentric individual valorizes nature and in consequence, considers that the nature deserves to be preserved to the sake of its intrinsic values" (Thompson & Barton 1994). In this respect, the consumer believing in ecocentric values cares for the environment independently of the interests coming out of its preservation to the determinant of the quality of his life or of the economy.

2.2.19 Measurement of Environment Literacy of Students

As noted by Roth (1992) measuring environmental literacy is important if the term is to have any real meaning in the realm of education. According to (Harkness, 2016; Kalpana, 2014 & Richardson, 1997); environmental literacy of university students is measured by constructivism. Constructivism is the belief that students construct their own understanding and knowledge of the world through their experiences and reflecting on those experiences. In constructivist philosophy, students are encouraged to engage in numerous hands-on, real life experiences in which they interact with and made sense of their world (Nielson, 2006). Constructivism allows students to actively construct their knowledge from their personal experiences with others and the environment (Simpson, 2011).

The constructivist approach to learning, credited to Piaget in Harkness (2016) is also based on observation and the scientific study of how the students learn. Azeem, Khalid (2015) Perez (2012) and Evangelist (2002) claimed that constructivism rests on adaptation which guides intellectual growth and biological development. They observed that students assimilate their environment and external events into their mental structures, which change with experiences, hence, they made behavioural adaptation to enable them to live and achieve a perfect and complete level of environmental literacy.

2.2.20 Instrument For Testing Environmental Literacy of Students

In view of the complicated nature of environmental literacy researches, and its several dimensions like knowledge, curiosity, sensitivity, etc, it has become imperative to test environmental literacy of students.

One of the instruments that are widely used to test environmental literacy is called "The New Environmental Paradigm Scale". It was developed by social scientists Dunlap and Van Liere in (1978). It was originated from the notion that dominant social paradigm which emphasized human ability to control and manage the environment, limitless natural resources, private property rights, and unlimited industrial growth had changed. Instead a New Environmental Paradigm (NEP) became valid for the individuals. The New Environmental Paradigm emphasized

environmental protection, limited industrial growth and population control, etc (Taskan 2008, Murdoch, 2012; Lalonde, 2002).

2.2.21 Concept of Green Marketing

Marketing has evolved from transactional paradigm to green paradigm and today, the green marketing paradigm has emerged (Nkamnebe 2016). Green marketing is considered one of the major trends in modern business (Kassaye, 2001; McDaniel & Rylander 1993; Pajan & Wright, 1996). Chain and Chen (2010) defined green marketing as the activities taken by firms that are concerns about theenvironment or green problems by delivering the environmentally sound goods or services to create consumers' satisfaction. Other definitions of green marketing as proposed by marketing scholars include social marketing, ecological marketing or environmental marketing.

Unlike environmentalism, green marketing is a movement initiated by firms to develop and market environmentally products, whose bottom-line is to reduce reuse or recycle wastes from such products. It could rightly be seen as a business response to environmentalist agitations and regulations (Brassington & Pettit, 2014).

Information concerning a company's green marketing effort is usually indicated on a product's packaging (Okpara, 2002). Therefore, packages contain relevant product's green signs and messages relating to issues such as;

Ozone friendliness (indicating zero – CFC)

Responsible disposal (by advising against littering)

Biodegradability (by using the green dot sign)

Recyclability (by indicating that the natural environment is not jeopardized in the pack's manufacture)

Packaging is a major communication instrument in green marketing. This is partly because packaging generally constitutes one third of all solid wastes in most countries (Kotler & Keller 2013). Germany is the pioneer of the "green dot" on packaging. Following the German Packaging Ordinance (Verpackungs Dung) enacted in June

1991, companies were made responsible to collect, sort and ultimately recycle their packaging wastes.

These green marketing effort and signs are meant to identify, for the concerned and enlightened consumers, products that have less destructive impact on the environment than similar products.

2.2.22 Green Consumers and Green Products

In general, green product is known as an ecological product or environmental friendly products. Shamdasani, Lin and Richmond (1993) defined green product as the product that will not pollute the earth or deplore natural resources, and can be recycled or conserved. It is a product that has more environmentally sound content or packaging in reducing the environmental impact (Elkington & Makower, 1988; Wasik, 1996).

In other words, green products refers to product that incorporate the strategies in recycling or with recycled content, reduced packaging or using less toxic materials to reduce the impact on the natural environment. Empirical evidence (see Krause 1993) found that consumers were becoming more concerned about their everyday habits and the impact on the environment. The outcome of this is that some of the consumers translated their environmental concern into actively purchasing green products commitment (Martin & Simintris, 1995).

Green consumers are individual that have preferences for evnronmentally friendly products and motivations that are aligned with the preservation of the environmental (Noonan & Coleman, 2013). Green consumers demonstrate an interest in product characteristics, such as recyclability and chemical content, organic, energy efficiency, or biodegradable packaging (Leonidou, Leonidou, & Kvasova, 2010). Along with showing higher levels of concern for environmental preservation issues, green consumers are recognized as showing perceived consumer effectiveness (Noonan & Coleman, 2013).

Perceived consumer effectiveness is “the extent to which the consumer believes that his/her personal efforts can contribute to the solution of a problem” (Vermeir &

Verbeke, 2006). The impact of consumers' perceptions towardsthe green concept and going green is important, as their green behaviour influences them to seek products and services that help to save the environment (Chen & Chang, 2013).

2.2.23 Concept of Waste

The notion of waste is relative in two main respects, "something becomes a waste when it loses its primary function for the user, a waste is therefore relative to this primary function". However, the second perspective "what is considered waste with regard to this primary function may be useful for a secondary function. In another words, somebody's waste is often somebody else's (secondary) raw materials" (Tsiboe & Marbell, 2004; World Health Organization (WHO) (2015).

Nature is an excellent example of many cases, the defecation of mammals is used as food by some insects. A discarded empty bottled water container or empty beer bottle may be useful to a "zobo" or "local soya milk producer". Though those empty containers are discarded because their owners found them useless, they can become a resource to another person. In the light of this, waste has been conceptualized by different scholars.

According to Essuman (2017), Augustino, Bahati and Alexanda (2015) waste is any material which the owner discard or intend to discard. It can basically refer to as any material considered to be useless which means it is no longer needed for its intended purpose (Hoornweg & Tata, 2012). The prodigious phenomenon of waste generation is peculiar to all human and animal communities (Ahmed, 2008).

In human habitation, waste generation often leads to urbanization problems as this is the case in cities in the third world countries nowadays. This phenomenon becomes a serious threat when good sanitary condition elude human in their habitation. Normally, man's activities on domestic, institutional and commercial processes produce some undesirable non-gaseous and non-liquid materials which are effluent. Any human habitation with attendant activities is bound to generate by-products known as wastes.

Glossary of environmental statistics in the United States of America (1997) as further noted by Okoye et al (2015) defined waste as "materials that are not prime products (that is products produced for the market) for which the generator has no further use in terms of his/her own production, transformation or consumption and of which he/she wants to dispose". However, the teething problem hinges on how these by-products are disposed so that they do not constitute environmental nuisance in the university and society at large. For example, polythene used for many purposes are littered in the university environment indiscriminately with attendant negative effect on public health and environmental hazard.

Accordingly, Akunro, Ikumanoyi and Oluogungba (2012) opined that, polythene for assorted items poses various threats to the public health and adversely affect flora and fauna (goodness of the flowers and goodness of fertility) as well as the environment.

Puopiel (2010) defined waste as any material which comes from domestic, commercial institutional sources arising from human activities which has no value to the people who possess it and is discarded as useless. In the early days, waste disposal did not pose difficulty as habitations were sparse and there was enough land. Waste disposal became problematic with the rise of towns and cities where large number of people started to congregate in relatively small areas in pursuit of various economic activities including education (Shafial & Mansoor, 2003).

Equally, waste may be defined as any substance be it solid, liquid or gaseous that remains a residue or an incident by-product of the processing of the substance and for which no use can be found by the organism or system that produces it (Karley, 2013). In other words, wastes are substances or objects discarded as worthless or unwanted defective and of no further value to the user and should be dispose (Buckle & Smith, 2008).

Nigel in Akinwale (2005) defines wastes as rubbish or materials that are not needed and are economically unusable without further processing. Here, Nigel emphasis is that to ascertain something as a waste, it has to be economically unusable, in other words, it is unproductive since it has lost the economic value(s) therein. However,

Nigel's position can be questioned because recent practices have shown that what one party considers as unneeded materials, and of course economically unusable, may be the most needed and of economic importance to another party. This is to say, what is waste in a place may turn out to become non waste in another place. For example, after drinking the liquid contents of a bottle of champagne, the empty bottle is considered as a waste by the person who drank the liquid content and perhaps is thrown away. But, another person may pick it up from the point of disposal and either reuse or recycle the empty bottle for containing another liquid substance or some other item of economic importance. The bone of contention here is that it is not clear to say at what point an item constitutes a waste.

Defra in Ogwueleka (2009) succinctly posits that there is no definitive list of what is and is not waste. It goes further to state that whether or not a substance is discarded as waste-and when waste ceases to be waste-are matters that must be determined on the facts of the case and the interpretation of the law. Defra is of the opinion that whether or not a substance is discarded as waste rests, on one hand, with the producer or holder of such substance to decide whether it is being discarded as waste and, on the other hand, with regulation or laws stipulating a such.

Contrary to Defra's position that there is no definitive list of what is and is not waste, the Council of the European Communities had on the 26th of March, 1991, adopted that waste shall mean any substance or object in the categories set out below, which the holder discards or intends or is required to discard. The categories include:

- Production or consumption residues not otherwise specified below;
- Off specification products;
- Products whose date for appropriate use has expired.
- Materials spilled, lost or having undergone other mishap, including any materials, equipment, etc, contaminated as a result of the mishap;
- Materials contaminated or soiled as a result of planned actions (e.g. residues from cleaning operations, packing materials, containers, etc).
- Unusable parts (e.g. reject batteries, exhausted catalysts, etc)

- Substances which no longer perform satisfactorily (e.g. contaminated acids, contaminated solvents, exhausted tempering salts, etc).
- Residues of industrial process (e.g. slags, still bottoms, etc).
- Residues from pollution abatement processes (e.g. scrubber sludge's, bughouse dusts, spent filters, etc).
- Machining / finishing residues (e.g. lathe turnings, mill scales, etc).
- Residues from raw materials extraction and processing (e.g. mining residues, oil field slops, etc).
- Any materials, substances or products whose use has been banned by law.
- Products for which the holder has no further use (e.g. agricultural, household, office, commercial and shop discards, etc).
- Contaminated materials, substances or products resulting from remedial action with respect to land.
- Any materials, substances or products which are not contained in the above categories.

The holder, in this context, shall mean the producer (anyone whose activities produce waste and/or anyone who carries out preprocessing, mixing, or other operations resulting in a change in the nature or composition of this waste) of waste or the natural or legal person who is in possession of it. It may worth our while to re-emphasize here that waste is sometimes a subjective concept, because items that some people discard may have value to others and as Wikipedia Free Encyclopedia (2010) observes that on a global scale, it is difficult to report waste because countries have different definitions of waste and what falls into waste categories, as well as different ways reporting. In other words, what the Council of the European Communities listed as waste may differ from what constitutes waste in Nigeria or in any other territory.

The 2009 Model Encarta soft Dictionary, highlighted seven aspects of waste, they include waste as an (a):

- **Act of Wasting:** a failure to use something wisely, properly, fully, or to good effect. Example, a complete waste of money.

- **Unwanted Material:** Unwanted or unusable items, remains, or byproducts, or household garbage. Example, chemical waste.
- **Excrement:** the undigested remained of food expelled from the body as excrement.
- **Used or Contaminated Water:** used or contaminated water from domestic, industrial or mining applications.
- **Rock Associated with Mineral:** enclosing rock mined with a mineral, or ore with insufficient mineral content to justify further processing.
- **Wild Area:** an uncultivated, desolate, or wild area (often used in the plural as in the frozen wastes of Antarctica).
- **Destroyed Area:** a place or region that has been destroyed or ruined.

Contributing to the subject matter, the Basel convention cast its vote to the school of thought that believes that wastes are "substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law". While the United Nations Statistics Division (UNSD) in Ikediukwu (2011) stated that "wastes are materials that are not prime products (that is products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. Residuals recycled or reused at the place of generation are excluded".

Talichi (2010) describes waste as "any human activity that absorbs resources but creates no value". By implications, Talichi was of the view that whatsoever human activity that only receives without giving out value(s) could be termed as waste. At this point, the bone of contention as to the un-clarification of at what point an item constitutes a waste could be balanced, drawing conclusion from the discussion so far. To be brief, we shall adopt our conclusion from the consensus of the Waste Framework Directive of the European Union (75/442/EC) that once a substance or object has become waste, it will remain waste until it has been fully recovered and no

longer poses a potential threat to the environment or to human health. Therefore, anything which is discarded or otherwise dealt with as if it were waste shall be presumed to be waste unless the contrary is proved. Waste, as a concept, does not exist in abstraction but has impacts as well as costs on nature and human. The Wikipedia Free Encyclopedia (2010) observes three different costs of waste. These costs include:

Environment Costs

Waste can attract rodents and insects which cause gastrointestinal parasites, yellow fever, worms, the plague and other conditions for humans. Exposure to hazardous wastes, particular when they are burned, can cause various other diseases including cancers. Waste can contaminate surface water, ground water, soil, and air which cause more problems for humans, other species and ecosystem. Waste treatment and disposal produces significant green house gas (GHG) emissions, notably methane, which is contributing significantly to global climate change.

Social Costs

Waste management is a significant environmental justice issue. Many of the environmental burdens cited above are more often borne by marginalized groups, such as racial minorities, women, and residents of developing nations. NIMBY (not-in-my-back-yard) is a popular term used to describe the opposition of residents to a proposal for a new development close to them. However, the need for expansion and sitting of waste treatment and disposal facilities is increasing worldwide. There is now a growing market in the trans-boundary movement of waste, and although most waste that flows, between countries goes between developed nations, a significant amount of waste is moved from developed to developing nations.

Economic Costs

The economic costs of managing waste are high, and are often paid for by municipal governments. Money can often be saved with more efficiently designed collection routs, modifying vehicles, and with public education. Environmental policies such as pay as you throw can reduce the cost of management and reduce waste quantities.

Waste recovery (that is, recycling, reuse) can curve economic costs because it avoids extracting raw materials and often cuts transportation costs.

The location of waste treatment and disposal facilities often has an impact on property values due to noise, dust, pollution, unsightliness, and negative stigma. The informal waste sector consists mostly of waste pickers who scavenge for metals, glass, plastic, textiles, and other materials and then trade them for a profit. This sector can significantly alter or reduce waste in a particular system, but other negative economic effects come with the disease, poverty, exploitation, and abuse of its workers. The study shall now take a look at some of the wastes types that are of interest to the study.

2.2.24 Types of Waste

Since almost any substances can become waste, there are an infinite number of ways of classifying it (Bharal & Singh, 2007). The problem of waste has been a major environmental and health affair throughout the advancement of civilization. Waste can be generated by human beings in any areas of life like in the academic environment.

Unarguably, whenever human beings exist, there will be waste at the same time (Jayarama, 2011). There are so many types of waste on the planet earth but a few shall be mentioned here, for the purpose of the study, however we shall classify waste according to their origin namely, biodegradable waste, biomedical waste, business or commercial and industrial waste, chemical waste, medical (clinical) waste, institutional waste, construction waste, municipal solid waste (MSW) controlled and hazardous waste. These wastes are discussed below;

i. The encyclopedic dictionary of environment (2007) defined biodegradable waste as a type of waste, typically originating from plant or animal sources, which may be broken down by other living organisms. Waste that cannot be broken down by other living organisms may be called non-biodegradable. Biodegradablewaste can be commonly found in municipal solid waste (sometimes called biodegradable municipal waste, or BMW) as green waste, food waste, paper waste, and biodegradable plastics. Other biodegradable wastes include human waste, manure, sewage, slaughter house waste.

ii. Biomedical waste consists of solids, liquids, sharps, and laboratory waste that are potentially infectious or dangerous and are considered bio-waste. It must be properly managed to protect the general public, specifically healthcare and sanitation workers who are regularly exposed to biomedical waste as an occupational hazards. Biomedical waste differs from other types of hazardous waste, such as industrial waste, in that it comes from biological sources or is used in the diagnosis, prevention, or treatment of diseases. Common producers of biomedical waste include hospitals, health clinics, nursing homes, medical research laboratories, offices of physicians, dentists and veterinarians, home health care, and funeral homes.

iii. Business (or commercial and industrial) waste – cover the commercial waste and industrial waste types. Generally, businesses are expected to make their own arrangements for the collection, treatment and disposal of their wastes. Waste from smaller shops and trading estate where local authority waste collection agreements are in place will generally be treated as municipal waste.

iv. Chemical waste is a waste that is made from harmful chemicals (mostly produced by large factories). Chemical waste may or may not be classed as hazardous waste.

v. Medical waste, also known as clinical waste, normally refers to waste products that cannot be considered general waste, produced from healthcare premises, such as hospitals, clinics, doctor's offices, laboratories and nursing homes.

vi. Institutional waste consists of waste from premises used wholly mainly for the purposes of recreation, education or entertainment but not including household, agricultural or industrial waste.

vii. Construction waste consists of unwanted material produced directly or incidentally by the construction or industries. This includes building materials such as insulation, nails, electrical wiring, and rebar, as well as waste originating from site preparation such as dredging materials, tree stumps, and rubble construction waste may contain lead, asbestos, or other hazardous substances.

viii. Controlled waste is a waste type composed of domestic, commercial and/or industrial waste. They are regulated by governmental institutions or acts, because of their toxicity or imminent hazardous nature, either in themselves, obtained during biodegradation or biochemical degradation.

Municipal Solid Waste (MSW), also called urban solid waste, is a waste type that includes predominantly household waste (domestic waste) with sometimes the addition of commercial wastes collected by a municipality within a given area. They are in either solid or semisolid form and generally exclude industrial hazardous wastes. The term residual waste relates to waste left from household sources containing materials that have not been separated out or sent for reprocessing. Having talked about some of the waste types, this study would be incomplete if we fail to bring to the fore what hazardous waste is all about.

The 2009 Encarta Encyclopedia observed that hazardous wastes are solid, liquid, or gas wastes that can cause death, illness, or injury to people or destruction of the environment if improperly treated, stored, transported, or discarded. Substances are considered hazardous wastes if they are ignitable (capable of burning or causing a fire), corrosive (able to corrode steel or harm organisms because of extreme acidic or basic properties), reactive (able to explode or produce toxic cyanide or sulfide gas), or toxic (containing substances that are poisonous). Mixtures, residues, or materials containing hazardous wastes are also considered hazardous wastes. Many dangerous substances can be used only with special precautions that decrease their risks. When discarded, these substances are no longer under the direct control of the user and may pose special hazards to people or other organisms that come in contact with them. The encyclopedia further enunciated for main sources of hazardous waste, these are;

Industrial Waste

Hazardous wastes are generated by nearly every industry, those industries that themselves generate few hazardous wastes nonetheless use products from hazardous waste generating industries. For example, in the computer software industry, writing software generates little hazardous waste, but the manufacture of computers involves many industries processes. Making a computer circuit board generates spent

electroplating baths that contain metal salts, and the production of computer chips uses acids, other caustic chemicals, and solvents. Other hazardous wastes are generated in the manufacture of fibre optics and copper wire used in election transmission, as well as magnetic disks, paper for technical manuals, photographs for packaging and publicity, and trucks for the transportation of the finished product.

Agricultural Waste

Industry is not alone in generating hazardous wastes. Agriculture produces such wastes as pesticides and herbicides and the materials used in their application. Fluoride wastes are by-products of phosphate fertilizer production. Even soluble nitrates from manure may dissolve into groundwater and contaminated drinking-water wells, high levels of nitrates may cause health problems.

Household Waste

Household sources of hazardous wastes include toxic paints, flammable solvents, caustic cleaners, toxic batteries, pesticides, drugs and mercury from broken fever thermometers. Local waste-disposal systems may refuse these items. If they are accepted, careful monitoring may be required to make sure soil or groundwater is not contaminated. The householder may be asked to recycle or dispose of these items separately.

Renovations of older homes may cause toxic lead paint to flake off from walls. Insulation material on furnace pipes may contain asbestos particles, which can break off and hang suspended in air, when inhaled, they can cause lung disease and cancer.

Medical Waste

Hospitals use special care in disposing of wastes contaminated with blood and tissue, separating these hazardous wastes from ordinary waste. Hospitals and doctor's offices must be especially careful with needles, scalpels and glassware, called "sharps". Pharmacies discard outdated and unused drugs, testing laboratories dispose of chemical wastes. Medicine also makes use of significant amounts of radioactive isotopes for diagnosis and treatment, and these substances must be tracked and disposed of carefully.

Hazardous wastes may pollute soil, air, surface water, or underground water. Pollution of soil may affect people who live on it, plants that put roots into it, and animals that move over it. Toxic substances that do not break down or bind tightly to the soil may be taken up by growing plants; the toxic substances may later appear in animals that eat crops grown there and possibly in people who do so. Air may become contaminated by direct emission of hazardous wastes. The air above hazardous waste may become dangerously contaminated by escaping gas, as can occur in houses built on mine tailings or old dump sites. River and lake pollution, if it is toxic enough, may kill animal and plant life immediately, or it may injure slowly. For example, fluoride concentrates in teeth and bone, and too much fluoride in water may cause dental and bone problems. Compounds such as dichlorodiphenyltrichloroethane (DDT), PCBs, and dioxins are more soluble in fats than in water and therefore tend to build up in the fats within plants and animals. These substances may be present in very low concentrations in water but accumulate to higher concentrations within algae and insects, and build up to even higher levels in fish. Birds or people that feed on these fish are then exposed to very high levels of hazardous substance. In birds, these substances can interfere with egg production and bone formation. Even pollution that is not toxic can kill. Phosphates and nitrates, usually harmless, can fertilize the algae that grow in lakes or rivers. When algae grow, in the presence of sunlight, they produce oxygen. But if algae grow too much or too fast, they consume great amounts of oxygen, both when the sun is not shinning and when the algae die and begin to decay. Lack of oxygen eventually suffocates other life; some living things may be poisoned by toxins contained in the algae. This process of algal overgrowth, called eutrophication, can kill life in lakes and rivers. In some cases, particular algae can also poison the drinking water of people and livestock. Irrespective of the category or type of wastes involved, the need for an effective and efficient management of wastes in the society becomes inevitable. According to Mowoe (1990) the management of waste is a matter of national and international concern. The volume of waste does not actually constitute the problem but the ability or inability of governments, individuals and waste disposal firms to keep up with the task of managing waste and the environment. There is no doubt that a dirty environment affects the standard of living,

aesthetic sensibilities, health of the people and thus the quality of their lives. The corollary is that improper disposal or storage of this waste can constitute hazards to the society through the pollution of air, land and especially water as already noted above.

2.2.25 Methods of Waste Disposal

The environmentally preferable concept with respect to waste is to consider wastes as resources out of place (Anamalu & Eneh; 2015). We may not be able to recycle and reuse everything, but the increasing cost of raw materials, energy, transportation and land will make it financially feasible to reuse and recycle more resources. This is what is called industry ecology – the industry society functions more like an ecological system, where waste from one part of the system will be a resource for another part (Sada & Odemerho, 1988). Some of the modern methods of waste disposal are highlighted below;

i. Sanitary Landfill

Sanitary land filling includes confining the waste, compacting it and covering with soil. It not only prevents burning of garbage but also helps in reclamation of land forvaluable use (Centre for Environment and Development 2003). The placement of solid waste in landfills is the oldest and definitely the most prevalent form of ultimate waste disposal (Zerbock, 2003). He further argued that "landfills" are nothing more than open, sometimes controlled dumps. According to him the difference between landfills and dumps is the level of engineering, planning and administration involved. Open dumps are characterized by the lack of engineering measures, no consideration of landfill gas management and few, if any, operational measures such as registration of users, control of the number of "tipping fronts" or compaction of waste (Zerbock, 2003).

Furthermore, landfills are one form of waste management that nobody wants but everybody needs (Kreith, 1994). According to him, there are simply no combinations of waste management techniques that do not require land filling to make them work. Of the basic management options of solid waste, landfills are the only management technique that is both necessary and sufficient. According to Kreith (1994) some

wastes are simply not recyclable, many recyclable wastes eventually reach a point where their intrinsic value is completely dissipated and they no longer can be recovered, and recycling itself produces residuals. He further highlighted that the technology and operation of modern land fill can assure the protection of human health and the environment.

In contrast to what the various authors have said about sanitary landfill as an option for waste management, they have failed to recognize that land fill in itself has some disadvantages as it is costly to construct and maintain, can pollute ground water through leaching, location is a problem in terms of availability of land particularly in the cities. Other critical factors such as gas recovery, composting, waste to energy recovery, storm water control, distance to any settlement and water body were not clearly spelt out by the authors. Therefore, there could be an alternative which is recycling. This method is discussed in the next sub-section.

ii. Recycling

According to Momoh and Oladebeye (2010), recycling has been viewed as a veritable tool in minimize the amount of household solid wastes that enter the dump sites. It also provides the needed raw materials for industries. According to them, it has been established that, it is the best, efficient and effective method of solid waste management system. However, this may not be cost effective in developing countries like Nigeria. The United States Environmental Protection Agency (USEPA) (2016) has recommended recovery as one of the most effective waste management techniques. According to USEPA, recycling turns materials that would otherwise become waste into valuable resources and, it yields environmental, financial and social returns in natural resource conservation, energy conservation, pollution prevention, and economic expansion and competitiveness. More importantly, a sizeable portion of what is thrown away contains valuable resources – metals, glass, paper, wood, and plastic – that can be reprocessed and used again as raw materials (USEPA, 2016).

Kreith (1994) has also added that, recycling is the most positively perceived and doable of all the waste management options. According to him recycling will return raw materials to market by separating reusable products from the rest of the municipal

waste stream. The benefits of recycling are many, he added. It saves precious finite resources, lessens the need for mining of virgin materials which lowers the environmental impact for mining and processing. For example, according to the Institute of Waste Management cited by Tsiboe and Marbel (2004), United Kingdom (UK) recycles only 11 percent for its household waste, Italy and Spain only 3 percent, Netherlands 43 percent, Denmark 29 percent and Austria 50 percent respectively. Having proposed recycling by different authors as the best option to manage solid waste in modern times, they have forgotten about the cost component which is the key to successful implementation of any recycling project. Even developed countries are not able to successfully do it. But alternatively, it may be the best option for effectively managing solid waste in Nigeria.

iii. Composting

Composting process uses microorganisms to degrade the organic content of the waste. Aerobic composting proceeds at a higher rate and converts the heterogeneous organic waste materials into homogenous and stable humus (Centre for Environment and Development, 2003).

UNEP (2000) has also defined composting as a biological decomposition of biodegradable solid waste under controlled predominantly aerobic conditions to a state that is sufficiently stable for nuisance-free storage and handling and is satisfactorily matured for safe use in agriculture. According to the UNEP (2009), composting is the option that, with a few exceptions, best fits within the limited resources available in developing countries. A characteristic that renders compositing especially suitable is its adaptability to a broad range of situation. According to Zerbock (2003), a low-technology approach to waste reduction is composting. He further says that in developing countries, the average city's municipal waste stream is over 50 percent organic material.

iv. Opening Burning

According to Krause (1993), open burning as a method of waste disposal method involves burning of waste in an open space without control from weather element like

air, or wind. In this type of method, smoke is released into the environment in an uncontrolled manner and create environmental pollution.

v. Sustainability

The management of waste is a key component in a business. Companies are encouraged to improve their environmental efficiencies each year by eliminating waste through resource recovery practices, which are sustainability-related activities. One way to do this is by shifting away from waste management to resource recovery practices like recycling materials such as glass, food scraps, paper and cardboard, plastic bottles and metal.

vi. Biological Reprocessing

Recoverable materials that are organic in nature, such as plant material, food scraps, and paper products, can be recovered through composting and digestion processes to decompose the organic matter. The resulting organic material is then recycled as mulch or compost for agricultural or landscaping purposes. In addition, waste gas from the process (such as methane) can be captured and used for generating electricity and heat. The intention of biological processing in waste management is to control and accelerate the natural process of decomposition of organic matter.

vii. Energy Recovery

The energy content of waste products can be harnessed directly by using them as a direct combustion fuel, or indirectly by processing them into another type of fuel. Thermal treatment ranges from using waste as a fuel source for cooking or heating and the use of the gas fuel, to fuel for boilers to generate steam and electricity in a turbine. Pyrolysis and gasification are two related forms of thermal treatment where waste materials are heated to high temperatures with limited oxygen availability. The process usually occurs in a sealed vessel under high pressure. Pyrolysis of solid waste converts the material into solid, liquid and gas products. The liquid and gas can be burnt to produce energy or refined into other chemical products (chemical refinery). The solid residue (char) can be further refined into products such as activated carbon. Gasification and advanced Plasma are gasification are used to convert organic materials directly into a synthetic gas (syngas) composed of carbon monoxide and

hydrogen. The gas is then burnt to produce electricity and steam. An alternative to pyrolisis is high temperature and pressure supercritical water decomposition (hydrothermal monophasic oxidation).

viii. Avoidance and Reduction Methods

An important method of waste management is the prevention of waste material bening created, also known as waste reduction. Methods of avoidance include reuse of second-hand products, repairing broken itemsinstead of buying new, designing products to be refillable or reusable (such as cotton instead of plastic shopping bags), encouraging consumers to avoid using disposable products (such as disposable cutlery), removing any food/liquid remains from cans, packaging and designing products that use less material to achieve the same purpose (for example, lightweighting of beverage cans).

2.2.26 Prevalent Wastes Generated In Institutions Of Higher Learning In Enugu State.

Wastes generated in the University environment are categorized into solid, liquid and gaseous sustenances. Smith (2009) aptly captured this when he noted that, "the output of daily waste depends on dietary habits, lifestyles, living standards, the degree of urbanization, academic activities and industrialization. In view of the foregoing and for the purpose of this study however, only solid and liquid wastes which are majorly generated in tertiary institutions would be discussed.

Solid Waste

The term solid waste has been defined differently by various scholars. According to Technobunoglous, Theisen and Vigil (1993), Zerbock (2003), solid waste is any material that arises from human and animal activities that are normally discarded as useless or unwanted.

Bassis (2004) as noted by Krukru (2001) classified solid waste into two broad categories – biodegradable and non-biodegradable solid waste. Biodegradable wastes are those wastes that can be easily decomposed by natural process ranging from food remnants to leaves from trees, cotton wool, clothes, banana peels, papers, etc. On the

other hand, non-biodegradable wastes are those wastes that cannot be broken down or decomposed by natural processes. They can be however be recycled or reused. Such wastes include bottles, glasses, plastics, cans and wrappings of all kinds, nylon bags, metals, needles and syringes, etc.

Students seem to indiscriminately litter their learning environment, urinate and desecrate arbitrarily in unauthorized places, examples, behind classroom blocks, laboratories, canteens, restaurants, public conveniences. Regrettably, Egun (2011) observed that "every available non-utilized space is immediately seen as a potential urinary/toilet and used". In some cases the public convenience provided are kept in bad condition that people dread making use of them in order not to contact one disease/illness or the other. In effect, learning activities in an uncongenial environment would result to defective output, and invariably affects physical and mental well beings of the students.

The U.S. Environmental Protection Agency (EPA) (2012) defined solid waste as any garbage refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution or control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, institutional and agricultural operations, and from community activities. Oyeniyi (2011) referred to solid waste as human and animal excrement or faeces. Smartranger (2013) defined solid waste as the useless and unwanted products in the solid state derived from the activities of and discarded by the society; produced either by product of production processes or arise from the domestic or commercial sector when objects or materials are discarded after use. In the view of County (2013) solid waste are materials such as household garbage (includes recycling), food wastes, yard wastes, and demolition or construction debris. He further opined that waste includes discarded items like household appliances, furniture, scrap metal, machinery, car parts and abandoned or junk vehicles. In the view of Desa, Kadir and Yusooff (2012) solid wastes are useless and unwanted products in the solid state derived from the activities of and discarded by society. In this study, solid wastes refer to materials in solid form that have lost their useful values and are discarded. A fundamental attribute of solid

waste is that it is inevitable as almost every human activity involves generation of waste in solid form (Sani, 2011).

2.2.27 Concept of Liquid Waste

According to Waife, Nooni, NLasia, Diaba and Fiaka (2015) liquid waste is any form of liquid residue that is hazardous for people or the environment. It can be bulky or sludgy, or even purely liquid such as with laboratories wastes.

Randel (2012) classified liquid waste into three main streams namely: sewage, trade waste and hazardous liquid waste. Some definitions and classifications by Randell (2012) for these three main streams are described below:

a. **Sewage:** Sewage means waste-water from the community, including faeceal matter urine, household, commercial or institutional waste-water that contains human waste. This sewage includes waste water associated with ordinary kitchen, laundry, shower, hand-basin, sink or similar fixture.

b. **Trade Waste:** These are wastes liquid or solid borne water generated from any industry business, trade, manufacturing process or similar that is approved for discharge to sewer but does not include wastewater from a toilet, hand-basin etc.

c. **Hazardous Liquid Waste:** According to Bharal and Sigh (2007) in Encyclopedic Dictionary of Environment, refers to waste particular harmful to the environment or to society. Unlike sewage and trade wastes, the hazardous stream often consists of some wastes that are liquids and some that are solid wastes. Sewage and trade wastes have suspended solids content, however, the waste stream is defined as liquid (Randell, 2012). Hazardous wastes may be dangerous because they are toxic, biologically active, flammable, corrosive, radioactive or a combination of these factors.

2.2.28 Waste Hierarchy

Waste hierarchy is a list of approaches to managing solid waste arranged in order of preferability. The waste hierarchy is widely used as a simple communication tool for

waste management, which is the strategies to avoid products becoming waste and seek to find a use for waste (Gertsakis & Lewis, 2003).

The concept of solid waste hierarchy is extensively used by governments, industry, educator and environment groups as a guiding principle for solid waste policy and programmes, which specifically states that waste should be managed in accordance with the following order of preference: reduce, reuse recycle, recovery of energy and landfill (Gertsakis & Lewis, 2003).

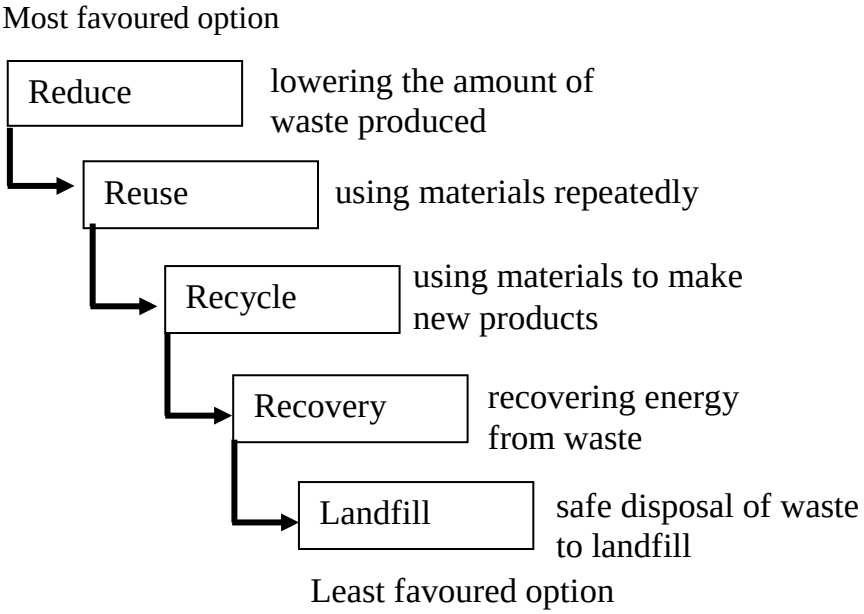


Fig 1: Waste Hierarchy

Source: Gertsakis and Lewis (2003) sustainability and the waste management hierarchy.

i. Waste Reduction and Reuse

Waste reduction and reuse of product are both methods of waste prevention. They eliminate the production of waste at the source of usual generation and reduce the demands for large scale treatment and disposal facilities. Methods of waste reduction include manufacturing products with less packaging, encouraging customers to bring their own reusable for packaging, encouraging the public to choose reusable products such as cloth napkins and reusable plastic and glass containers, backyard composting

and sharing and donating any unwanted items rather than discarding them (Ogboi & Okosun 2003).

ii. Recycling

Recycling refers to the removal of items from the waste stream to be used as a raw material in the manufacture of new products. Thus from definition recycling occurs in three phases: First the waste is sorted and recyclables collected, the recyclables are used to create raw materials such as, papers, plastic and tyres. These raw materials are then used in the production of new products. The sorting of recyclable may be done at the source (i.e. within the household) for selective collection by the municipality or to dropped off by the waste producer at a recycling centres (Okoli, 2013).

iii. Resources Recovery

Resources recovery is the process of turning what has been considered as waste into useful product for use (Wilson, 2015).

iv. Sanitary Landfill

Sanitary landfill is defined as a controlled method of disposing of wastes by spreading them in layers, compacting them into smallest practical volume and covering them with solid anytime the operation is performed in order to reduce environmental health nuisances (Richard 2013).

2.2.29 Concept of Dump Sites

Tchobanoslous, Theisen and Vigil (1993) in Pepple and Nwosu (2016) defined dumpsites as places designated for disposal of normally solid or semisolid materials, resulting from human and animal activities that are considered useless, unwanted or hazardous. In other words, they are essential part of any waste management system. According to Lee and Krieger (1990), dump sites are historically the most used method for waste disposal in the world. It has the longest history, the widest range of capabilities and in most instances, is the least expensive waste disposal method (Pepple & Nwosu, 2016), most of the existing solid waste disposal sites in developing countries including Nigeria are open dumping because the technology of proper sanitary landfill practice is not totally implemented (Matsufugi & Sinha, 1990).

The environmental conditions from these sites are thus exposed to be bad especially in terms of the contamination of the environment and lives. Asian Institute of Technology (AIT) (2004), pointed out that final disposal in most developing countries is usually a matter of transporting the collected waste to the nearest available open space and discharging them. This study further pointed out that in Nigeria especially in Higher Institutions in Enugu State, most solid waste is disposed of indiscriminately and in an environmentally unacceptable manner through open or controlled dumping.

Jung, Matsuto and Tanaka (2005) establishes that open dumping has potential to reduce environmental quality in neighbourhood and can also pose a threat to public health, the environment and even scavengers that depends on scavenging materials for their livelihood. Consequently, the following associated environmental and health hazards and risks may be experienced continuously (Jung et al 2005) (a) unplatable odor, (b) dust emissions (c) poor aesthetics (d) environmental nuisances (e) attraction of vermin, vector and pest (f) severe health risks to human beings and animal (g) breeding of disease vector, files and rats.

The insects and rats are potential disease transmitters (Gran, 1993). These can serve as source of pathogen organisms that can affect the scavengers who depend on recyclable materials for their livelihood and other waste workers. Brash (1996), Leton and Nweke (2003), Cointreau (2007), Afoni (2012), observed that there is the need to provide information on this informal activity (scavenging) that is on the increase on daily basis. In terms of occupation, they pointed out that scavenging is becoming an important occupation in waste management and disposal system.

2.2.30 The Effects of Solid Waste on the Environment

The lack of adequate waste collection and disposal systems in developing countries causes health problems resulting in diseases, which aggravate poverty and leads to negative consequences such as loss of income due to illness, increase spending on health care, and the deprivation of the poor's capacity to live in a safer environment, (World Bank, 2018). It is important to recognize that, the fulfillment of human needs depends on environmental factors such as availability of pure water, clean air, and adequate living space and in many circumstances people's ability to maintain a spirit

in cultural and aesthetic relation with their environment (Panneerselvam & Ramakrishnan, 2005).

Environment, health and poverty overlap extensively in Africa because many of the most widespread and devastating disease, particularly those that affect the poor disproportionately emanate from environmental conditions (Richard, 2002). An important aspect of environmental health is urban air pollution caused by, for example biomass burning in waste incinerators, the open burning of garbage on the streets and homes, and lack of street sweeping (Richard, 2002). Burning can cause both toxins and suspended particles like ash to be released into the air.

The major problem with open dumping is that decaying garbage can give rise to poisonous chemical substances, which leach into the surrounding soil and contaminate ground water, rivers and streams. Where refuse dumps are close to residential areas like is the case with Emene near Enugu flies, rats and other pests bring health hazards. Most of the waste in most developing countries is however not collected. This uncollected waste causes public health environmental hazards because it is left lying everywhere in market places, residential areas and open garbage dumps. Waste piles become feeding grounds for disease vectors, and clog drains generating floods in most residential areas. It is for this reason that Khonje (1992) state that due to poor solid waste collection, serious outbreaks of cholera and dysentery have occurred in most parts of Nigeria especially during the rainy season resulting in the loss of human lives.

Plastic is the most disturbing solid waste almost everywhere across the globe. It accumulates in the environment faster than any other form of waste partly because it is non-biodegradable and partly because it has replaced many other items such as glass bottles and paper bags that can be more easily recycled (Ddungu, 2004). Plastic is also often used in fast-food containers, disposable consumer and convenience goods, plastic is somehow a sign of the throw away philosophy that has contributed greatly to garbage crises in most developing countries like Nigeria. The worst problem in Nigeria is that plastic bags are given free of charge for any item bought.

Most people are however, aware that paper, glass and metal can be recycled even when these items are not recycled by the end users or consumers. Ddungu (2004) quotes Stefoff (1991) stating that recycling plastic is technologically difficult and expensive, and unlike glass and metal, can only be recycled once.

Despite all these negative effects of solid waste to the environment, there are however some positive effects. Solid wastes such as discarded plastic threads like those of tapes are used by women to make woven bags and raise income. Some scavengers collect waste bottles e.g. water bottles and cooking oil containers and sell them to marketers who later reuse them. In this way, solid waste has created employment and improvedthe standard of living for some people. Environmental education is an important tool required to raise awareness and creativity for people to make money out of waste.

It must be noted however that, there are more negative effects of solid waste than positive ones which most people might not be aware of or unconcerned about. This implies that there is need to bring about awareness of these negative effects of solid waste to the environment and people through EE. As long as there is development, waste generation will always be a side effect. Environmental education and public participation, very importantly, in the long run can be cost-saving as expected attitudes and commitment to the environment change for the better, hazards of pollution would not only be minimized but the cost of control would also be reduced (Richard, 2002).

Universities educate most of the people who develop and manage society's institutions (Armijo, 2003). Universities bear a vicarious responsibility in ensuring that sustainable plans and policies are imbibed in the society. Through their expertise, they have the capacity to increase awareness, knowledge, technology, and tools necessary to promote and sustain best practices within and around the community in which they are located.

Developed countries have made great progress in terms of waste management both at the university and community levels. Developing nations with their peculiar challenges are still trailing behind in this regard Nigeria is a typical developing

country facing similar challenges of waste management just like other developing nations. Various researchers have identified major challenges facing solid waste management in developing countries. The most problematic functional element of solid waste management in most developing countries has to do with disposal. (Kasseva and Mbuligwe, 1999). Guerrero (2012) also identified some other challenges associated with waste disposal, they are: increasing generation of waste, burden posed on municipal budget as a result of high costs of wastemanagement, lack of understanding over a diversity of factors that affect the different stages of waste management and linkages necessary to enable the entire handing system functioning. Rapid economic development and population growth, inadequate infrastructure, and expertise have contributed to the problem of solid waste management in most developing nations. Studies carried out in Malaysia (Zebrock, 2003) and other similar countries have shown this.

In Nigeria, for instance, the poor state of waste management is attributable to an inadequately formulated and poorly implemented environmental policy (Agunwamba, 1998), neglect of the economic, social, psychological, political and cultural life of Nigerians in the formulation and implementation of waste management programs. Ogwueleka (2008) also identified inefficient collection methods, insufficient coverage of collection system and improper disposal as factors contributing to poor waste management in Nigeria.

In the light of these challenges there is the need to involve universities in SWM cannot be overemphasized. Institutions of higher learning (universities), being autonomous by nature (Armijo, 2008) should be given utmost attention as regards waste management. Since they by their very nature have the capacity to accommodate innovative waste disposal practices which would trickle to other communities after being properly institutionalized. These institutions are usually held in high esteem and are often seen by the communities as model in terms of adopting best practices.

2.3 Theoretical Review

The major theories of this study are highly eclectic, mainstream literatures in many areas relevant to the study were reviewed. To review the behavioural and

environmental theories capable of nurturing pro-environmental behaviour, we will look at the meaning of theory.

According to Ezejelue, Ogwo and Nkamnebe (2008), theories are accepted principles, and rules of procedures devised to analyze, predict or otherwise explain the nature or behaviour of a specified phenomena. It is also the underlying principles upon which a phenomenon is based (Hornby 2012, Hammond Austin, Orcutt & Rosco 2001). To Anyanwu (2006), theories are developed to explain, predict and enhance the understanding of a phenomenon. It explains phenomenon in two ways, descriptive and prescriptive. Descriptive by telling what phenomenon exist and prescriptive by attempting "to answer the why question and thus suggest potential intervention strategies" (Grippin & Peters, 1984).

An integrative application of different behavioural and environmental theories could prove to be useful in solving contemporary environmental problems (Elijah, 2017). The relevant theories reviewed in this study inlcude: ecological value theory, health belief theory, social learning theory, cognitive dissonance theory, theory of human environmental interaction and diffusion of innovation theory.

This study concludes that none of these theories can independently entirely explain human environment interaction, but a combination of these theories will undoubtedly provide further insights and possible solutions to the 21st century environmental problems posed by humans and her technology.

Against this backdrop, this study was anchored on theory of environmentally responsible behaviour.

2.3.1 Theoretical Foundation: Theory of Environmentally Responsible Behaviour

This study is anchored on the theory of environmentally responsible behaviour by Tomera (2013). This theory states that environmental knowledge, locus of control, environmental curiosity, environmental sensitivity and environmental concern will influence whether a person adopts proper waste disposal or not.

The assumption of theory of environmentally responsible behaviour is that people are predisposed to pro-environmental behaviour when they are environmentally literate. This theory is relevant to this study because it reflects the major manifest variables that play a part in the individual process of environmentally responsible behaviour adoption.

The first variable environmental knowledge states that knowledge is necessary for decisions about the adoption of eco-practices and for initiation of action (Disinger & Roth, 1992).

The second variable, locus of control refers to an internalized sense of personal control over the events in one's own life (Elija, 2017) or it refers to student's perception of whether he or she has the ability to bring about change through his or her own behaviour (Newhouse 1991, Kollmus & Agyeman, 2017). The third variable, environmental curiosity according to Gulten et al (2011) refers to being eagerness to learn about environment and wondering to explore the relationship between man and the environment.

The fourth variable environmental sensitivity refers to an emphatic notion of the environment (Lee, Jan & Yang, 2013), expression of caring and positive feeling, towards the environment (Peterson, 1982).

The fifth variable environmental concern, refers to the extent which people are aware of environmental issues and their willingness to solve both concrete and abstract environmental problems (Alibeli & Johnson, 2015).

This theory of environmentally responsible behaviour (TERB) though very simplistic offer a succinct explanation of the interacting variables of human behaviour in environmental preservation (Hines, Hungerford & Tomera, 1987) and also highlights how multitude of variables interact in different degrees to influence the embracing of environmentally responsible behaviour (Hungerford & Volk, 1990). This study also reviewed other theories relevant to the study.

2.3.2 Ecological Value Theory

This theory was popularized by Dunlap (2005). The theory states that pro-environmental behaviour arises from quite specific value orientations in the individual. In its simplest form, the theory suggests that pro-environmental behaviour flow directly from pro-social or moral values. For instance, if an individual holds certain kinds of moral or altruistic values, that individual is more likely, according to the theory to engage in pro-environmental behaviour.

The ecological value theory draws on empirical evidence of the existence of three major value orientations prevalent in the society namely; egoistic value orientation, altruistic value orientation and biospheric value orientation.

This value theory further explained that those who hold egoistic values are less likely to engage in pro-environmental behaviour than those who hold altruistic values. The third value orientation focused on valuing the environment as distinct from other people. This biospheric value orientation is the work carried out in the context of Dunlap and van Liere's (1978) new environmental paradigm, which formed the foundation for the conceptualization of the ecological value theory by the same authors.

The starting point for Dunlap and van Liere was the suggestion of numerous earlier writers that environmental problems stem in part at least from the values, attitudes and beliefs that prevail in the society. These earlier writers had pointed in particular to 'our belief in abundance, our faith in science and technology, and our commitment to a laissez-faire economy, limited government planning and private property rights' (Dunlap & van Liere, 1978 as cited in Johnson (2005) as contributory factors in the environmental crisis'.

Dunlap and van Liere believed that this set of values-referred to by (Pirages & Ehrlch, 1974) as the 'Dominant Social Paradigm' – was being moderated or eroded to some extent in modern society by the emergence of a 'New Environmental Paradigm'. The New Environmental Paradigm, they argued, contained a set of core values (biospheric, altruistic and egoistic) which, as distinct from the Dominant – Social Paradigm, pay

increased respect to natural limits and the importance of preserving the balance and integrity of nature. Since Dunlap and van Liere's original studies have been carried out attempting to confirm the existence of three distinct value orientations: biospheric, altruistic and egoistic. A number of studies have also attempted to explore the relationships between these different value orientations and pro-environmental behaviour, which is consistent with the ecological value orientation.

Further, the ecological value theory also suggests that there is no general one-to-one correspondence between biospheric values and pro-environmental behaviours. Some pro-environmental behaviours are motivated by self-interest, some by altruism, and others by biospheric values. There is interesting evidence to suggest that those with primarily egoistic value orientations are less likely to engage in certain kinds of pro-environmental behaviour than those with pro-social or biospheric value orientations (Stern 1995) and that those who adhere strongly to the Dominant Social Paradigm are less likely to hold pro-environmental attitudes (Kilbourne, 2001).

A number of studies have confirmed the ecological value theory. Zavestoski (2002), for example, finds that environmental concern correlates positively with both self-enhancement (egoistic) and self-transcedent (altruistic) value orientations. In addition to Zavestoski's study, since Dunlap and van Liere's original study, a number of studies have been carried out attempting to confirm the existence of three distinct value orientations: biospheric, altruistic and egoistic, which are in attempt to confirm the ecological value theory in different contexts. A number of studies (see Stern, 1995; Kilbourne 2001; Peattie, 2001; McCarthy 2001; Devinney, Eckhardt & Belk, 2009; Gupta, 2009) have also attempted to explore the relationship between these different value orientations and pro-environmental behaviour.

Regrettably, the ecological value theory contends with three key problems. The first of these is the attitude-behaviour gap. Having pro-social or pro-environmental values or attitudes is not the same thing as engaging in pro-social or pro-environmental behaviour. This point is most pragmatically illustrated by Brinkman (2004) study on littering. The same issue has been highlighted in studies of domestic energy

consumption. Gatersleben (2002) and Jensen (2002) both demonstrated that proenvironmental intentions and behaviours do not necessarily correlate with reduced energy consumption by consumers.

Another problem for value theory lies in the instability of individual values across different contexts and situations. There is quite a lot of (not entirely conclusive) evidence on longitudinal or cohort shifts – for example changes in the strength of environmental values over time or at different ages. There is also some fairly convincing evidence to suggest that the values and beliefs that are salient at any one time – i.e. important to the decision-making process – vary according to the context or situation in which people find themselves.

2.3.3 Health Belief Theory

The Health Belief Theory (HBT) was developed in 1997 by social psychologists. Hochbaum, Rosenstock and Kegeis working in the United States Public Health Services. The theory attempts to explain and predict health behaviour by focusing on the attitudes and beliefs of individuals.

The theory postulates that belief helps shape behaviour, while enduring, beliefs are not fixed individual's characteristics but rather are acquired through primary socialization (Sheeran & Abvaham, 1996). The Health Belief Theory focuses on two aspects of an individual's views of health and behaviour: threat perception and behavioural evaluation (Janz & Becket 1984). Threat perception – or perceived risk appraisal is based on one's perceived susceptibility to illness and the anticipated severity of the consequences of such an illness. The Health Belief Theory suggests that, as an individual's assessed level of risk increases, the likelihood the individual will adopt recommended prevention behaviours increases (Mattson 1999). Behavioural evaluation, also called coping appraisal (Zak-Pace & Stem 2004), relates to the belief than an individual course of action will be beneficial and the anticipated barriers or costs of taking action do not outweigh the benefits (Rosenstock, 1990).

In the context of our study, tenets of this theory could be applied in environmental studies for prediction of behaviour change, particularly a study like this one which

also bears an interplay with health in terms of some negative environmental practices that can lead to the incidence/prevalence of diseases. Also, the Health Belief Theory will enable the researcher to assert if the fear of negative outcomes from bad environmental practices propels individuals to imbibe pro-environmental practices or not. Furthermore, since pro-environmental behaviour is a mixture of self-interest (e.g. pursuing a strategy that minimizes one's own health risk) and of concern for other people, the next generation, other species or whole ecosystems (e.g. preventing air pollution that may cause risks for others' health and or the global climate), this theory can as such provide a good base for a better understanding for such cause and action.

Again, the discourse of environmental education and waste management cuts across numerous areas especially for the reason that it deals with human behaviour which is in itself a complex variable.

2.3.4 Social Learning Theory (SLT)

Social learning theory is increasingly cited as an essential component of sustainable natural resource management and the promotion of desirable behavioural change (Muro and Jeffrey, 2008). This theory is based on vicarious learning and the idea that we learn from our interactions with others in a social context. Separately, by observing the behaviour of others, people develop similar behaviour. After observing the behaviour of others, people assimilate and imitate that behaviour, especially if the observational experiences are positive one or include rewards related to the observed behaviour (Bandura, 2004).

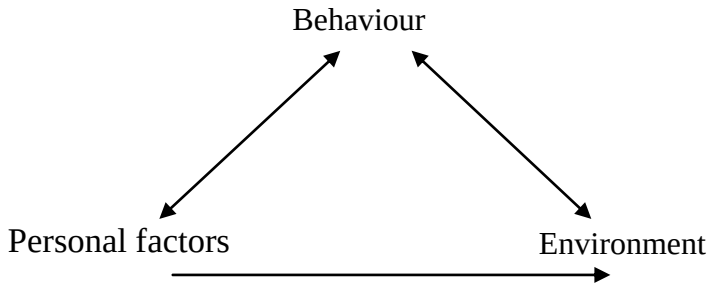


Fig. 2 Social Learning Theory

Source: Adapted from Bandura (2004) social foundation of thought and action. London Prentice Hill Incorporated.

Behaviour is depicted as being shaped and controlled either by environmental influences or by personal factors. In this model, behaviour cognition and other personal factors and environmental influences all operate as interacting determinants that influence each others bidirectionality of influence between behaviour and environmental circumstances. People are both products and producers of their environment. Thus, behaviour determines which of the many environmental influences will come into play, and what forms they will take. Environmental influences in turn, partly determine what forms of behaviour would be developed and activated.

2.3.5 Cognitive Dissonance Theory

The Cognitive Dissonance Theory (CDT) was developed in (1957) by Leo Festinger an American Social Psychologist. The theory posits that people adjust their attitudes to match their behaviour or that people, based on subjective norms, cannot stand to be different from their peers and thus adjust their attitudes and behaviour accordingly. According to Festinger (1957) as cited by Sharma (2014) cognitions are elements of knowledge that people have about their behaviour, their attitudes and their environment. When a situation comes up that causes dissonance, a gap between behaviour and either attitudes or knowledge, the individual is motivated, depending on the extent of the difference, to adjust their attitudes, or beliefs to reduce dissonance (McGuire, 1989, Ximbardo, Ebbesen & Maslach 1977).

In an environmental situation, cognitive dissonance would be present if an individual believes that it is acceptable to throw away recyclable goods, and then they find that their peers believe the opposite, that it is not acceptable to throw away recyclable goods. The individuals must either change their views or decide like their peers that they should recycle rather than throw away recyclable goods, or they must change their peer group to one that believes like they do, that throwing away recyclable goods is acceptable.

Sharma (2014) argues that a cognitive dissonance is evident in situation where an individual behaviour conflicts with beliefs that are integral to his or her self-identity. Linking this theory to our context, a man who places a value on being environmentally responsible just purchased a brand new car that he later discovers does not get great

gas mileage. It is important for the man to take care of the environment as he is driving a car that is not environmentally friendly. A pro-environmental action will be to sell the car and reduce the actions that reduce the impacts of driving a gas-guzzling vehicle such as utilizing public transportation more frequently or riding his bicycle to work on occasion.

Arguably, there is a clear difference between action and actual impact when it comes to environmental consequences. Consumers may engage in a range of seemingly pro-environmental activities on a daily basis, but these actions do not always address environment priority areas, and are therefore not necessarily achieving greater environmental sustainability (Sahakian & Wilhite, 2014). For example, the environmental benefits of riding a bicycle to work every day instead of driving a car may be canceled out by regular airplane trips to faraway destinations. However, one important property of social practices is that they are far from static: how consumers go about their daily lives has changed and continues to change over time, and in different locations. Cognitive theory represents a promising theoretical framework to deliver new insights to influence more environmental consumption practices (Sahakian & Wilhite, 2014).

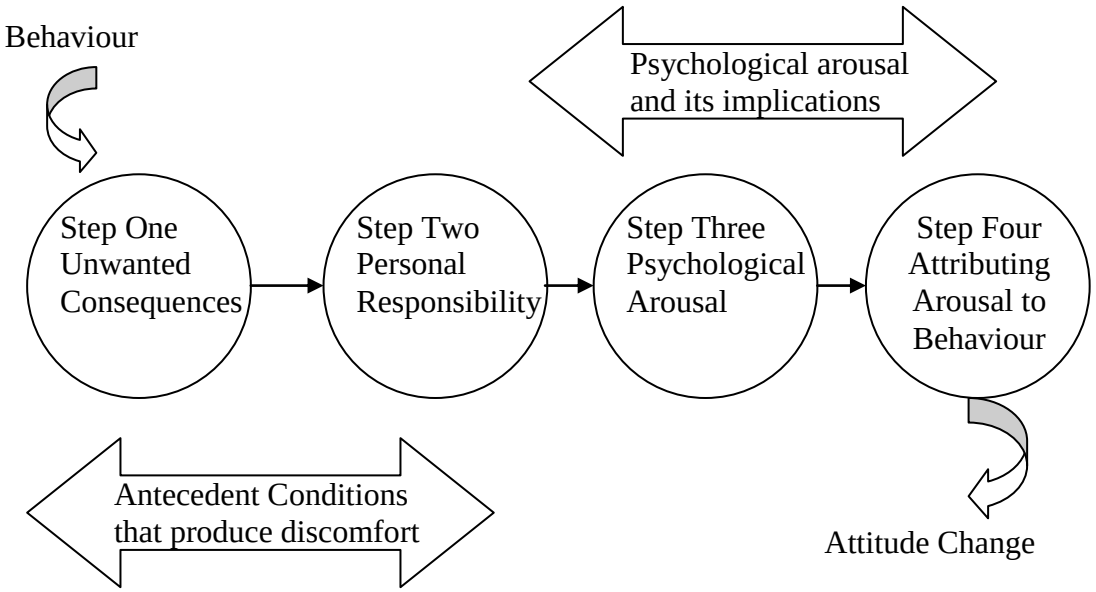


Fig. 3: Diagram of Cognitive Dissonance Theory

Source: Adapted from: Pwell, Symbaluk, MacDonald, Introduction to Learning and Behaviour 2000

2.3.6 Theory of Human – Environmental Interaction (HEI):

Human - environmental interaction theory was popularized by Margulis (1979). The theory postulates that humanity faces two choices; either to indirectly cause our own extinction by destruction of our life supporting systems or to reverse the impacts that humanity has had on the natural environment.

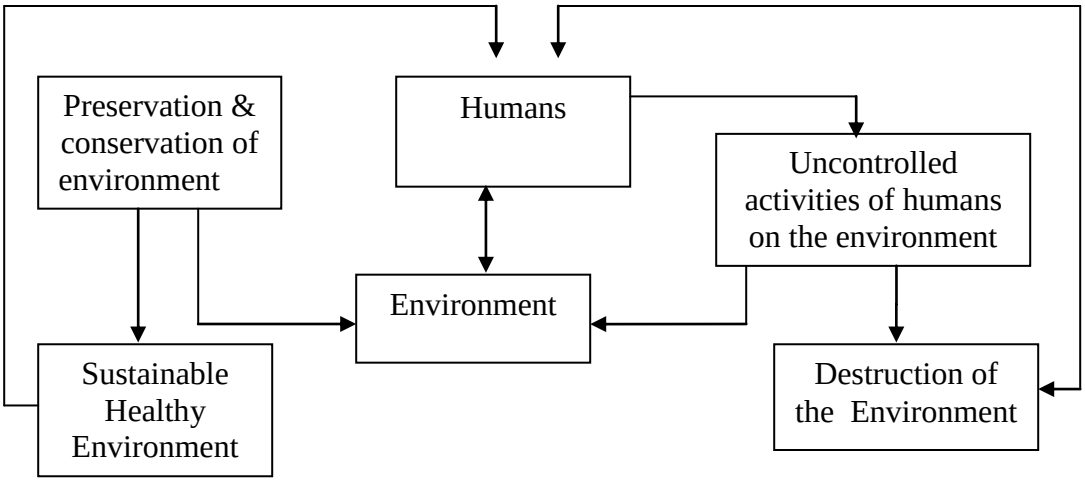


Fig. 4: Diagram of Theory of Human – Environmental Interaction (HEI):

Source: Adapted from: Nigeria Environmental Study Team 1991.

The model portrays a system of dependency of man on hisenvironment and the impact of its attitude and activities on the same environment. From the model, man can either choose to protect or destroy their own environment through his/her actions. The outcome of the action is either total destruction or sustainability of the environment. The model also revealed the fact that either man chose to destroy or protect their environment; the repercussion of his choice goes back to him. The people's health is at risk when the environment is not properly managed. Oyaigbermen (1988) states that the disposal of solid waste and hazardous waste in or on hand without careful planning and management can present a danger to human health and the environment.

2.3.7 Diffusion of Innovation Theory

Instead of focusing entirely on individual decision makers or social structures, the diffusion of innovation (DOI) theory in this research places emphasis on innovation as an agent of behaviour change, with innovation defined as "an idea practice, or object perceived as new (Rogers 2003). Originally published in 1962, building particularly

on rural sociology research into the uptake of agricultural technology in the United States of America, the theory has been subsequently been very widely applied to issues including marketing, development and health (Greenhalgh, Robert, Macfarlane, Bate & Kyriakidou, 2004).

The theory postulates that change spread in a population through a normal distribution of willingness to accept new ideas. The labels of the distribution include innovators (2.5%) of the population, early adopters (13.5%) early majority (34%) late majority (34%) and laggards (16%).

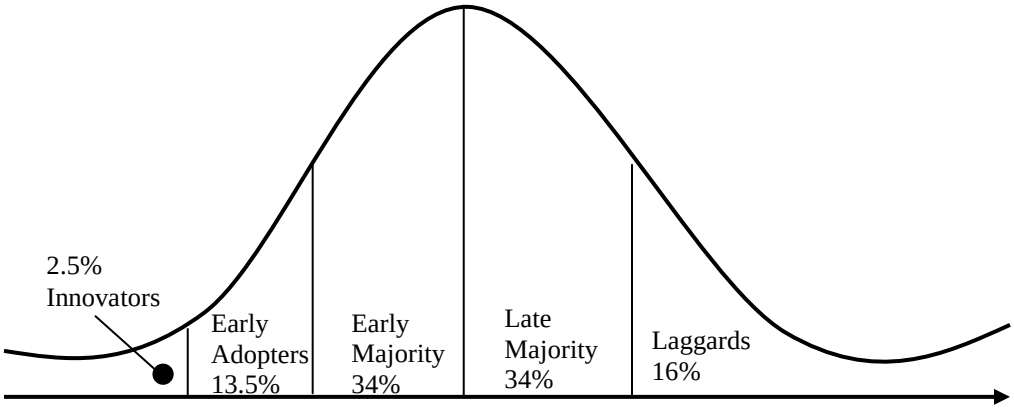


Fig. 5: Diffusion of Innovation Theory

Source: Adapted from Rogers 2003

Innovators: These are people who want to be the first to try the innovation. They are venturesome, opinion leaders, educated and are technology enthusiasts. These people are very willing to take risks, and they enjoy tinkering with innovations and mastering their intricacies. Very little, if anything, needs to be done to appeal to this population.

Early Adopters: These are people who represent opinion leaders. They enjoy leadership roles, and embrace chance opportunities. They are already aware of the need to change and so are very comfortable adopting new ideas. Strategies to appeal to this population include how-to manuals and information sheets on implementation. Early adopters tend to be more economically successful, well connected and well informed and hence more socially respected. Also what early adopters say about an innovation determines its success.

Early Majority: These are pragmatists who adopt new technology when its benefits are proven. They typically need to see evidence that the innovation works before they are willing to adopt it. They want to hear "industry standard" and "endorsed by normal, respectable folks". Strategies to appeal to this population include success stories and evidence of the innovation's effectiveness.

Late Majority: These people are skeptical of change, of lower socio-economic status and are conservative pragmatists who hate risk and are uncomfortable with new innovation. They will only adopt an innovation after it has been tried by the majority. Strategies to appeal to this population include information on how many other people have tried the innovation and have adopted it successfully.

Laggards: These people are bound by tradition and very conservation. They are very skeptical of change, the hardest group to bring on board and the last to adopt an innovation. Strategies to appeal to this population include statistics, fear appeals and pressure from people in the other groups.

Diffusion of innovation is applied to this study because new methods of waste disposal trickle down from develop countries to less developed countries. The developed countries have efficient waste management policies, which are gradually being adopted in other countries of the world (expansion diffusion). With the present technological advancement and the trend towards globalization, waste management in Nigeria a typical developing nation will improve over time. Diffusion of innovation posits four "main elements of behaviour change" innovation, communication system, time and social systems (Ismail, 2006; Rogers, 2003; Greenhalgh, et al 2018).

As Rogers (2003) notes:

> "Diffusion is a process in which an innovation is communicated through certain channels over time among the members of a social system. It is a special type of communication in that the message are concerned with new ideas" (P. 48).

According to DIO theory, behaviour will change more rapidly if innovations are perceived as being better than previous options (relative advantage) and consistent with the easy to understand (complexity), testable via limited trials (trialability) and

their results are visible (observability). Different information exchange relationships (communication channels) have specific impacts in terms of innovation diffusion.

This study discussed the four main elements of behaviour change (Rogers, 2003), thus:

i. Innovation

An idea, practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 1983). It includes all sets of products and services which are new or old but present an unexampled use for the user when he uses it or simply when a user perceives it to be new in terms of use, it becomes an innovation.

ii. Communication Systems

The communication system is a channel through which users share the information with each other. It is a means that handles the to and fro movement of the information between users. The better and faster a communication system, the quicker the diffusion of innovations. Rogers has classified the communication systems into *Mass Media* and Interpersonal channels. While mass media can disperse information more rapidly, Rogers believes that it is the interpersonal channel that is more important for the diffusion of new innovations or technology. On the other hand, "diffusion is a very social process that involves interpersonal communication relationships" (Rogers, 2003).

iii. Time

The time aspect of the innovation diffusion process actually records adopter categorization and rate of adoptions. It measures the clock from the moment of the creation of an innovation till it ceases to be one. It registers the pace with which the innovation is diffused into a society and adopted by different users.

iv. Social Systems

A set of interrelated units engaged in joint problem solving to accomplish a common goal (Rogers, 2003). An innovation is of no use unless it is accepted as one by a social system. If a society fails to recognize an innovation it ceases to be one. The diffusion

of innovation only takes place when a social system accepts it as an innovation and then shares information about it within the system and with other systems.

Social systems, so-called 'diffusion networks', are critical to this theory as diffusion occurs within them – they establish boundaries around the diffusion. Social networks and communication come together around the concepts of homophily and heterophily. Homophily is defined as the degree to which interacting individuals are similar in their attributes (e.g. education, social status, values) with heterophily being the opposite, i.e. degree of difference. Generally, communication is most likely and effective within homophilous social networks where members share common understandings, language and meanings. However, homophily can be problematic in situations where difference in knowledge or views is needed. Prell (2009) recognize natural resource management as one such instance, and DOI theory asserts that homophily can 'act as a barrier to the flow of innovations in a system' (Rogers 2003) and that some heterophily is therefore essential for diffusion of innovation to occur.

> 'One of the most distinctive problems in the diffusion of innovation is that the participants are usually quite heterophilous. This difference frequently leads to ineffective communication as the two individuals do not speak the same language. However, when two individuals are identical regarding their technical grasp of an innovation, diffusion cannot occur as there is no new information to exchange. The nature of diffusion demands that at least some degree of heterophily be present between the two participants in the communication process. Ideally, the individuals would be homophilous on all other variables, even though they are heterophilous regarding the innovation" (Rogers, 2003, Prell, Hubacek & Reed, 2009).

2.4 Empirical Review

2.4.1 Studies Related to Environmental Literacy

According to Kerlinger (1977), Cohen and Manion (1980) as cited in Obasi (2008), the empirical basis of science means that investigations are focused on concrete facts or realities which are amenable to verification by observation. Quite a few academic studies have been conducted in the area of environmental literacy with divergent focus. But we will review the ones that relate closely to this study and those that capture environmental literacy success determinants.

Matthew, Owusu, Kwakye and Welbeck (2017) carried out a study entitled "Environmental literacy of business students, a study of business students in Ghana" using survey method, the purpose was to investigate the relationship between students' interests in environmental issues and knowledge levels and to assess how these two constructs influence students' overall environmental behaviour and actions. Questionnaire structured in five (5) points likert scale was used to collect data from 605 respondents purposively selected. Descriptive and inferential statistics were used to analyze the data and test the hypotheses. Their finding further establishes the existence of a direct and positive relationship between students' interest in environmental activities and their environmental literacy level. Also, interest in environmental activities and literacy level were found to be good predictors of the actual involvement of students in activities that promote sustainable development.

Williams (2017) carried out a study titled "An assessment of environmental literacy among Oklahoma Public High School Students and the factors affecting students' environmental literacy of United States students. Questionnaire was used to collect data from the respondents. The findings showed that anti-environmental conservative beliefs are deeply rooted in the Oklahoma students' culture and the rejection of scientific principles of leaders in the community affect both knowledge and attitude domains.

Franzen and King (2017) conducted a study on "environmental literacy in environmentally Themed Higher Education Courses in Turkey". The aim of the study was to assess environmental literacy and the influence of pedagogical perspective and instructor's emphasis in environmentally themed higher education courses. Data were analyzed using a paired samples t-test and one-way ANOVA with a Turkey HSD post hoc test. The findings includes: that environmentally themed higher education courses are having a significant influence on students' self perceptions of their environmental literacy.

In the work of Clores and Nunez (2017) on environmental literacy of K-10 student completers in Philippines. The study used quantitative research designs specifically, the non-experimental descriptive correlational design to determine the students' level

of environmental knowledge and sensitivity. The findings of their study showed that the students completers of K-10 grade levels have a moderate level of environmental literacy. That the students also have moderate level of environmental knowledge and behaviour and high level of environmental attitude and sensitivity.

In 2015, Karpudewan and Shamuganathan tested 384 students (114 males and 270 females) enrolled in matriculation courses in a Pre-University Matriculation College located at the Northern Region of Malaysia. The study used covariance based on structural equation modeling (B-SEM) to determine the influence of students' attitudes towards performing responsible environmental behaviour and the environmental issues. The result of findings showed that students' knowledge does not mediate the influence of belief on the responsible environmental behaviour and that individual who possess certain desirable attitude, belief and conservation knowledge have more tendencies to engage in responsible environmental behaviour.

Studying environmental literacy and its implications for effective public policy formulation, Burchett (2015) in Tennessee Knoxville United States of America analyzes contemporary literature about public understanding of environmental problems, the role of the public in formulation of public policy related to environmental issues and the study revealed that education has the responsibility to effectively communicate the scientific information regarding the environment in such a way that is understandable for everyone. Also that environmental education should focus on skills that are less technical and involve more learning to appreciate the environment and its resources rather than exploit them for financial benefit.

Eheazu (2014) studied promotion of environmental literacy in university education, a desirable option for achieving Nigeria's environmental policy objectives in Port Harcourt Nigeria. The sample of the study comprised 1514 final year students selected from seven departments (Physics, Chemistry, Biology, Adult and Community Education, Science Education Geography, Environmental and Business Education) in four Faculties (Science, Education, Social Sciences and Management Sciences) of the Universities of Port Harcourt (UNIPORT), Calabar (UNICAL), and the Rivers State

University of Science and Technology (RSUST). Selection of the final year students for the study will be based on the anticipation that such students would have acquired nearly all (if any) environmental knowledge, skills and attitudes their universities could have afforded them during their four to five years of the study. Data were obtained through the use of questionnaire modeled after Roth's (2002) framework for shaping environmental literacy: percentages, means, the PearsonProduct Moment Correlation Coefficient. The Spearman Brown formular and the Analysis of Variance (ANOVA) were the statistical methods used to analyze the obtained data. The results revealed that Nigerian universities are yet to fully embrace and implement the10 point action plan of the Tbilisi Declaration to which Nigeria is a signatory on behalf of her universities, and, which inter-alia requires the universities to educate for environmentally responsible citizenship (ULSE, 1990) and specifically, General Studies (GES) which is compulsory course for all Nigerian Universities, is yet to identify with the global movement to ensure that "Core General Education requirement for undergraduate degrees incorporate an indepth focus on sustainability, including environmental literacy components.

The research of Spinola (2015) on environmental literacy in 9th grade students from Madeira Island Portugal involving 491 students, have shown that 9th grade students have good levels of environmental literacy but need to improve in several aspects of knowledge and attitude and much more in environmentally responsible behaviours.

Don, Juliet and Erhabor (2016) conducted a research entitled "impact of environmental education the knowledge and attitude of students towards the environment in Benin City, Nigeria" using survey method. The aim was to assess students' level of knowledge and attitude towards the environment. The survey was conducted on 130 respondents who were full time students of environmental education in a Federal University in Edo State, Nigeria. The data were statistically analyzed using mean, standard deviation and correlation coefficient. The findings revealed that there is high level of knowledge and positive attitude towards the environment among the students, and to have more environmental literates students in Nigeria, more need to be done to promote and encourage Environmental Education (EE) at all levels in the

country especially by the government and its agency to ensure that effective implementation.

Ogunjinmi, Oluwatuyi and Onyia (2015) conducted a study determining ecological knowledge and attitudes of students in Akure South Local Government Area of Ondo State, Nigeria. Data were obtained through structured questionnaires administered to 135 students in 10 randomly selected schools. Data were analyzed using descriptive statistics, chi square, Pearson's correlation and multiple linear regressions. The findings reveal that there was a strong and significant relationship between the status of the school and the ecological attitude of students, also there was a significant relationship between school exposure through teachings and their ecological knowledge and attitudes.

Fidan, Tugba Selenikay (2016) researched on "acquisition of operational environmental literacy in social studies courses in Turkey". The aim of the study is to determine students' views about operational environmental literacy activities and the effects of these activities on students' responsible environmental behaviour. The study used mixed method. The participants of the study were 22 fourth grade students. The findings obtained from the study are as follows: the majority of the participants were aware of the environmental problems and their level of environmental awareness is high and that activities to improve operational environmental literacy should focus on actions rather than information.

Teksoz, Sabin and Tekkaya-Oztekin (2012) conducted a study on 1,345 University students that aimed to propose an environmental literacy that aimed to propose an environmental literacy components model to explain how the components relate to each other.

The finding showed that high levels of environmental knowledge stimulate the university students' concern, attitudes and personal responsibility toward environmental protection. It had indirect relationship with environmental attitudes and responsibility. Moreover, while attitudes toward the environment were found to be a significant determinant of environmental responsibility, environmental concern held

responsibility, environmental concern held significant association with attitudes toward the environment and outdoor activities.

Erdogan and Marcinkwoski (2012) conducted a national wide survey in order to assess Turkish students' Environmental Literacy (EL) level by considering six EL components. The sample of the study comprised of 2,412 fifty graders selected from 78 primary schools (26 private and 52 public in 26 provinces of Turkey. Data were obtained through the use of an Elementary School Environmental Literacy (ESEL) including five parts and total of 75 items. The results revealed that most of the students scored a moderate level of environmental literacy, quarter of the students scored a high level of environmental literacy and only a few students showed low level of environmental literacy.

Lin and Huang (2014) carried out a study on undergraduate students' attitudes towards biodiversity in America and Taiwan students. Questionnaires were used to collect data from the respondents. The t-test was conducted to examine the difference among the students of different backgrounds. The findings shows that both American and Taiwanese undergraduate students had consensus that they expressed lower level of confidence in the ability of science and technology to solve biodiversity problems, and they did not agree that people worry too much about the problem of biodiversity issue.

The research of Igbokwe (2016) on environmental literacy assessment: assessing the strength of an Environmental Education Programme (Eco schools) in Ontario Canada, University of Windsor, has shown that environmental literacy was generally low. Only 29.3% of the students were deemed as having met the provincial standard of level of 3 (70% or higher) in the environmental scores.

Johannsdottir (2009) using 15 different environmental concepts examined the environmental literacy level of MBA students at University of Iceland in Norway. He found out that the MBA students had how levels of environmental literacy because of lack of environmental education in their curriculum.

Lillah (2011) survey 308 students from the Business and Economies Faculty of the Nelson Mandela Metropolitan University South Africa to assess their environmental literacy level. He found out that although the students were normally sensitive to environmental issues and that the ecological and business knowledge acquired had greatly influenced certain pro-environmental behaviours of the students.

Pe'er, Goldman and Yavetz (2007) report on the environmental attitudes and knowledge of 766 first-year students in three teacher-training colleges in Israel shows that although the students' environmental knowledge was limited, their overall attitudes towards the environmental were positive. Also that students' majority in environmental related fields were more knowledgeable and had more environmental oriented attitudes compared with other students.

Moody, Garrison and Golley (2005) evaluated that environmental requirement of University of Georgia after its introduction. Their study showed that although, overall, students were satisfied with their environmental literacy experience and thus considered the environmental literacy requirements as valuable, the faculty members were dissatisfied with the environmental literacy requirements criteria despite their agreement to its appropriateness and importance. The implication is that there could be differences between faculty and students of the same academic institution regarding environmental literacy through the teaching and learning process.

Oluwasanumi (2003) conducted a study on correlates of environmental conservation habit of members of a school-based environmental education programme in Gombe, Nigeria. An instrument called Environmental Conversation Habit Inventory (ECHI) was used to collect data from 584 respondents. The obtained data were analyzed using multiple regression analysis (background solution) with the aid of SPSS Package. The result of the study as regards students' class level variable 8 indicated that their class level had significant effect on their environmental conservation habit.

In her study, Istanbullu (2008) investigated environmental literacy of 6^{th} grade students at a private school in Ankara capital of Turkey and students' background characteristics on environmental literacy dimensions (knowledge, attitude).

Questionnaires were administered to 681 students. Zero order correlation was used to investigate the relationship among environmental dimensions; knowledge attitude.

Canonical correlation was used to analyze the relationship among environmental background of students. Findings of zero order correlation showed that "knowledge and use, and attitude were positively correlated. According to the result of canonical correlation, parents' involvement in environmental activities positively related to environmental attitude.

Nkamnebe, Ukenna, Nwaizugbo, Moguluwa and Olise (2012) profile the environmental sustainability – conscious (ESC) consumer in Nigeria. The paper sought to explore the nature of the various measures used for profiling the Environmental Sustainability Conscious Consumer (ESC) segment and to posit a measure that will be most appropriate for profiling this segment. The study uses 55 models for assessing market segmentation approaches, the study critiqued the common measures, which are singly adopted for profiling the ESC segment. Findings of the study show that psychographic measures are most suitable over socio-demographic measures for profiling the ESC consumers (e.g. Diamantopolous, Schlegelmilch & Sinkovics 2003).

Chu and Lee (2006) investigated Korean students' environmental literacy development according to their grades and relationship between areas of environmental literacy variables as affecting their environmental literacy. The instrument used for data collection was titled, Environmental Literacy of Korean's Students (ELKS). Result of the study from 300 students showed that environmental behaviour and attitude were correlated significantly and environmental knowledge and environmental skills as well.

Hodgkinson and Innes (2001) studied environmental attitudes and beliefs of fresh students in different disciplines at an Australian University and concluded that students involved in economically relevant disciplines such as business are consistency less pro-environmental than students in other disciplines.

McMillan, Wright and Beazley (2004) evaluated the impact of an introductory environmental studies class on environmental values of students at Dalhousie University in Canada, and observed that students appeared to be more environmentally concerned after taking the course.

Kaplowitz and Levine (2005) conducted research to measure levels of environmental knowledge of Michigan State University students. The author argues that while the students showed a higher level of environmental knowledge than the general public, their overall score was still deficient.

Kobierska, Tarabula-Fiertak and Grodzinnsk Juerzak (2007), assessed polish secondary school students' attitudes towards the environment, which referred to environmental knowledge and action for the benefit of the environment. Questionnaires were used to collect data from 1034 respondents by using stratified random method. The finding showed that high level of environmental knowledge was not always accompanied by pro-environmental behaviour but behaviour regarding contact with environment.

McGinn (2014) evaluated seven liberal arts colleges. The research study examined caring, knowledge and practical competency (ERB) components. The results of the study found 58% of students were literate, however, only 4% of students tested at a high level of literacy. The most students who were illiterate were so because of practical competency. A similar study by Nash (2015) measured attitude and behavioural components of undergraduates from a liberal arts university. The study assessed and compared student environmental literacy with the student's major. As expected, students who majored in environmental studies had the highest levels of environmental literacy. The results of the study ranked the majors: environmental studies, hard sciences, economics, arts/humanities and social sciences, respectively. Interestingly, hard science majors also received the lowest scores total. While many assessments reinforce previous findings, it is important to note there are some discrepancies. For example, the number of courses a college student takes does not improve student attitudes or behaviour (Altantar, 2011). Conversely, Hovarth (2013) found students who took three or more sustainability courses had significantly higher

environmental literacy than students who take zero to two courses. These studies show that the factors affecting both environmental literacy and environmental education need further evaluation.

A study carried out in Jakarta indicated that social influence was the second lowest determinants on the green purchase behaviour among the university students (Irawan & Darmayanti, 2012). The author concluded that the topic of environmental issue particularly environmental-friendly products was not encouraging among the group of university students in Jakarta. Thus, social influence does not have significant effect on green purchasing behaviour. However, the author suggested that the green marketers should consider this factor because young consumers were peer oriented in nature.

A study in Nigeria by Haruna and Kamariah (2012); findings indicated that knowledge of green products, perceived behavioural control and availability of green products will heighten green purchase intention. In this study, the relationship between green knowledge, green brand image, green perceived value and green purchase intention are found to be significant.

Moreover, a study by Aman (2012) had been conducted to examine the influence of environmental knowledge and concern on green purchasing intention on 384 Sabahan consumers. The research finding also showed that environmental concern has significance influence on the green purchasing intention. This study used attitude as the mediating variable. The authors figured out that the higher level of environmental concern has positive impact on consumers' attitude and hence this attitude will lead to the green purchase intention.

In 1999, Willis conducted a study research in order to assess EL of high school students. The instrument used in this study was developed by the National EL Assessment Project (1994) and included knowledge, affective, skill and behaviour components. The study revealed knowledge of ecological principles and environmental science, limited awareness of environmental problems, positive attitudes towards environment, moderate levels in using environmental action strategies, and limited participation in environmental responsible behaviour.

Donavan (2001) conducted a research aimed to evaluate twelfth-grade students' environmental knowledge, attitudes and behaviours while comparing between two groups of students to each other and to the nation's adults in Texas, United States of America. The results showed that although the students scored higher than the nation's adults, however the nation's adults had higher score on environmentally responsible activities. The results indicated also that these were positive relationships among environmental knowledge, attitudes and behaviour.

Benton (1993) tested 88 MBA students both before and after a 10-week environmental management course, using an environmental attitude and knowledge scale and he found that students were more environmentally knowledgeable, expressed greater concern about the environment and were more action oriented after the course than before the course.

Hsu (1997) conducted a research aimed to assess the EL level and to determine the effects of nine selected variables on participants' ERB of 236 secondary school teachers in Taiwan. Hsu developed her own instrument. The findings revealed that knowledge of and skills in using environmental action, and intention to act were found to be three powerful predictors of ERB. She also found that using environmental action strategies, environmental responsibility and locus of control had the best impact on the intention to act. The best predictors of ERB, for urban teachers were, intention to act, skill, major source of information and membership in environmental organization but for rural teachers the best predictors of ERB were; perceived knowledge of environmental action strategies, intention to act and perceived knowledge of environmental problems and issues.

2.5 Gap in Literature

The introduction of environmental education by Universities to produce individuals who will be motivated toward rational use of the environment is becoming very prominent both in the advanced and developing nations of the world (Marcinkowski, 1991, Eheazu 2014). These universities believed that the environment is one subject area which there is a clear and overriding need for all citizens to be informed (Kirbert 2000, Ofori et al 2017, Roth 1992, Karakashian 1996). However, despite the intensifying environmental education efforts and the spread of environmental literacy

concept, there is still a growing discourse in literature on whether and how environmental literacy influences waste disposal behaviour of university undergraduates in Enugu State (Roth 1992, Robin 2013). This is the major gap that triggered this study.

Again, there are conflicting and fragmented findings from quantum of studies till date in providing a valid model of who are environmental literate citizens and the generalizable conclusions of variations on consumers' environmental literacy behaviour that could apply in all contexts (Wike 1995 McBride, Berkowitz Borne 2013). However, it is not clear how these variations in consumers' environmental literacy behaviour and lack of generalizable conclusions influence students' environmental literacy. The effects and lack of provision of a valid model of who are environmentally citizens need to be investigated.

Finally, while researchers and scholars especially those in the developed nations of the world have conducted numerous studies on environmental literacy (see Williams 2017, Frazen & King 2017, Burchett 2015, Fiden et al 2016, Erdogan 2011). (Western dominance), not much research has been done in developing countries like Nigeria a typical developing nation. A few studies that have been conducted in developing nations did not adequately reflect how environmental literacy influences waste disposal behaviour of consumers in Nigeria.

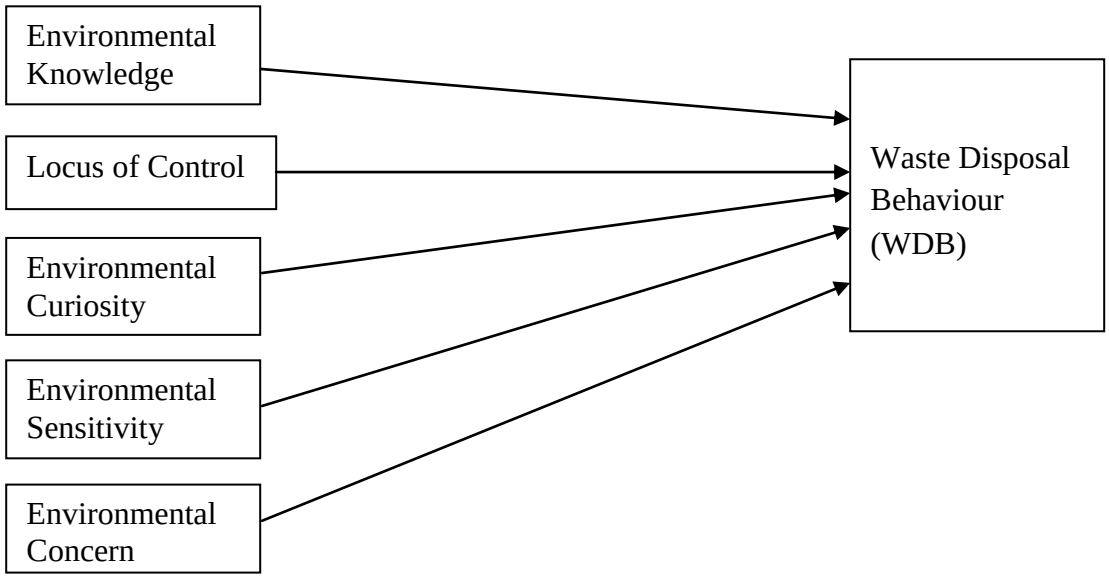


Figure 6: The Research Model

Source: Adapted from Tomera 2013 Environmental Responsible Behaviour.

Figure 6 shows the direct effect of independent variables on the dependent variable. This suggests that having higher environmental knowledge and environmental curiosity etc to take environmental action leads to engaging more in responsible behaviour towards the environmental protection (Hangerford & Volk 1990). This further suggests that proper waste disposal of students depends on their environmental knowledge, locus of control, environmental concern, environmental sensivity and environmental curiosity concerning the environment.

2.6 Summary of Review of Related Literature

Environmental literacy refers to an understanding of the interaction between humans and their natural environment with regard to both living and non-living things. The focus of environmental literacy was to make people more knowledgeable about the environment and its associated issues with a view to being environmentally knowledgable which will lead to pro-environmental behaviour.

Literature reviewe of this work addressed all the vital areas expected. Existing related academic research studies were reviewed simultaneously with the theoretical foundation employed to anchor this research. Furthermore, all the concepts and variables used in this study including; environmental knowledge, locus of control, environmental curiosity, environmental sensitivity, environmental concern, waste disposal behaviour, concept of environment and environmentalism, pro-environmental behaviour, methods of waste disposal, waste hierarchy etc were extensively conceptualized in this chapter.

In addition to the above, quite a number of gaps were identified from the previous studies reviewed. Infact, there is a relatively low volume of research in the domain of environmental literacy and waste disposal behaviour of university undergraduates in Nigeria, most of them centred on, promotion of environmental literacy in university education in Nigeria (Eheazu 2014). Impact of environmental education and knowledge attitude of students towards the environment in Nigeria (Don, Juliet & Erhabor 2010), determining ecological knowledge and attitudes of students in Akure, Nigeria (Ogunjimni, Oluwatuyi & Onyia, 2015). However, none of these studies were conducted using environmental knowledge, locus of control, environmental curiosity,

environmental sensitivity and environmental concern to investigate how these factors influence waste disposal of university undergraduates in Enugu State, Nigeria. It should also be noted that several weaknesses were indentified in these studies. First was inadequacy of empirical study on environmental literacy and waste disposal behaviour of university undergraduates in Nigeria, second, most of these studies were done in the western world (western dominance) and are alien to a typical developing nation like Nigeria. Some studies confirmed positive relationship, some confirmed negative relationship, while some remained undecided or inconclusive. This arouse my research interest hence this empirical investigation.

CHAPTER THREE

RESEARCH METHODOLOGY

Research methodology refers to a set of systematic techniques used in a research. It is a guide to research and how it is conducted (Sanders, Lewis & Thornhill; 2012). In the light of the above, this chapter on research methodology was divided into eleven sections namely: research design, area of study, population of the study, sample size determination, sampling procedures, sources of data, description of research instrument, validity and reliability, administration of research instrument, measurement of variables of study and data analysis, etc.

3.1 Research Design

Survey research design was adopted and used in this study and this involves asking questions to respondents and recording responses using a structured instrument (Hair et al; 2012). This type of design is more directly related to descriptive and causal research and success in collecting primary data is more a function of correctly designing and administering the survey instrument which in this research is the questionnaire.

3.2 Area of Study

This study was conducted across five universities in Enugu State Nigeria which are University of Nigeria Nsukka and Enugu Campuses, Enugu State University of Science and Technology, Enugu and Agbani Campuses, Godfrey Okoye University Enugu, Caritas University Enugu, and Madonna University Akpugo Campus.

The people of Enugu State are of Igbo extraction and their major language is Igbo. The State has seventeen local government areas, and two sytems of government state and local government administration. It has three arms of government, the executive, legislature and the judiciary. Enugu State had a population of 3,267,837 people according to National Bureau Statistics (NBS) (2015). A significant portion of the people of Enugu adhere to Christianity with small groups adhering to African traditional religion known as Omenani (Emmanuel; 2013).

3.3 Population of the Study

Population in our context refers to the defined group of individuals from which a sample is drawn (Bates & Cozby, 2012). The target population of this study consists of all university undergraduates of the selected universities in Enugu State, namely University of Nigeria Nsukka and Enugu Campuses, Enugu State University of Science and Technology, Enugu and Agbani Campuses, Caritas University Amorji Nike, Enugu, Godfrey Okoye University Thinkers Corner Enugu, Madonna University Akpugo Enugu State. According to the Registry Department of these universities as at 2017, there were 69,091 students in both public and private universities under study.

Table 3.1 below shows the population for this study.

University	Type of University	Year Founded	Population
University of Nigeria Nsukka/Enugu Campuses	Federal	1960	23,140
Enugu State University of Science and Technology Agbani & Enugu Campuses	State	1992	17,634
Madonna University Akpugo Enugu State	Private	2008	13,817
Caritas University Amorji Nike Enugu	Private	2005	4,500
Godfrey Okoye University Thinkers' Corner Enugu	Private	2008	10,000
Total			**69,091**

Source: Field Work, 2018

Specifically and in tanden with previous studies (Williams 2017; Eheazu 2014; Tugen et al 2016) that used university undergraduates as population of study, university students are likely to be the starting point of sustained change and action toward the environment. Most of the parents of the undergraduate students are illiterates and environmental literacy of their children will influence their proper waste disposal behaviour (Nkamnebe, 2017). Besides, a study conducted in Ghana, an emerging economy like Nigeria, Owusu and Matthew (2017) argued that in the context where

the interaction between human beings and the environment is not sustainable, it will make research sense to use university students who are found to be good predictors of the actual involvement in activities that promote sustainable and responsible environmental behaviour.

3.4 Sample Size Determination

A sample is defined as a group of objects selected from a population for the purpose of making generalization about the population from which the sample was drawn (Okeke et al 2014). We needed to draw a sample from the population as it would be difficult to study the entire population.

The Slovin's formular (2007) for finite population was used to determine the sample size.

The formular is stated thus:

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

Where

n	=	The number of subjects to be drawn from the population (sample size)
N	=	Population figure
e	=	Level of precision (tolerable error margin) * 95% confidence level and p = 0.05 are assumed (read from the standard normal distribution table)
I	=	Unity (always constant in value)

Substituting in the formula, we have

$$n = \frac{69{,}091}{1 + 69{,}091\ (0.05)^2}$$

$$n = \frac{69{,}091}{1 + 172.7275 \text{ X } 0.0025}$$

$$n = \frac{69{,}091}{173}$$

$$n = 399.6 \approx 400$$

Therefore, the sample size was 400.

3.5 Sampling Procedure

Sampling procedure refers to the method used to select a subset of the population that really represents the entire population (Saunders Lewis & Thornhill, 2012, Sharma; Shenoy & Srivastava, 2015; Okeke Olise & Eze; 2014).

This study adopted the stratified random sampling (STRs) procedure or the representative sampling procedure (Saunders et al 2012; Kothari & Gary 2014; Krishnaswany 2002).

To these researchers, this procedure is a complex random sampling design or mixed sampling design because it represents a combination of probability and non-probability sampling procedure in selecting a sample. As a probability sampling procedure, every unit of the study population has an equal and known probability of or chance of being represented in the sample. As a non-probability sampling procedure, the target population can be divided into different groups called strata, and the selection of samples from each stratum to constitute a sample (Kothari & Garg, 2014). Furthermore, Bowley's (1998) proportional allocation formula was employed to assign values to the samples selected.

3.6 Sources of Data

It is an axiom to mention here that the major pillar of research is data (Churchhill & Brown 2007). According to Hair et al; (2012), data refer to facts and figures relating to any issue of subject. It is what distinguishes research from guess work, imagination and other sources of knowledge. Data used in this study came from two main sources: primary and secondary sources of data. This appears consistent with Young (2011) and Hamii (2015) advocacy for methodological pluralism for behaviour oriented studies such as the one undertaken in this study.

Primary Sources

These are first-hand information collected basically for the purpose of the problem under investigation and the instrument used for this is questionnaire (Okeke, 2017). Primary data are original in nature (Kothari & Garg 2014).

Secondary Sources

These comprise sources of data which, though needed for the current study, were collected primarily for another study. Secondary data for this study were sourced from already existing materials like journals, discussion paper, internet, encyclopedia, newspapers.

3.7 Description of Research Instrument

The research instrument for this study was a structured questionnaire a list of questions designed to elicit information from the specified target respondents. There are justifications for the use of questionnaires (Kent 2009; Kothari & Garg, 2014). They are less expensive as they are administered to a large number of people at one place and at the same time. Again, it ensures anonymity and privacy; there is lack of bias and it ensures speedy administration and analysis.

The questions in the instrument were designed based on the constructs of the study. Accordingly, the questionnaire was divided into two sections. Section A dealt with demographic profile of respondents while section B dealt with the main constructs of this study namely, environmental knowledge, locus of control, environmental curiosity, environmental sensitivity and environmental concern. Five points likert scale of: strongly agree, agree, undecided, disagree, strongly disagree was used to measure some of the questions while others were measured using frequency and tables. This is in line with researches in marketing and consumer behaviour (Okeke, 2017).

3.8 Validity and Reliability of Research Instrument

3.8.1 Validity of Research Instrument

Validity refers to the extent which a research instrument measures what it is designed to measure (Gregory, 1992). The research instrument was content validated. Content validity is a judgment evaluation of the scale. This was achieved by submitting the research instrument to the experts in the department of Marketing, Nnamdi Azikiwe University Awka. Their critical and professional review of the questionnaire ensured not only the proper wording of the items but to modify it to be consistent with the objectives of the study (Malhotra & Dash 2013).

3.8.2 Reliability of Research Instrument

According to Jope (2001) this measures the extent the results of the instrument are consistent over time. The Cronbach's Alpha reliability test was used by the researcher. The Statistical Software Package, SPSS Version 23 was used to confirm the internal reliability. All statements under each construct were reliably tested using Cronbach's Alpha score with an acceptable coefficient of 0.60 and above. This is consistent with the argument that a scale is reliable if alpha value is between 0.60 to 0.70 (Hair et al, 2009).

Reliability Statistics

Cronbach's Alpha values for independent variables section of structured questionnaire

Cronbach's Alpha	Number of items
.894	25

Source: SPSS Version 23

The Cronbach's Alpha on the test of measurement reliability scale for independent variables showed an alpha level of .894 which is above the generally accepted threshold of .07. Thus, the instrument is reliable.

Reliability Statistics

Cronbach's Alpha values for dependent variable section of structured questionnaire

Cronbach's Alpha	Number of items
.883	4

Source: SPSS Version 23

The Cronbach's Alpha on the test of measurement reliability scale for the dependent variable showed an alpha level of .883 which is above the generally accepted threshold of .07. Thus, the instrument is reliable.

3.9 Administration of Research Instrument

The sample size for this study was 400, this means that 400 copies of research instrument were administered to undergraduates in the various selected universities in Enugu State.

Moreover, Bowley's and Aldrich (2002) proportional allocation formular was used to determine the number of elements to be drawn from the stratum. The formula is stated thus:

$$nhi = \frac{n\,(nh)}{N}$$

Where

nhi = The number of items in each stratum in the population

n = Total sample size

N = Population size

nh = The number of units to be allocated to each stratum

Distribution of sample using proportional allocation formular.

Allocation to selected universities in Enugu State.

$$\frac{\text{Total for Selected Universities}}{\text{Grand population total}} \times \frac{\text{Sample size}}{1}$$

Allocation to University of Nigeria Nsukka / Enugu Campuses

$$= \frac{23140 \times 400}{69091} = 134$$

Allocation to Enugu State University of Science and Technology Enugu/Agbani Campuses

$= \frac{17634 \text{ X } 400}{69091} = 102$

Allocation to Madonna University Akpugo

$= \frac{13817 \text{ X } 400}{69091} = 80$

Allocation to Caritas University Amorji Nike Enugu

$= \frac{4500 \text{ X } 400}{69091} = 26$

Allocation to Godfrey Okoye University Thinkers' Corner, Enugu

$= \frac{10{,}000 \text{ X } 400}{69091} = 58$

Total = 400

3.10 Measurement of Variables of Study

In research, variables are individual elements or attributes upon which data have been collected (Saunders et al; 2012; Bates & Cozby, 2012). According to Hair et al; (2014) measurement refers to rules for assigning numbers to objects so that these numbers represent quantities of attributes.

In the context of the present study, we measure the variables of this study under dependent and independent variables:

Dependent Variable

Dependent variables are the effects, outcomes, or simply the process the researcher is trying to explain or predict (Kent, 2007). The variable that remains constant is the independent variable. If we keep environmental literacy constant (independent variable) waste disposal behaviour (dependent variable) students waste disposal behaviour depend on how environmentally literate they are. In the language of cause

and effect relationship, the independent variable is the cause while the dependent variable is the effect (Anyanwu, 2000, Bates & Cozby, 2012).

Independent Variable

According to Bates and Cozby (2012), independent variables are variables when manipulated, influence, predict, and affect other variables. In this study, there were five independent variables which are: environmental knowledge, locus of control, environmental curiosity, environmental sensitivity and environmental concern.

3.11 Method of Data Analysis

The data collected to test the hypotheses for this study would be analysed using the Structural Equations Modelling (SEM) and because it is the SEM analysis we first conducted a confirmatory factor analysis. Confirmatory factor analysis (CFA) is a version of *factor analysis* in which specific hypotheses about structure and relations between the *latent variables* that underlie the data are tested (Field, 2013). CFA was employed to determine the degree of internal consistency between the multiple measurements and to ensure the reliability and the unidimensionality of the items used to measure the constructs.

The data collected was analyzed with the aid of statistical package for social sciences (SPSS) version 23.0 software. Analysis was performed in two parts: descriptive and inferential statistics.

Descriptive Statistics

According to Ezejelue, Ogwo and Nkamnebe (2009), descriptive statistics refers to that branch of statistics that deals with describing the important aspects of a population or a sample. Tables, frequencies and percentages were used to present the responses to the questions as contained in the research instrument. Morever, means and standard deviations were also evaluated for all the constructs of environmental literacy of the students.

Inferential Statistics

According to Okeke (2001) inferential statistics refers to that branch of statistics which studies a group of numerical data in order to use the result in making generalization on a larger group of data. Logically, it is basically a procedure for making decisions based on information obtained from a part of a population. Statistical package for social sciences SPSS 23.0 was used for descriptive analysis while the multiple linear regression was done with Structural Equation Modeling (SEM) with the aid of Analysis of Moment Structures (AMOS) 23 software.

The general equation of the multiple regression models is as follows:

$Y = \beta_o + \beta x_1 + \beta x_2 + \beta x_3 + \beta x_4 + \beta x_5 + e$

Where

Y	=	Dependent variable
βo	=	Intercept
β_1	=	Coefficient representing the contribution of the independent variables X1, X2, X3, X4, X5. variable that is associated with the predictor variables
X_1	=	Represents the independent variables that influence the dependent variable
e	=	Denotes error terms

The preliminary analysis which includes data entry, data presentation, and descriptive analysis were done with SPSS version 23 while the multiple linear regression was done with structural equations modeling (SEM) with the aid of Analysis of Moment Structures (AMOS 23) software. The use of structural equation modeling (SEM) is justified by the following reasons.

i. This study deals with the measurement of many variables (environmental knowledge, locus of control, environmental curiosity, environmental sensitivity and environmental concern), therefore multivariate analysis has been chosen through structural equation modeling (SEM). Multivariate

analysis is statistical techniques that simultaneously analyze multiple measurements on individuals under study (Anderson & Gerbing, 2009).

ii. SEM is able to deal directly with how well the measures reflect their intended constructs by applying one of its applications, Confirmatory Factor Analysis (CFA). CFA is both more rigorous and more parsimonious than other statistical techniques in estimating the reliability and construct validity of measures (Krishnaswany, 2002).

iii. SEM also provides flexible and powerful means of simultaneously assessing the quality of the research model and examining the relationship among its constructs (Byrne, 2001). It tests hypotheses by explicit tests of both the overall quality of the factor solution and the specific parameters composing the model (Kent, 2007).

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

This chapter concerns data presentation, analyses and interpretation of the results of the analyses. Accordingly the chapter is handled under the following sub-headings: data presentation, descriptive statistics analysis, assessment of normality, analysis of the measurement model/confirmatory factor analysis, the research SEM model and hypotheses testing.

4.1 Data Presentation

In this section we presented the responses to the questions as contained in the research instrument which is the primary data collection tool. We started first with the socio-demographics or just the demographic variables after which we presented the responses to the items used to measure the constructs.

Table 4.1: Demographic characteristics of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Gender:	Male	165	44.8	44.8	44.8
	Female	203	55.2	55.2	100.0
	Total	368	100.0	100.0	
Age bracket:	18-20 years	66	17.9	17.9	17.9
	21-25 years	138	37.5	37.5	55.4
	26-30 years	164	44.6	44.6	100.0
	Total	368	100.0	100.0	
Ethnicity:	Igbo	301	81.8	81.8	81.8
	Hausa	37	10.1	10.1	91.8
	Yoruba	30	8.2	8.2	100.0
	Total	368	100.0	100.0	
Religion:	Christianity	317	86.1	86.1	86.1
	Islam	51	13.9	13.9	100.0
	Total	368	100.0	100.0	

Source: Field Work, 2018

From Table 4.1, 165(44.8%) of the respondents were males while 203(55.2%) were females. On age bracket, 66(17.9%) were within the age of 18-20 years; 138(37.5%) were within the age bracket of 21-25 years; while majority of 164(44.6%) were within the age

bracket of 26-30 years. On ethnicity, majority of the respondents 301(81.8%) were Igbo, 37(10.1%) were Hausa, while the remaining 30(8.2%) were Yoruba. This was informed by the fact that the study was conducted in an Igbo dominated area. On religion, 317(86.1%) were Christians while the remaining 51(13.9%) were of the Islamic faith. Again Enugu State is Chriatian dominated hence the high response from Christianity. Next we presented the responses to the items used to measure the various constructs.

Table 4.2: Responses on Environmental Knowledge

Environmental Knowledge	**Strongly Agree**		**Agree**		**Undecided**		**Disagree**		**Strongly Disagree**	
Items	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
My knowledge of environmental issues will influence me to sort waste before disposal.	167	45.4	179	48.6	7	1.9	15	4.1	-	-
Environmental knowledge provides me with useful information about sorting system.	74	20.1	168	45.7	30	8.2	82	22.3	14	3.8
I rely on environmental knowledge for proper waste sorting.	71	19.3	108	29.3	68	18.5	91	24.7	30	8.2
Environmental knowledge helps me to sort waste easily.	96	26.1	163	44.3	50	13.6	37	10.1	22	6.0
Waste sorting is an easy and efficient way of solid waste disposal.	124	33.7	36	9.8	21	5.7	89	24.2	98	26.6

Source: Field Work, 2018

The first construct is Environmental Knowledge measured with five items, the responses to which were shown in Table 4.2. For the first item, 167(45.4%) strongly agreed, 179(48.6%) agreed, 7(1.9%) were undecided, 15(4.1%) disagreed. For the second item, 74(20.1%) indicated strongly agreed, 168(45.7%) agreed, 30(8.2%) were undecided,

82(22.3%) disagreed while the remaining 14(3.8%) strongly disagreed. For item three, 71(19.3%) indicated strongly agreed, 108(29.3%) agreed, 68(18.5%) were undecided, 91(24.7%) disagreed while the remaining 30(8.2%) disagreed. For item four, 96 (26.1%) indicated strongly agreed, 163(44.3%) agreed, 50(13.6%) were undecided, 37(10.1%) agreed while the remaining 22(6.0%) strongly disagreed. For item five, 124(33.7%) strongly agreed, 36(9.8%) agreed, 21(5.7%) were undecided, 89 (24.2%) disagreed while the remaining 98(26.6%) strongly disagreed.

Table 4.3: Responses on Locus of Control

Locus of Control	**Strongly Agree**		**Agree**		**Undecided**		**Disagree**		**Strongly Disagree**	
Items	**Freq.**	**%**	**Freq**	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
Locus of control encourages me to control my clothes donation practice.	72	19.6	110	29.9	59	16.0	91	24.7	36	9.8
Locus of control increases my preference to encourage others to donate clothes the way I do.	43	11.7	129	35.1	35	9.5	115	31.3	46	12.5
Locus of control is positively associated with responsible environmental behaviour such as donation and recycling.	84	22.8	155	42.1	49	13.3	58	15.8	22	16.0
Internal locus of control influences my choice of donation to charitable organizations.	52	14.1	167	45.4	51	13.9	59	16.0	39	10.6
I know the benefits of donation as a waste disposal behaviour.	57	15.5	117	31.8	73	19.8	39	10.6	82	22.3
Locus of control has a significant impact on students' donation behaviour.	86	23.4	88	23.9	61	16.6	104	28.3	29	7.9

Source: Field Work, 2018

The second construct is Locus of Control measured with six items, the responses to which were shown in Table 4.3. For the first item, 72(19.6%) strongly agreed, 110(29.9%) agreed, 59(16.0%) were undecided, 91(24.7%) disagreed, 36(9.8%) strongly disagreed. For the second item, 43(11.7%) indicated strongly agreed, 129(35.1%) agreed, 35(9.5%) were undecided, 115(31.3%) disagreed while the remaining 46(12.5%) strongly disagreed. For item three, 84(22.8%) indicated strongly agreed, 155(42.1%) agreed, 49(13.3%) were undecided, 58(15.8%) disagreed while the remaining 22(16.0%) disagreed. For item four, 52(14.1%) indicated strongly agreed, 167(45.4%) agreed, 51(13.9%) were undecided, 59(16.0%) disagreed while the remaining 39(10.6%) strongly disagreed. For item five, 57(15.5%) strongly agreed, 117(31.8%) agreed, 73(19.8%) were undecided, 39(10.6%) disagreed while the remaining 82(22.3%) strongly disagreed. Lastly for item six, 86(23.4%) strongly agreed, 88(23.9%) agreed, 61(16.6%) were undecided, 104(28.3%) disagreed while the remaining 29(7.9%) strongly disagreed.

Table 4.4: Responses on Environmental Curiosity

Environmental Curiosity	**Strongly Agree**		**Agree**		**Undecided**		**Disagree**		**Strongly Disagree**	
Items	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Environmental literacy programmes that focus on environmental activism will be better understood.	128	34.8	233	63.3	7	1.9	-	-	-	-
Environmental curiosity encourages me to describe myself as an activist who bring about positive environmental change.	160	43.5	149	40.5	7	1.9	44	12.0	8	2.2
Activism encompasses a wide range of actions that aim to provoke social change.	114	31.0	168	45.7	42	11.4	29	7.9	15	4.1
My friends would rather describe me as an environmental activist who is curious for societal change.	87	23.6	93	25.3	37	10.1	121	32.9	30	8.2

Source: Field Work, 2018

The third construct is Environmental curiosity measured with four items, the responses to which were shown in Table 4.4. For the first item, 128(34.8%) strongly agreed, 233(63.3%) agreed, 7(1.9%) were undecided. For the second item, 160(43.5%) indicated strongly agreed, 149(40.5%) agreed, 7(1.9%) were undecided, 44(12.0%) disagreed while the remaining 8(2.2%) strongly disagreed. For item three, 114 (31.0%) indicated strongly agreed, 168(45.7%) agreed, 42(11.4%) were undecided, 29(7.9%) disagreed while the remaining 15(4.1%) strongly disagreed. For item four, 87(23.6%) strongly agreed, 93(25.3%) agreed, 37(10.1%) were undecided, 121(32.9%) disagreed while the remaining 30(8.2%) strongly disagreed.

Table 4.5: Responses on Environmental Concern

Environmental Concern	**Strongly Agree**		**Agree**		**Undecided**		**Disagree**		**Strongly Disagree**	
Items	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
I will not dump wastes in gutters and river channels if there are waste bins at strategic points.	136	37.0	209	56.8	23	6.3	-	-	-	-
Naturally, I am passionate about the well-being of the environment. So I feel guilty if I do not dump waste in an environmentally friendly manner.	158	42.9	72	19.6	30	8.2	93	25.3	15	4.1
My personal values do not support dumping of waste indiscriminately.	191	51.9	140	38.0	7	1.9	-	-	30	8.2
Environmental concern discourages consumers' dumping of waste in gutters and river channels.	109	29.6	170	46.2	29	7.9	29	7.9	31	8.4
Concern for the environment encourages me to consume sustainably.	71	19.3	88	23.9	59	16.0	80	21.7	70	19.0
I am concerned about how dumping of waste affect the environment.	98	26.6	148	40.2	69	18.8	24	6.5	29	7.9

Source: Field Work, 2018

The forth construct is Environmental Concern measured with six items, the responses to which were shown in Table 4.5. For the first item, 136(37.0%) strongly agreed, 209 (56.8%) agreed, 23(6.3%) were undecided. For the second item, 158 (42.9%) strongly agreed, 72(19.6%) agreed, 30(8.2%) were undecided, 93(25.3%) disagreed while 15(4.1%) strongly disagreed. For item three, 191(51.9%) indicated strongly agreed, 140(38.0%) agreed, 7(1.9%) were undecided, while the remaining 30(8.2%) strongly disagreed. For item four, 109(29.6%) strongly agreed, 170(46.2%) agreed, 29(7.9%) were undecided, 29 (7.9%) disagreed while the remaining 31(8.4%) strongly disagreed. For item five, 71(19.3%) strongly agreed, 88(23.9%) agreed, 59(16.0%) were undecided, 80(21.7%) disagreed while 70(19.0%) strongly disagreed. Lastly for item six, 98(26.6%) strongly agreed, 148(40.2%) agreed, 69(18.8%) were undecided, 24(6.5%) disagreed while the remaining 29(7.9%) strongly disagreed.

Table 4.6: Responses on Environmental Sensitivity

Environmental Sensitivity	**Strongly Agree**		**Agree**		**Undecided**		**Disagree**		**Strongly Disagree**	
Items	**Freq.**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
I am empathic about the environment so I refuse to incinerate waste in an open area.	64	17.4	201	54.6	59	16.0	30	8.2	14	3.8
I conserve natural resources, respect hunting and fishing laws.	42	11.4	42	11.4	103	28.0	71	19.3	110	29.9
Incineration is not an expression of caring and positive feeling toward the environment.	90	24.5	183	49.7	36	9.8	22	6.0	37	10.1
Environmental sensitivity that focus on changes in people's values will discourage incineration as a waste disposal action.	110	29.9	228	62.0	8	2.2	7	1.9	15	4.1

Source: Field Work, 2018

The fifth construct is Environmental Sensitivity measured with four items, the responses to which were shown in Table 4.6. For the first item, 64(17.4%) strongly agreed, 201(54.6%) agreed, 59(16.0%) were undecided, 30(8.2%) disagreed, while 14(3.8%) strongly disagreed. For the second item, 42(11.4%) strongly agreed, 42(11.4%) agreed, 103(28.0%) were undecided, 71(19.3%) disagreed while 110 (29.9%) strongly disagreed. For item three, 90 (24.5%) strongly agreed, 183(49.7%) agreed, 36(9.8%) were undecided, 22(6.0%) disagreed while 37(10.1%) disagreed. For item four, 110 (29.9%) strongly agreed, 228 (62.0%) agreed, 8(2.2%) were undecided, 7(1.9%) disagreed while 15(4.1%) strongly disagreed.

Table 4.7: Responses on Waste Disposal Behaviour.

Waste Disposal Behaviour	**Strongly Agree**		**Agree**		**Undecided**		**Disagree**		**Strongly Disagree**	
Items	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Waste disposal behaviour is the storage and destruction of waste materials in such a way that the impact on the environment and society is minimized.	185	50.3	169	45.9	7	1.9	-	-	7	1.9
Undergraduates that dispose waste properly are engaged in an environmental responsible behaviour.	117	31.8	236	64.1	7	1.9	-	-	8	2.2
Undergraduates who dump waste indiscriminately portray a negative attitude toward the environment.	94	25.5	168	45.7	14	3.8	30	8.2	62	16.8
Undergraduates that sort waste display pro-environmental behaviour.	117	31.8	176	47.8	24	6.5	44	12.0	7	1.9

Source: Field Work, 2018

The sixth construct was the dependent variable that is, Waste Disposal Behaviour measured with four items, the responses to which were shown in Table 4.7. For the first item, 185(50.3%) strongly agreed, 169(54.6%) agreed, while 7(1.9%) strongly disagreed. For the second item, 117(31.8%) strongly agreed, 236(64.1%) agreed, 7(1.9%) were undecided, while 8(2.2%) strongly disagreed. For item three, 94(25.5%) strongly agreed, 168(45.7%) agreed, 14(3.8%) were undecided, 30(8.2%) disagreed while 62(16.8%) disagreed. For item four, 117(31.8%) strongly agreed, 176(47.8%) agreed, 24(6.5%) were undecided, 44(12.0%) disagreed while 7(1.9%) strongly disagreed. The next stage is the descriptive statistics analysis.

4.2 Descriptive Analysis

Preliminary analysis of the data collected from the field was conducted using a number of descriptive statistics. The descriptive statistics were employed to check the behavior of the data and to ready the data for inferential statistics analysis. The results of the analysis are shown in Table 4.8

Table 4.8:Descriptive Statistics

	N	Minimum	Maxi-mum	Mean	Std. Deviat-ion	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
EK1	368	2	5	4.35	.716	-1.311	.127	2.412	.254
EK2	368	1	5	3.56	1.152	-.567	.127	-.798	.254
EK3	368	1	5	3.27	1.253	-.177	.127	-1.116	.254
EK4	368	1	5	3.74	1.129	-.912	.127	.119	.254
EK5	368	1	5	3.00	1.661	.098	.127	-1.687	.254
LoC1	368	1	5	3.25	1.290	-.193	.127	-1.170	.254
LoC2	368	1	5	3.02	1.278	-.064	.127	-1.293	.254
LoC3	368	1	5	3.60	1.172	-.672	.127	-.502	.254
LoC4	368	1	5	3.36	1.214	-.607	.127	-.703	.254
LoC5	368	1	5	3.08	1.391	-.289	.127	-1.217	.254
LoC6	368	1	5	3.27	1.306	-.082	.127	-1.277	.254
EnCur1	368	3	5	4.33	.509	.290	.127	-.946	.254
EnCur2	368	1	5	4.11	1.058	-1.280	.127	.817	.254
EnCur3	368	1	5	3.92	1.050	-1.096	.127	.766	.254
EnCur4	368	1	5	3.23	1.343	-.046	.127	-1.402	.254
EnCon1	368	3	5	4.31	.582	-.169	.127	-.602	.254
EnCon2	368	1	5	3.72	1.347	-.508	.127	-1.286	.254
EnCon3	368	1	5	4.26	1.100	-2.002	.127	3.497	.254
EnCon4	368	1	5	3.81	1.190	-1.116	.127	.388	.254
EnCon5	368	1	5	3.03	1.412	-.042	.127	-1.335	.254
EnCon6	368	1	5	3.71	1.160	-.898	.127	.136	.254
EnSen1	368	1	5	3.74	.967	-1.013	.127	.895	.254
EnSen2	368	1	5	2.55	1.328	.387	.127	-.937	.254
EnSen3	368	1	5	3.73	1.190	-1.116	.127	.414	.254
EnSen4	368	1	5	4.12	.867	-1.917	.127	4.987	.254
WDB1	368	1	5	4.43	.716	-2.094	.127	7.736	.254
WDB2	368	2	5	4.26	.600	-.778	.127	2.572	.254
WDB3	368	1	5	3.55	1.392	-.851	.127	-.653	.254
WDB4	368	1	5	3.96	1.017	-1.039	.127	.446	.254
Valid N (listwise)	368								

Source: SPSS Output

Table 4.8 presents the information requested for each of the items used to measure the variables of the study. The next two columns show the minimum and maximum and the highest under maximum is 5 while the least under minimum is 1. This is a confirmation that the variables were measured with five-point scale coded one to five. Also from the table all the items have mean range from 2.55 and above up to 4.54 among other mean values while most of the standard deviation values are above one. Standard deviations measure variability hence with standard deviations above one for items measured with five point likert scale is an indication that the respondents are not in agreement as their opinions are diverse.

Descriptives statistics also provides information concerning the distribution of the scores on continuous variables (skewness and kurtosis) (Pallant, 2016). These pieces of information are necessary if the variables are to be used in parametric statistical techniques (eg. Pearson correlation, t-tests, and covariance structural equations modelling (CB-SEM)) which is the situation in this study. The skewness value provides an indication of the symmetry of the distribution. Kurtosis on the other hand provides information about the "peakedness" of the distribution. Positive skewness values indicate positive skew (scores clustered to the left at the low values). Negative skewness indicates a clustering of scores at the high end which is the situation with our data. Positive kurtosis values indicate that the distribution is rather peaked (clustered in the centre), with long thin tails. Kurtosis values below 0 indicate a distribution that is relatively flat (too many cases in the extremes). In Table 4.8, the skewness of the items are mixed with very high values and very low values. Also the kurtosis show very high and very low or values below zero. This implies that there is a mix of peakedness and flattened values in the items.

4.3 Confirmatory Factor Analysis

This section is confirmatory factor analysis (CFA). CFA is a way of testing how well measured variables represent a smaller number of constructs (Hair, et al 2009). CFA is used to provide a confirmatory test of our measurement theory. A measurement theory specifies how measured variables logically and systematically represent constructs involved in a theoretical model (Hair, et al. 2009). In other words, measurement theory

specifies a series of relationships that suggest how measured variables represent a latent construct that is not measured directly. The measurement theory may then be combined with a structural theory to fully specify a SEM model. The CFA model is shown in Figure 7.

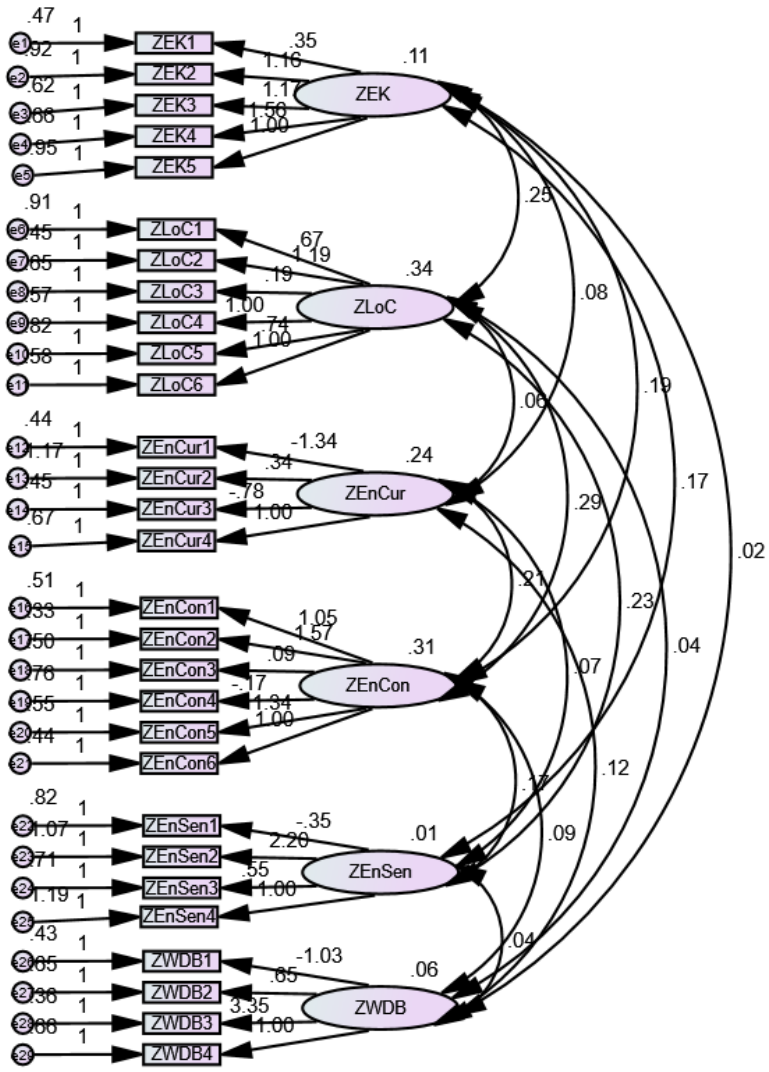


Figure 7: Measurement/Confirmatory Factor Analysis Model.

Related to the leverage values are the Mahalanobis distances, which measure the distance of cases from the mean(s) of the predictor variable(s). Look for the cases with the highest values. These distances have a chi-square distribution, with degrees of freedom equal to the number of predictors (Tabachnick & Fidell, 2012).Because of the above further analysis was conducted using the Mahalanobis Distance which indicate

that many of the responses were observations farthest from the centroid (Mahalanobis distance) and were removed (Appendix C). The *Rule of Thumb* is that for a study with five predictors like this our study Mahalanobis Distance above 25 are a cause for concern. These observations were removed and the other observations were standardized (Z-Values) and used to run the confirmatory factor analysis (CFA) and the SEM models.The CFA was run two times and Figure is the second run. The results are: Chi-Square: 4631.32, degree of Freedom DF: 362 and p-value = .000; root mean residual (RMR): .15; while the root mean square error approximation (RMSEA): .17. Based on these we proceed to run the structural equations modelling to confirm/validate the hypotheses.

4.4 Hypotheses Testing

The results of the structural model shown in Figure 9 were used to test the five hypotheses formulated for the study.

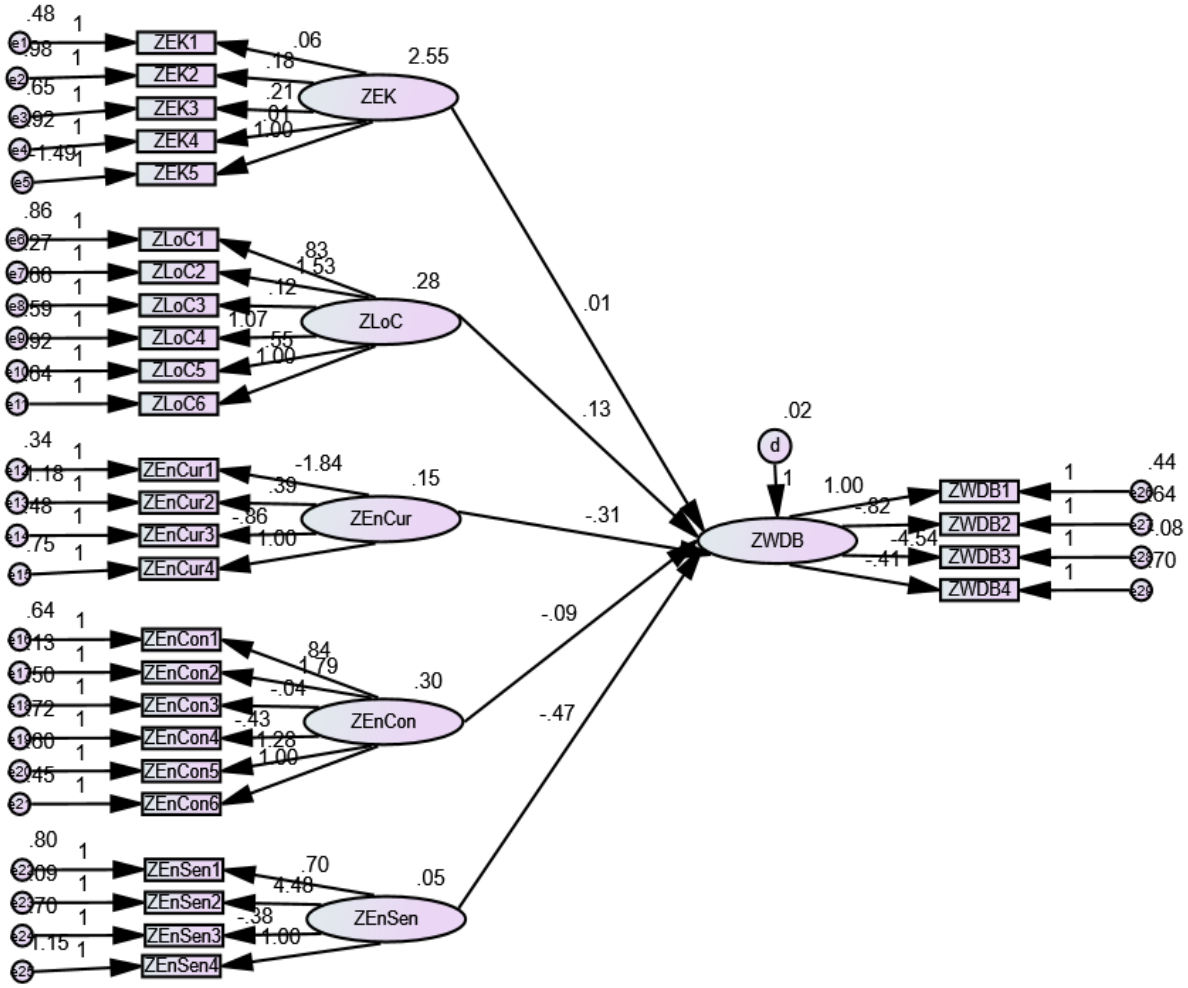


Figure 8: The Research SEM Model.

Structural Equation Modeling (SEM) is an advanced statistical techniques that are used to evaluate a proposed set of relationships among variables using quantitative non experimental methods. SEM has its roots in path analysis which was invented by the geneticist Sewall Wright (Wright, 1918). To date, it is customary to start a SEM analysis by drawing a path diagram. According to Raykor and Marcauliders (2000) a path diagram consists of boxes and circles, which are connected by arrows.

Field (2000) pointed out that a popular way to conceptualize a model is using a path diagram, which is a schematic drawing of the system (model) to be estimated. As we can see in the work circles or eclipses represents latent variables, squares or rectangles represents measured variables; single-headed arrow represents directional effects. A double-headed arrow represents non-directional relations, it is useful to represent the

variance of a variable using a double-headed arrow that connects a variable to itself. Each arrow represents either a free of fixed parameter. Fixed parameters should be indicated by their value, free parameters should be indicated using an appropriate letter or asterisks.

The results are: Chi-Square: 6861.483, degree of Freedom DF: 372 and p-value = .000; which is an increase over that of the measurement model hence we proceed to interpret the coefficients from the regression weights and use that to validate the research hypotheses.

Table 4.9: Regression Weights: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
ZWDB <--- ZEK	.013	.007	1.884	.060	Not Supported
ZWDB <--- ZLoC	.126	.036	3.478	***	Supported
ZWDB <--- ZEnCur	-.310	.089	-3.476	***	Supported
ZWDB <--- ZEnCon	-.086	.026	-3.242	.001	Supported
ZWDB <--- ZEnSen	-.466	.180	-2.598	.009	Supported

$H1_1$: There is a positive relationship between environmental knowledge and waste disposal behaviour of university undergraduates.

The path ZWDB <--- ZEK has a coefficient of .013; critical ratio (CR) = 1.884 and ρ-value of .060 which is above the .05 margin of error hence hypothesis one is rejected.

$H1_2$: There is a positive relationship between locus of control and waste disposal behaviour of university undergraduates.

The path ZWDB <--- ZLoC has a coefficient of .126; critical ratio (CR) = 3.478 and ρ-value of .000 which is well below the .05 margin of error hence hypothesis two is accepted and validated.

$H1_3$: There is a positive relationship between Environmental curiosity and waste disposal behaviour of university undergraduates.

The path ZWDB <--- ZEnCur has a coefficient of -.310; critical ratio (CR) = -3.476 and ρ-value of .000 which is well below the .05 margin of error hence hypothesis three is accepted and validated.

$H1_4$: There is a positive relationship between environmental sensitivity and waste disposal behaviour of university undergraduates.

The path ZWDB <--- ZEnSen has a coefficient of -.466; critical ratio (CR) = -2.598 and ρ-value of .009 which is well below the .05 margin of error hence hypothesis four is accepted and validated.

$H1_5$: There is a positive relationship between environmental concern and waste disposal behaviour of university undergraduates.

The path ZWDB <--- ZEnCon has a coefficient of -.086; critical ratio (CR) = -3.242 and ρ-value of .001 which is well below the .05 margin of error hence hypothesis five is accepted and validated.

4.5 Discussion of Findings

The main objective of this study was to investigate environmental literacy and waste disposal behaviour of university undergraduates in Enugu State. Environmental literacy was decomposed into environmental knowledge, locus of control, environmental curiosity, environmental sensitivity and environmental concern. These variables were subjected to statistical tests against waste disposal behaviour.

Environmental Knowledge and Waste Disposal Behaviour

Hypothesis one was tested with the structural modeling to examine the relationship between environmental knowledge and waste disposal behaviour of university undergraduates in Enugu State. The coefficient shows .013 with a p-value of .060 which is above the margin of error 0.05. This suggests that there was no positive relationship between environmental knowledge and waste disposal behaviour of university undergraduates this led to rejection of hypothesis one.

This result was in support of the views of (Disinger & Roth, 1992) which reported that knowledge alone is not necessary for decisions about the adoption of eco-practices and sustainable behaviours (Byers, 1996) and for initiation of action. In constrast, (Spinola 2015, Ofori et al 2017; Hungerford & Volk 1990; Ramsey & Rickson, 1976; Rowe 2007; Orion & Carmi 2014) reported that concrete knowledge can actually be applied to the protection of the environment (example proper waste disposal, consumption of products that are less harmful to the environment, energy and water conservation (Schahn & Holzt, 1991).

Besides Schahn and Holzt (1990), Salem (2014) distinguished between abstract knowledge and concrete knowledge, whereas abstract knowledge measures factual knowledge about the environment; example ecology, harmful effects of phosphate on marine life (Maloney & Ward, 1973). Concrete knowledge measures knowledge about environmental behaviour that can be applied to the protection of the environment (example, proper waste disposal, consumption of products that is less harmful to the environment, energy and water conservation.

Locus of Control and Waste Disposal Behaviour

Hypothesis two was tested with structural equation modeling to examine the relationship between locus of control and waste disposal behaviour of university undergraduates. The coefficient shows .126 with p-value of .000 which is well below the .05 margin of error. This implies that there is a positive relationship between locus of control and waste disposal behaviour of students, which led to the acceptance and validation of hypothesis two.

This result corroborates with the views expressed by (Hwang, Kim & Jeng 2000, Hsu 2004) that locus of control is positively related to activities toward ecological conscious living and environmental behaviour. From extant literature reviewed, it was also discovered that internal locus of control is related to the propensity to purchase ecologically packaged products. Meanwhile, previous studies on environmental behaviour (see Hines, Hungerford & Tomera 1987) reported that an internal locus of control is positively related to environmentally responsible behaviour and provide people with the belief that they can do something to preserve the environment.

Environmental Curiosity and Waste Disposal Behaviour

Hypothesis three was tested with structural equation modeling to examine the relationship between environmental curiosity and waste disposal behaviour of university undergraduates. The coefficient shows .310 with p-value .000 which is well below the .05 margin of error. This implies that there is a positive relationship between environmental curiosity and waste disposal behaviour of university undergraduates, which led to acceptance of hypothesis three.

This result was in support of the views expressed by (Mussel 2012, Reio 2000, Kashdam & Roberts 2004) that environmental curiosity influences university undergraduates' behaviour in both positive and negative ways at all the stages of their life cycle. Besides, this finding contradicts earlier argument in mainstream literature reported by (Day 1982, Schmitt & Lahroodi 2008; Reio, 1997, Loewy 1978) that, indeed, environmental curiosity is a trigger of learning and a driving force in students' environmental literacy development. Indeed, the finding of this lend credence to eloquent testimony to the forceful argument of (Yaman, Deringol & Ozsari, 2011) that environmental curiosity still remains eagerness to learn about environment and wondering to explore the relationship between man and the environment.

Environmental Sensitivity and Waste Disposal Behaviour

Hypothesis four was tested with structural equation modeling to examine the relationship between environmental sensitivity and waste disposal behaviour of university undergraduates. The coefficient shows -466 with p-value of .009 which is well below the .05 margin of error.

This implies that there was a positive relationship between environmental sensitivity and waste disposal behaviour of university undergraduates which led to the acceptance of hypothesis four.

This result was in support of the views of (Hungerford & Volk 1990, Yang, Jan & Lee, 2013, Chawla, 1998, Sia, Hungerford & Tomera 1988; Peterson 1982) that environmental sensitivity denotes the expression of caring and positive feelings towards the environment. Yang et al (2013) also revealed that environmental sensitivity represents an individual's empathy for the environment, interest in learning about the environment, concern for the environment and tendency to act to protect the environment.

Environmental Concern and Waste Disposal Behaviour

Hypothesis five was tested with structural equation modeling to examine the relationship between environmental concern and waste disposal behaviour of university undergraduates. The coefficient shows -086 with p-value of .001 which is

below.05 margin of error. This implies that there is a positive relationship between environmental concern and waste disposal behaviour of university undergraduates, which led to the acceptance of hypothesis five in chapter one.

This result was in consonance with the studies of (Alibeli & Johnson 2015, Aman, Hamn & Hussein, 2012) that environmental concern are awareness of environmental issues and their willingness to solve both concrete and abstract environmental problems. Concrete environmental problems are visible local environmental degradation such as water and air pollution that has an immediate and direct effect on individuals, while abstract environmental problems are less visible and are more global problems which do not cause immediate threat to individuals such as ozone depletion and global warming (Gosken, Adaman & Zenginobus, 2002, Liebe, Preisendorrfer & Meyerchoff 2010). This study also found out that environmental concern is the degree of emotional involvement in environmental issues.

From consumer perspective, involvement is defined as the heightened state of awareness that motivates consumers to seek out, attend to, and think about product information before actual purchase (Okeke 2013, Beckman, Lindquist & Sirgy, 1997).

This study also found out that environmental concern is a function of some deeper cause such as underlying religious beliefs – "mastery of nature" and "stewardship of nature" (Murdock 2012) or dominant social paradigm (Pirages & Ehrlich, 1974), new environmental paradigm (Dunlap & Van Liere, 1978).

There is a common agreement among scholars (Baker & Saren 2011, Maclaran, 2009, Tadajewski, 2006, Majumdar, 2015) that theory offers explanations of the physical and social world around us and reveal deeper insights of how and why things happen. In line with these schools of thought, this study reviewed different behavioural and environmental and behavioural theories such as ecological value theory, health belief theory, social learning theory, cognitive dissonance theory, theory of human environmental interaction and diffusion of innovation theory. Inspite of these integrative applications of different theories to explain human behaviour, this study was anchored on theory of environmentally responsible behaviour (TERB) by Tomera

(2013). This theory states that environmental knowledge, locus of control, environmental curiosity, environmental sensitivity and environmental concern will influence whether a person adopt proper waste behaviour or not. It also assumes that people are predisposed to pro-environmental behaviour when they are environmentally literate. The relevance of this theory to this study is that it reflects all the variables that play a part in individual process of environmentally responsible behaviour adoption.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

This chapter provides the summary of the findings from data presentation and analysis in chapter four and it also gives conclusion and recommendations of the study based on the objectives this study hoped to achieve. The essence of this study was to investigate environmental literacy and waste disposal behaviour of university undergraduates in Enugu State.

These were the major findings from the analysis and hypotheses testing.

- There was no positive relationship between environmental knowledge and waste disposal behaviour of university undergraduates.
- There was a positive relationship between locus of control and waste disposal behaviour of university undergraduates.
- There was a positive relationship between environmental curiosity and waste disposal behaviour of university undergraduates.
- Environmental sensitivity was found to be positively related to waste disposal behaviour of university undergraduates.
- There was a positive relationship between environmental concern and waste disposal behaviour of university undergraduates.

5.2 Conclusion

The conclusions of this study are based on the results of major findings and test of hypotheses. This study concludes that there was no positive relationship between environmental knowledge and waste disposal behaviour of university undergraduates in Enugu State, Nigeria. The findings also show that locus of control, environmental curiosity, environmental concern and environmental sensitivity have positive relationship with waste disposal behaviour of university undergraduates in Enugu State.

5.3 Recommendations

From the major findings, we recommend the following measures to nip in the bud the indiscriminate waste disposal behaviour of university undergraduates in Enugu State, Nigeria.

1. Since there was no positive relationship between environmental knowledge and waste disposal behaviour, this study recommends that environmental programmes be integrated into the academic curriculum for university undergraduates to enable them to fully appreciate these environmental issues that would stimulate action.
2. All university undergraduates should have internal locus of control to bring about behavioural change in the environment. This they can do by understanding of the importance of sustainability, where emphasis is laid on inquiry-based problem approaches, interdisciplinary and critical thinking as well as using relevant cases studies and indentifying best practices. For instance, Department of Marketing, Nnamdi Azikiwe University, Awka Nigeria has sustainability marketing as a course, the focus is on considering values and ethics associated with sustainability issues.
3. University undergraduates should be curious about the environment. This will influence their behaviour in both positive ways at all stages of their life cycle. As a trigger of learning, it will push students to learn more about the environment.
4. University undergraduates should be sensitive to environmental issues. This they will do by being emphatic, caring and having positive feelings towards the environment.
5. University undergraduates should show higher environmental concern. This they do by embracing the new environmental paradigm and rejection of mastery of nature.

5.4 Areas for Further Study

This study is limited to university undergraduates in Enugu State Nigeria. For the further research, population, sample size can be increased in order to generalize the

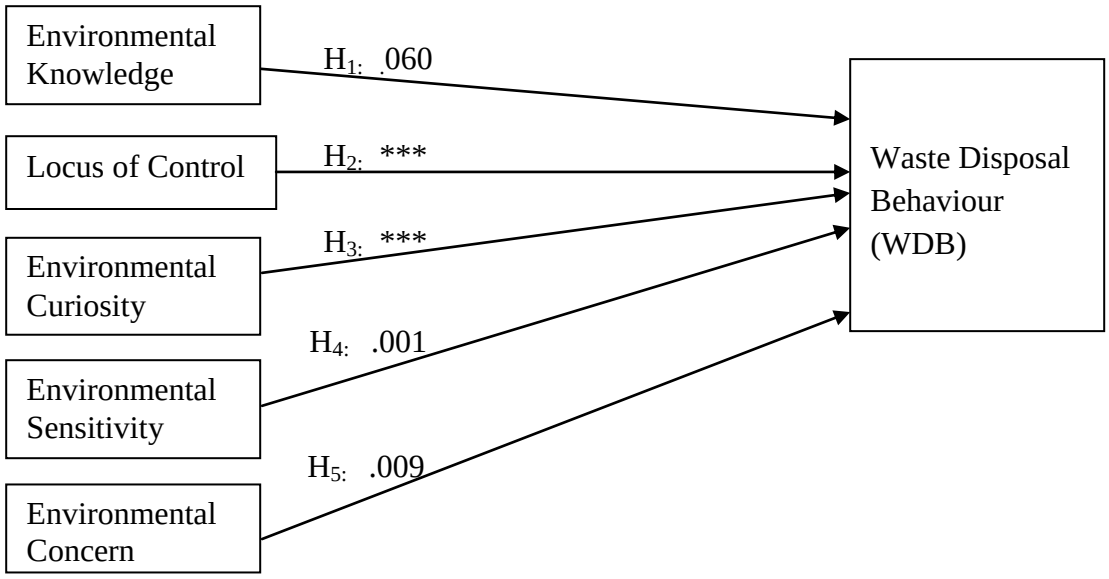
results of the present study. However, waste disposal behaviour permeates all strata and affects all persons; hence a further research should be conducted on the less educated individuals or people with no education to determine a departure or support for this study.

This study was quantitative in nature, further study can be qualitative. This will enable respondents to freely and naturally express their views on indiscriminate waste disposal behaviour of university undergraduates.

5.5 Contributions to Knowledge

According to Otaha (2015), it will be a barren exercise if any research does not make any contribution to the body of knowledge especially by breaking a new ground or adding something new to existing body of knowledge.

Although what constitutes contributions to knowledge is still a debatable topic but Whetten (2009) and John (2006) argued that formulation of a new or extension of existing ones are considered as a contribution to knowledge.



In the light of these assertions, this study extended the model by adding an additional variable of "environmental concern" to the previous models with the degree of relationships among the variables as contribution to knowledge.

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APPENDIX A

Faculty of Management Sciences,
Department of Marketing,
Nnamdi Azikiwe University,
Awka – Anambra State.

August 30th, 2018

Dear Respondent,

REQUEST TO FILL A QUESTIONNAIRE

I write to request for your assistance in filling my research questionnaire. I am a post graduate student of the aforementioned department conducting a research on *"Environmental Literacy and Waste Disposal Behaviour of University Undergraduates in Enugu State, Nigeria"*.

Consequently, kindly answer the following questions as frankly as possible. All you are expected to do is to simply tick (√) the answer of your choice in the options provided following each statement.

Please, note that all the information that you provide will be treated with utmost confidentiality. Kindly make your response very objective.

Your cooperation will be highly appreciated.

Thank you.

Yours faithfully,

Nwankwo Christian
Researcher (08037643869)

cc

INSTRUCTION:

Kindly tick (√) on the options most appropriate on the questions provided.

Section A: Demographic Variables of Respondents

1. Age:
   (a) 18-20 [ ] (b) 21-25 [ ]
   (c) 26-30 [ ]
2. Gender:
   (a) Male [ ] (b) Female[ ]
3. Ethnicity:
   (a) Igbo [ ] (b) Hausa [ ]
   (c) Yoruba[ ] (d) Foreigner [ ]
4. Religion:
   (a) Christianity [ ]
   (b) Islam [ ]
   (c) African Traditional Religion [ ]
   (d) Others [ ]

Section B: Structured Questionnaire

Please respond to the following statements by making a TICK (√) on the appropriate number. Indicate the response that best describes your AGREEMENT or DISAGREEMENT on the 5-point likert scale as follows: 5=strongly agree, 4= agree, 3= undecided, 2 = disagree and 1= strongly disagree.

S/N	Environmental Knowledge	SA 1	A 2	UD 3	D 4	SD 5
1.	My knowledge of environmental issues will influence me to sort waste before disposal.					
2.	Environmental knowledge provides me with useful information about sorting system.					
3.	I rely on environmental knowledge for proper waste sorting.					
4.	Environmental knowledge help me to sort waste easily.					
5.	Waste sorting is an easy and efficient way of solid waste disposal.					

	Locus of Control					
6.	Locus of control encourages me to control my clothes donation practice.					
7.	Locus of control increases my preference to encourage others to donate clothes the way I do.					
8.	Locus of control is positively associated with responsible environmental behaviour such as donation and recycling.					
9.	Internal locus of control influence my choice of donation to charitable organizations.					
10.	I know the benefits of donation as a waste disposal behaviour.					
11.	Locus of control has a significant impact on students' donation behaviour.					
	Environmental Curiosity					
12.	Environmental literacy programmes that focus on environmental activism will be better understood.					
13.	Environmental curiosity encourages me to describe myself as an activist who bring about positive environmental change.					
14.	Activism encompasses a wide range of actions that aim to provoke social change.					
15.	My friends would rather describe me as an environmental activist who is curious for societal change.					
	Environmental Concern					
16.	I will not dump wastes in gutters and river channels if there are waste bins at strategic points.					
17.	Naturally, I am passionate about the well-being of the environment. So I feel guilty if I do not dump waste in an environmentally friendly manner.					
18.	My personal values do not support dumping of waste indiscriminately.					
19.	Environmental concern discourages consumers' dumping of waste in gutters and river channels.					
20.	Concern for the environment encourages me to consume sustainably.					
21.	I am concerned about how dumping of waste affect the environment.					
	Environmental Sensitivity					
22.	I am empathic about the environment so I refuse to incinerate waste in an open area.					
23.	I conserve natural resources, respect hunting and fishing laws.					

24.	Incineration is not an expression of caring and positive feeling toward the environment.					
25.	Environmental sensitivity that focus on changes in people's values will discourage incineration as a waste disposal action.					
	Waste Disposal Behaviour					
26.	Waste disposal behaviour is the storage and destruction of waste materials in such a way that the impact on the environment and society is minimized.					
27.	Undergraduates that dispose waste properly are engaged in an environmental responsible behaviour.					
28.	Undergraduate who dump waste indiscriminately portray a negative attitude toward the environment.					
29.	Undergraduate that sort waste display pro-environmental behaviour.					

APPENDIX B

Frequency Table

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	161	43.8	43.8	43.8
	Female	203	55.2	55.2	98.9
	3	4	1.1	1.1	100.0
	Total	368	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-20 years	66	17.9	17.9	17.9
	21-25 years	138	37.5	37.5	55.4
	26-30 years	164	44.6	44.6	100.0
	Total	368	100.0	100.0	

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Igbo	301	81.8	81.8	81.8
	Hausa	37	10.1	10.1	91.8
	Yoruba	30	8.2	8.2	100.0
	Total	368	100.0	100.0	

Religion

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cgristianity	317	86.1	86.1	86.1
	Islam	51	13.9	13.9	100.0
	Total	368	100.0	100.0	

My knowledge of environmental issues will influence me to sort waste before disposal.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	15	4.1	4.1	4.1
	undecided	7	1.9	1.9	6.0
	Agree	179	48.6	48.6	54.6
	strongly agree	167	45.4	45.4	100.0
	Total	368	100.0	100.0	

Environmental knowledge provides me with useful information about sorting system.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	14	3.8	3.8	3.8
	Disagree	82	22.3	22.3	26.1
	undecided	30	8.2	8.2	34.2
	Agree	168	45.7	45.7	79.9
	strongly agree	74	20.1	20.1	100.0
	Total	368	100.0	100.0	

I rely on environmental knowledge for proper waste sorting.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	30	8.2	8.2	8.2
	Disagree	91	24.7	24.7	32.9
	undecided	68	18.5	18.5	51.4
	Agree	108	29.3	29.3	80.7
	strongly agree	71	19.3	19.3	100.0
	Total	368	100.0	100.0	

Environmental knowledge help me to sort waste easily.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	22	6.0	6.0	6.0
	Disagree	37	10.1	10.1	16.0
	Undecided	50	13.6	13.6	29.6
	Agree	163	44.3	44.3	73.9
	Strongly agree	96	26.1	26.1	100.0
	Total	368	100.0	100.0	

Waste sorting is an easy and efficient way of solid waste disposal.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	98	26.6	26.6	26.6
	Disagree	89	24.2	24.2	50.8
	Undecided	21	5.7	5.7	56.5
	Agree	36	9.8	9.8	66.3
	Strongly agree	124	33.7	33.7	100.0
	Total	368	100.0	100.0	

Locus of control encourages me to control my clothes donation practice.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	36	9.8	9.8	9.8
	Disagree	91	24.7	24.7	34.5
	Undecided	59	16.0	16.0	50.5
	Agree	110	29.9	29.9	80.4
	Strongly agree	72	19.6	19.6	100.0
	Total	368	100.0	100.0	

Locus of control increases my preference to encourage others to donate clothes the way I do.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	46	12.5	12.5	12.5
	Disagree	115	31.3	31.3	43.8
	Undecided	35	9.5	9.5	53.3
	Agree	129	35.1	35.1	88.3
	Strongly agree	43	11.7	11.7	100.0
	Total	368	100.0	100.0	

Locus of control is positively associated with responsible environmental behaviour such as donation and recycling.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	22	6.0	6.0	6.0
	Disagree	58	15.8	15.8	21.7
	Undecided	49	13.3	13.3	35.1
	Agree	155	42.1	42.1	77.2
	Strongly agree	84	22.8	22.8	100.0
	Total	368	100.0	100.0	

Internal locus of control influence my choice of donation to charitable organizations.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	39	10.6	10.6	10.6
	Disagree	59	16.0	16.0	26.6
	Undecided	51	13.9	13.9	40.5
	Agree	167	45.4	45.4	85.9
	Strongly agree	52	14.1	14.1	100.0
	Total	368	100.0	100.0	

I know the benefits of donation as a waste disposal behaviour.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	82	22.3	22.3	22.3
	Disagree	39	10.6	10.6	32.9
	Undecided	73	19.8	19.8	52.7
	Agree	117	31.8	31.8	84.5
	Strongly agree	57	15.5	15.5	100.0
	Total	368	100.0	100.0	

Locus of control has a significant impact on students' donation behaviour.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	29	7.9	7.9	7.9
	Disagree	104	28.3	28.3	36.1
	Undecided	61	16.6	16.6	52.7
	Agree	88	23.9	23.9	76.6
	Strongly agree	86	23.4	23.4	100.0
	Total	368	100.0	100.0	

Environmental literacy programmes that focus on environmental activism will be better understood.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undecided	7	1.9	1.9	1.9
	Agree	233	63.3	63.3	65.2
	Strongly agree	128	34.8	34.8	100.0
	Total	368	100.0	100.0	

Environmental curiosity encourages me to describe myself as an activist who bring about positive environmental change.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	8	2.2	2.2	2.2
	Disagree	44	12.0	12.0	14.1
	Undecided	7	1.9	1.9	16.0
	Agree	149	40.5	40.5	56.5
	Strongly agree	160	43.5	43.5	100.0
	Total	368	100.0	100.0	

Activism encompasses a wide range of actions that aim to provoke social change.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	15	4.1	4.1	4.1
	Disagree	29	7.9	7.9	12.0
	Undecided	42	11.4	11.4	23.4
	Agree	168	45.7	45.7	69.0
	Strongly agree	114	31.0	31.0	100.0
	Total	368	100.0	100.0	

My friends would rather describe me as an environmental activist who is curious for societal change.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	30	8.2	8.2	8.2
	Disagree	121	32.9	32.9	41.0
	Undecided	37	10.1	10.1	51.1
	Agree	93	25.3	25.3	76.4
	Strongly agree	87	23.6	23.6	100.0
	Total	368	100.0	100.0	

I will not dump wastes in gutters and river channels if there are waste bins at strategic points.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undecided	23	6.3	6.3	6.3
	Agree	209	56.8	56.8	63.0
	Strongly agree	136	37.0	37.0	100.0
	Total	368	100.0	100.0	

Naturally, I am passionate about the well-being of the environment. So I feel guilty if I do not dump waste in an environmentally friendly manner.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	15	4.1	4.1	4.1
	Disagree	93	25.3	25.3	29.3
	Undecided	30	8.2	8.2	37.5
	Agree	72	19.6	19.6	57.1
	Strongly agree	158	42.9	42.9	100.0
	Total	368	100.0	100.0	

My personal values do not support dumping of waste indiscriminately.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	30	8.2	8.2	8.2
	Undecided	7	1.9	1.9	10.1
	Agree	140	38.0	38.0	48.1
	Strongly agree	191	51.9	51.9	100.0
	Total	368	100.0	100.0	

Environmental concern discourages consumers' dumping of waste in gutters and river channels.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	31	8.4	8.4	8.4
	Disagree	29	7.9	7.9	16.3
	Undecided	29	7.9	7.9	24.2
	Agree	170	46.2	46.2	70.4
	Strongly agree	109	29.6	29.6	100.0
	Total	368	100.0	100.0	

Concern for the environment encourages me to consume sustainably.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	70	19.0	19.0	19.0
	Disagree	80	21.7	21.7	40.8
	Undecided	59	16.0	16.0	56.8
	Agree	88	23.9	23.9	80.7
	Strongly agree	71	19.3	19.3	100.0
	Total	368	100.0	100.0	

I am concerned about how dumping of waste affect the environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	29	7.9	7.9	7.9
	Disagree	24	6.5	6.5	14.4
	Undecided	69	18.8	18.8	33.2
	Agree	148	40.2	40.2	73.4
	Strongly agree	98	26.6	26.6	100.0
	Total	368	100.0	100.0	

I am empathic about the environment so I refuse to incinerate waste in an open area.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	14	3.8	3.8	3.8
	Disagree	30	8.2	8.2	12.0
	Undecided	59	16.0	16.0	28.0
	Agree	201	54.6	54.6	82.6
	Strongly agree	64	17.4	17.4	100.0
	Total	368	100.0	100.0	

I conserve natural resources, respect hunting and fishing laws.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	110	29.9	29.9	29.9
	Disagree	71	19.3	19.3	49.2
	Undecided	103	28.0	28.0	77.2
	Agree	42	11.4	11.4	88.6
	Strongly agree	42	11.4	11.4	100.0
	Total	368	100.0	100.0	

Incineration is not an expression of caring and positive feeling toward the environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	37	10.1	10.1	10.1
	Disagree	22	6.0	6.0	16.0
	Undecided	36	9.8	9.8	25.8
	Agree	183	49.7	49.7	75.5
	Strongly agree	90	24.5	24.5	100.0
	Total	368	100.0	100.0	

Environmental sensitivity that focus on changes in people's values will discourage incineration as a waste disposal action.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	15	4.1	4.1	4.1
	Disagree	7	1.9	1.9	6.0
	Undecided	8	2.2	2.2	8.2
	Agree	228	62.0	62.0	70.1
	Strongly agree	110	29.9	29.9	100.0
	Total	368	100.0	100.0	

Waste disposal behaviour is the storage and destruction of waste materials in such a way that the impact on the environment and society is minimized.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	7	1.9	1.9	1.9
	Undecided	7	1.9	1.9	3.8
	Agree	169	45.9	45.9	49.7
	Strongly agree	185	50.3	50.3	100.0
	Total	368	100.0	100.0	

Undergraduates that dispose waste properly are engaged in an environmental responsible behaviour.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	8	2.2	2.2	2.2
	Undecided	7	1.9	1.9	4.1
	Agree	236	64.1	64.1	68.2
	Strongly agree	117	31.8	31.8	100.0
	Total	368	100.0	100.0	

Undergraduate who dump waste indiscriminately portray a negative attitude toward the environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	62	16.8	16.8	16.8
	Disagree	30	8.2	8.2	25.0
	Undecided	14	3.8	3.8	28.8
	Agree	168	45.7	45.7	74.5
	Strongly agree	94	25.5	25.5	100.0
	Total	368	100.0	100.0	

Undergraduate that sort waste display pro-environmental behaviour.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	7	1.9	1.9	1.9
	Disagree	44	12.0	12.0	13.9
	Undecided	24	6.5	6.5	20.4
	Agree	176	47.8	47.8	68.2
	Strongly agree	117	31.8	31.8	100.0
	Total	368	100.0	100.0	

APPENDIX C

Observations farthest from the centroid (Mahalanobis distance) (Group number 1)

Observation number	Mahalanobis d-squared	p1	p2
45	45.159	.028	1.000
95	45.159	.028	1.000
145	45.159	.028	.998
195	45.159	.028	.993
245	45.159	.028	.980
295	45.159	.028	.950
345	45.159	.028	.899
21	41.942	.057	1.000
71	41.942	.057	.999
121	41.942	.057	.998
171	41.942	.057	.995
221	41.942	.057	.988
271	41.942	.057	.977
321	41.942	.057	.959

Observation number	Mahalanobis d-squared	p1	p2
25	40.658	.074	.997
75	40.658	.074	.993
125	40.658	.074	.988
175	40.658	.074	.978
225	40.658	.074	.963
275	40.658	.074	.942
325	40.658	.074	.911
46	39.743	.088	.983
96	39.743	.088	.971
146	39.743	.088	.955
196	39.743	.088	.933
246	39.743	.088	.903
296	39.743	.088	.865
346	39.743	.088	.818
26	37.735	.128	.999
76	37.735	.128	.998
126	37.735	.128	.997
176	37.735	.128	.995
226	37.735	.128	.992
276	37.735	.128	.987
326	37.735	.128	.980
4	37.490	.134	.986
54	37.490	.134	.979
104	37.490	.134	.969
154	37.490	.134	.955
204	37.490	.134	.937
254	37.490	.134	.915
304	37.490	.134	.887
354	37.490	.134	.853
2	37.054	.145	.930
52	37.054	.145	.906
102	37.054	.145	.877
152	37.054	.145	.843
202	37.054	.145	.804
252	37.054	.145	.759
302	37.054	.145	.709
352	37.054	.145	.655
3	36.874	.149	.692
53	36.874	.149	.638
103	36.874	.149	.581
153	36.874	.149	.523

Observation number	Mahalanobis d-squared	p1	p2
203	36.874	.149	.465
253	36.874	.149	.407
303	36.874	.149	.352
353	36.874	.149	.301
6	36.679	.155	.349
56	36.679	.155	.298
106	36.679	.155	.251
156	36.679	.155	.208
206	36.679	.155	.170
256	36.679	.155	.137
306	36.679	.155	.109
356	36.679	.155	.085
50	36.478	.160	.112
100	36.478	.160	.088
150	36.478	.160	.068
200	36.478	.160	.052
250	36.478	.160	.039
300	36.478	.160	.029
350	36.478	.160	.021
32	35.697	.183	.161
82	35.697	.183	.131
132	35.697	.183	.106
182	35.697	.183	.084
232	35.697	.183	.065
282	35.697	.183	.051
332	35.697	.183	.038
1	35.399	.192	.076
51	35.399	.192	.059
101	35.399	.192	.046
151	35.399	.192	.035
201	35.399	.192	.026
251	35.399	.192	.019
301	35.399	.192	.014
351	35.399	.192	.010
28	34.752	.213	.079
78	34.752	.213	.062
128	34.752	.213	.048
178	34.752	.213	.037
228	34.752	.213	.028
278	34.752	.213	.021
328	34.752	.213	.016

Observation number	Mahalanobis d-squared	p1	p2
31	34.683	.215	.016
81	34.683	.215	.011
131	34.683	.215	.008
181	34.683	.215	.006

APPENDIX D

Table 4.9: Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
ZWDB	<---	ZEK	.013	.007	1.884	.060	
ZWDB	<---	ZLoC	.126	.036	3.478	***	
ZWDB	<---	ZEnCur	-.310	.089	-3.476	***	
ZWDB	<---	ZEnCon	-.086	.026	-3.242	.001	
ZWDB	<---	ZEnSen	-.466	.180	-2.598	.009	
ZEK5	<---	ZEK	1.000				
ZEK4	<---	ZEK	.013	.021	.629	.529	
ZEK3	<---	ZEK	.207	.080	2.595	.009	
ZEK2	<---	ZEK	.181	.075	2.418	.016	
ZEK1	<---	ZEK	.060	.029	2.078	.038	
ZLoC6	<---	ZLoC	1.000				
ZLoC5	<---	ZLoC	.552	.139	3.981	***	
ZLoC4	<---	ZLoC	1.066	.154	6.913	***	
ZLoC3	<---	ZLoC	.116	.107	1.086	.278	
ZLoC2	<---	ZLoC	1.534	.204	7.501	***	
ZLoC1	<---	ZLoC	.830	.151	5.487	***	
ZEnCur4	<---	ZEnCur	1.000				
ZEnCur3	<---	ZEnCur	-.855	.188	-4.544	***	
ZEnCur2	<---	ZEnCur	.389	.207	1.880	.060	
ZEnCur1	<---	ZEnCur	-1.844	.345	-5.342	***	
ZEnCon6	<---	ZEnCon	1.000				
ZEnCon5	<---	ZEnCon	1.284	.137	9.344	***	
ZEnCon4	<---	ZEnCon	-.430	.106	-4.079	***	
ZEnCon3	<---	ZEnCon	-.041	.083	-.495	.620	
ZEnCon2	<---	ZEnCon	1.788	.175	10.213	***	
ZEnCon1	<---	ZEnCon	.837	.115	7.247	***	
ZEnSen4	<---	ZEnSen	1.000				
ZEnSen3	<---	ZEnSen	-.375	.263	-1.427	.154	
ZEnSen2	<---	ZEnSen	4.477	1.829	2.448	.014	

ZEnSen1	<---	ZEnSen	.700	.329	2.124	.034
ZWDB1	<---	ZWDB	1.000			
ZWDB2	<---	ZWDB	-.824	.248	-3.327	***
ZWDB3	<---	ZWDB	-4.543	.993	-4.575	***
ZWDB4	<---	ZWDB	-.406	.226	-1.796	.072