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A Conceptual Framework of Predictors of Electronic Wastes Disposal Behaviour Among Youths in South-South, Nigeria: The Moderating Effect of Education

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Abstract: *This study investigates the predictors of electronic trash (e-waste) disposal behavior among youths in South-South Nigeria, with a particular emphasis on the moderating role of education. E-waste, which includes obsolete electrical and electronic gadgets, has grown exponentially internationally as a result of rapid technological advancements and the obsolescence of older devices. Developing countries, especially Nigeria, confront substantial environmental and socioeconomic issues as a result of poor e-waste disposal methods that contribute to air pollution, water contamination, and other environmental risks. Despite extensive research on pro-environmental behavior and e-waste disposal in advanced nations, the applicability of these findings to developing economies is questionable due to contextual differences. This study fills this gap by identifying major predictors of e-waste disposal behavior among Nigerian young people, stressing the importance of education as a moderator, and providing a conceptual framework appropriate for a typical developing economy with high informality. The study emphasizes the importance of education in increasing environmental awareness, attitudes, and pro-environmental behaviors. Drawing on existing literature, it demonstrates how education promotes responsible waste management practices, minimizing the negative effects of e-waste. Furthermore, the study adds to the discussion about sustainability by presenting a conceptual framework geared to a developing economy environment. This framework is intended to help policymakers and stakeholders plan effective initiatives targeted at encouraging ethical and sustainable e-waste disposal behaviors among young adults in Nigeria.*

Keywords: e-waste, disposal behavior, education, sustainability, youths, Nigeria, developing economy.

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INTRODUCTION

Electrical and electronic waste, commonly referred to as e-waste, constitutes the discarded or obsolete components stemming from telecommunications and technological devices. The proliferation of e-waste has been a conspicuous phenomenon over the past few decades. This surge is primarily attributable to several contributory factors. First and foremost, the rapid obsolescence of existing technological and telecommunication devices has given rise to an alarming turnover rate, rendering these devices obsolete in a relatively short span of time.

Moreover, the advent of artificial intelligence in the technology sector has exacerbated the obsolescence of established electrical and electronic devices. Consequently, there is a compelling imperative to develop devices that align with the prevailing technological trends. These collective circumstances have engendered a notable escalation in e-waste accumulation within our natural environment. This is discernible through the evidently improper disposal and recycling practices, which, in turn, exert detrimental consequences on our societal and ecological milieu.

As posited by Zhao (2023), the practices of e-waste disposal exhibit notable variations both among and within affluent and developing economies. This underscores the inapplicability of a disposal model employed in a developed economy to a developing nation. In a similar vein, Kumar, Holuszko, and Espinosa (2017) contend that the quantity of e-waste generated by a given country exhibits a direct correlation with its Gross Domestic Product (GDP). This conveys that countries with higher GDPs are more likely to generate greater volumes of e-waste compared to those with lower GDPs. This assertion aligns with the findings of Awasthi, Li, Koh, and Ogunseitan (2019), who estimate that the global e-waste production has now exceeded 44.7 million metric tons, predominantly originating from countries such as China and Nigeria. Consequently, the hazards posed by e-waste have reached a critical threshold on the international stage, as emphasized by Mohan (2008). In response to this situation, there is an exigent need for effective measures to curtail e-waste through proper disposal practices, particularly amongst young adults who constitute the predominant and potential consumers of electrical and electronic devices.

In the context of a typical developing country, the improper disposal of e-waste poses a significant challenge to pro-environmental behavior, a concern that is not unique to Nigeria. Furthermore, the mismanagement of e-waste frequently culminates in detrimental environmental repercussions, encompassing air pollution, coastal erosion, ozone layer depletion, and water contamination, as reported by Meen, Ahmed, Hossain, and Khan (2021).

Understanding the determinants of e-waste disposal behavior, particularly among young adults in a developing economy, assumes paramount significance. This comprehension equips policy

makers and proponents of pro-environmental initiatives with the necessary insights to craft suitable models and frameworks for the responsible and ethical disposal of e-waste.

Education status has a significant moderating effect on various aspects of social and economic life. Furthermore, the role of education as a moderator in various aspects of life is a key theme in the mainstream literature. Meikle (2014) emphasizes the importance of a good education, while Gatzov (2020) and Stoller (2018) both underscore the significant impact of education on future prospects. Langton (2007) further explores this, highlighting the relative influence of school education in a cross-national study. These studies jointly assert that education plays a crucial moderating role in shaping individuals' lives and opportunities.

In similar vein, education plays a crucial role in waste disposal, with a focus on environmental awareness and knowledge. Ima (2022) highlights the need for improved environmental education programs in schools to address the health impact of waste disposal. Kumar (2020) emphasizes the importance of education in waste management, particularly in developing countries. Kolbe (2019) discusses the role of community and school education in waste management, with a focus on the individual teacher's motivation and interest. Bora (2021) proposes a mathematical model for solid waste management in educational institutions, underscoring the practical application of education in this area. These studies collectively underscore the significant role of education in shaping attitudes and behaviors towards waste disposal.

Furthermore, the identification of predictive factors that influence e-waste disposal behavior and the moderating role of education status among youths in Nigeria, particularly in the South-South region in the extant literature, holds timely and substantial importance. This knowledge serves as a catalyst for raising awareness regarding the perils of improper e-waste disposal and underscores the necessity for adherence to proper disposal protocols developing a robust and comprehensive conceptual framework suitable for a typical emerging economy like Nigeria. In light of these considerations, the urgency and importance of reviewing the predictors of e-waste disposal behavior and the moderating role of education status among youths are underscored, motivating the pursuit of this study.

While an extensive body of literature pertaining to pro-environmental behavior and e-waste disposal behavior exists (cf. Wang et al., 2019; Zhao, 2023; Borthakur & Govind, 2017; Wang, Liu & Zhu, 2029; Fehegaray & Hansstein, 2016; Kumar, 2029; Issock, 2023; Aboeimaged, 2020), the majority of these investigations have been conducted within developed nations. Consequently, their conceptual models may not be inherently transferable or adaptable to a typical developing economy characterized by substantial informal economic activities, as exemplified by Nigeria. Also, studies on the e-waste disposal behaviours based on extended theory of planned behaviour in sub-Saharan Africa are scarce and grossly under-reported hence, the necessity to develop a robust and comprehensive conceptual framework on the predictors of electronic wastes disposal

behaviour among youths suitable for a typical developing country context, while examining education as a moderator.

LITERATURE REVIEW

Electronic Waste Disposal Behavior

The proliferation of electronic waste, commonly referred to as e-waste, has become a pressing global concern. E-waste primarily originates from used or outdated electrical and electronic devices, with a substantial portion arising from telecommunication and technology gadgets. This surge in e-waste generation over the past few decades can be attributed to various factors, including the rapid obsolescence of existing devices due to the relentless introduction of newer technological and telecommunication counterparts.

The accelerated rate at which modern devices outpace their predecessors has led to an alarming turnover of electronic equipment. Consequently, many once state-of-the-art devices become obsolete in a remarkably short span of time, further contributing to the mounting e-waste predicament. Furthermore, the advent of artificial intelligence in the technology sector has rendered a significant proportion of current electrical and electronic devices outdated. This, in turn, necessitates the development of devices that align with the latest technological trends, amplifying the burden of e-waste on our environment. As a result of these intertwined factors, there has been a noticeable surge in the improper disposal and recycling of e-waste, causing adverse consequences for both our social and natural surroundings.

Zhao (2023) highlights that the disposal habits related to e-waste exhibit significant variations across and within affluent and developing economies. This discrepancy underscores the need to recognize that e-waste disposal behavior in a developed economy may not be directly applicable to a developing country, given the socio-economic disparities and varying levels of technological penetration. Therefore, a nuanced and context-specific approach is imperative to address the disparities in e-waste disposal behavior, which may vary significantly even within the boundaries of a single nation.

Kumar, Holuszko, and Espinosa (2017) draw attention to the correlation between a country's gross domestic product (GDP) and the volume of e-waste it generates. Their research reveals a positive association, suggesting that countries with higher GDPs tend to produce larger quantities of e-waste. This aligns with Awasthi, Li, Koh, and Ogunseitan's (2019) assertion that the global volume of e-waste has now surpassed a staggering 44.7 million metric tons. Much of this waste emanates from nations such as China and Nigeria, underlining the international magnitude of the e-waste problem. Therefore, it is crucial to recognize that the issue of e-waste hazards has escalated to a pinnacle on the international stage, as emphasized by Mohan (2008).

Addressing the e-waste challenge demands an immediate and comprehensive approach, and a key aspect of this is fostering responsible e-waste disposal behavior. This is particularly pertinent among young adults, who constitute a significant portion of both current and potential consumers of electrical and electronic devices. With their prominent role in driving the demand for these products, young adults have a crucial role to play in the endeavor to mitigate the growing crisis of e-waste and its associated environmental and social repercussions.

Lastly, the escalation of electronic waste presents a multifaceted challenge with far-reaching environmental, social, and economic implications. As the generation of e-waste continues to surge due to rapid technological advancements, it is imperative to tailor approaches to e-waste disposal behavior according to the unique socio-economic and technological contexts of different regions. Moreover, recognizing the correlation between a nation's GDP and e-waste production underscores the necessity for comprehensive, international collaboration to address this global crisis. Prioritizing the cultivation of responsible e-waste disposal behavior, particularly among young adults, is an essential component of any comprehensive strategy to mitigate the detrimental impacts of mounting e-waste on our world.

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 behaviour (Lee, Jan & Yang, 2013). Since these concepts are synonymous, this study refers pro environmentally 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, 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 (2014) argued that pro- environmental behaviour is a special type of pro-social behaviuor (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- environmental behaviour change (Jackson, 2005).

Concept of Waste

The notion of waste is relative in two main respects, something becomes a waste when it loses it 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 defecate 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 (2012), 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).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 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 environment 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) define wastes 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). 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, 2000).

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 values(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 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 (eg. residues from cleaning operations, packing materials, containers, etc).
- Unusable parts (eg. reject batteries, exhausted catalysts etc)
- Substances which no longer perform satisfactorily (eg. Contaminated acids, contaminated solvents, exhausted temping salts etc)
- Residues of industrial process (eg. Slags, still bottoms, etc)
- Residues from pollution abatement processes (eg. Scrubber sludge's bughouse dusts, spent filters, etc).

- Machining/finishing residues (eg. Lathe turnings, mill scales, etc)
- Residues from raw materials extraction and processing (eg. Agricultural, household, office, commercial and shop discards etc)
- Any materials, substances or products whose use has been banned by law.
- Products for which the holder has no further use (eg. 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 Materials:** unwanted or unusable items, remains or byproduct, 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 Ikechukwu (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 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 value". By implications, Talichi was of the view that whatsoever human activity that only receives without giving out values(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.

Factors That Influence Electronic Waste Disposal Behaviour

Attitude

Attitude, in the realm of psychology, represents a relatively enduring and consistent proclivity towards certain behaviors, contingent upon an individual's cognitive recognition and preferences pertaining to people, events, objects, and their surrounding environment (Olsson & Zama, as cited in Tsai, 2010). According to the work of Huang and Chuang (2007), attitudes are discerned by the amalgamation of behavioral beliefs, which encompass salient convictions regarding the potential consequences, and the corresponding assessments of these outcomes.

Conner and Armitage (1998) posit that an individual's attitude towards a particular behavior exerts its influence on that individual's subsequent actions through the mediation of intentions. The conception of attitude towards a behavior can be succinctly defined as the extent to which an individual positively or negatively appraises the performance of that behavior. This evaluation, in turn, is shaped by the entirety of accessible behavioral beliefs that interconnect the behavior under consideration with a plethora of outcomes and other cognitive attitudes (Ajzen, 1999). This orientation towards a particular behavior is malleable and is molded by a nexus of beliefs and new experiences, both of which have the capacity to reinforce or attenuate existing convictions. Consequently, it is justifiable to assert that the study of attitudes towards behaviors bears significant merit in discerning the determinants of behavioral intentions.

Al-Nahdi (2008) contributes to this discourse by asserting that an individual who harbors beliefs stemming from engagement in a positive behavior is inclined to exhibit a favorable attitude towards the performance of that specific behavior. Conversely, a person whose convictions

emanate from participation in a negative behavior is more likely to manifest a negative attitude concerning the engagement in such behavior.

Subjective Norms

The subject matter under discussion pertains to the perspectives of individuals of paramount significance in a consumer's life concerning their actions, as well as the underlying motivations that drive consumers to adhere to the views of these pivotal figures (Fishbein & Ajzen, as cited in Schubert, 2008). These pivotal figures, as articulated by Schubert (2008), encompass individuals who maintain a close or pivotal role in the life of the consumer, including but not limited to parents, siblings, close friends, relatives, subordinates, supervisors, and business partners.

Fishbein and Ajzen (as cited in Tsai, 2009) have conceptualized subjective norm as an outcome arising from a synthesis of normative beliefs and the motivation to comply. According to Tsai (2009), normative beliefs encapsulate the perceived pressures exerted on individuals in relation to their actions or inactions concerning behaviors relevant to individuals or organizations of significance to them. Furthermore, Tsai (2009) posits that motivation to comply denotes the willingness of individuals to align their behaviors with the expectations of influential figures when deciding whether to engage in a particular behavior or refrain from it.

Huang and Chuang (2004) underscore that subjective norms are contingent upon the multiplication of normative beliefs, which constitute salient beliefs regarding how influential figures view a given behavior, by the motivation to comply. This conceptualization accentuates the pertinence of social pressures, particularly when individuals are engaging in novel actions or activities that fall outside their realm of expertise. It is worth noting that the influence of reference groups varies depending on the context, such as in the realm of leisure services as opposed to obligatory utilization of new services in a workplace setting (Ajzen, 1991).

The attitudes held by significant others significantly influence the intention to patronize and the ultimate choices made by consumers (Al-Nahadi, 2008). These attitudes of others denote the extent to which the sentiments of those in the consumer's immediate social sphere impact the consumer's decisions regarding product selection and their intention to patronize specific offerings over others. The crux of subjective norms is predicated on two principal elements: the potency of negative attitudes held by influential figures toward the consumer's distinct choices, and the consumer's propensity to comply with the attitudes of these influential figures. Notably, when influential individuals close to the consumer exhibit pronounced negativity toward a particular product, the consumer is more inclined to adjust their patronage intentions. Conversely, the consumer's intention to patronize a product increase when influential figures express a preference for the same product (Kotler & Keller, 2006).

Perceived Behavioural Control

According to Ajzen (1991, as cited by Schubert, 2008), the concept of perceived behavioral control pertains to individuals' subjective appraisal of the ease or difficulty associated with performing a specific behavior of interest. Huang and Chuang (2004) expound that this perception is influenced by control beliefs, which encompass the salient convictions regarding available resources, opportunities, obstacles, and impediments. These beliefs are weighted by the perceived level of ease with which the behavior can be executed. As articulated by Tsai (2009), for an individual to engage in a given behavior, they must possess the capacity to manage objective situational factors, such as access to resources, time, and financial means. Perceived behavioral control represents a composite construct, which incorporates control beliefs concerning factors that either facilitate or obstruct the behavior, coupled with the extent of control an individual believes they possess over these determinants (Ajzen, as cited in Tsai, 2009).

It is noteworthy that the successful enactment of a specific behavior relies not only on the individual's favorable intention but also on the presence of an adequate level of behavioral control. Insofar as its accuracy is concerned, perceived behavioral control may function as a proxy for actual control, thereby enabling predictions of the likelihood of the behavior's execution (Ajzen, 1991). Similarly, when considering the patronage of local food vendors, it becomes apparent that a customer's positive disposition towards street foods may not suffice to ensure their patronage if they lack the requisite resources, such as time, financial means, or even self-confidence.

Environmental Knowledge

Ajzen (1991) posits that the Theory of Planned Behavior (TPB) remains amenable to refinement through the incorporation of supplementary determinants, provided that empirical evidence substantiates their capacity to elucidate a substantial proportion of the variance in intention or behavior, even after accounting for the theory's existing variables (Ajzen, 1991). It is on this premise that other variables were included.

Awareness and knowledge pertaining to the environmental implications of electronic waste (e-waste) have a profound influence on the disposal and recycling behaviors of individuals and organizations. As modern society becomes increasingly reliant on electronic devices, the management of e-waste emerges as a critical concern due to its potential adverse effects on natural environments. Consequently, a comprehensive understanding of the environmental impact of e-waste is vital to foster responsible e-waste disposal practices.

E-waste, encompassing discarded electronic and electrical equipment, poses a multifaceted challenge to environmental sustainability. Improper disposal and management of e-waste can result in various environmental and health hazards, including soil and water contamination, release of toxic chemicals, and depletion of natural resources (Alzubaodi, Slade, & Dwivedi, 2018).

Therefore, the awareness and knowledge surrounding these issues are pivotal in determining how individuals, businesses, and policymakers engage with e-waste disposal.

Environmental knowledge in the context of e-waste disposal encompasses the comprehension and recognition of the detrimental consequences associated with improper handling and disposal of electronic equipment. When users and consumers are well-informed about these impacts, they are more likely to adopt responsible disposal and recycling behaviors (Borthakur & Govind, 2018). The significance of environmental knowledge lies in its potential to bridge the gap between awareness and action, as individuals equipped with a clear understanding of the environmental consequences are more inclined to act in environmentally responsible ways.

At the individual level, awareness and knowledge regarding e-waste are instrumental in shaping consumer behavior. Individuals who are cognizant of the environmental harms caused by e-waste often make more informed choices when purchasing electronic devices and are more likely to participate in recycling programs or engage in proper disposal methods. This, in turn, contributes to a reduction in the negative environmental impacts associated with e-waste.

Moreover, businesses and organizations play a pivotal role in managing e-waste, especially when dealing with obsolete equipment. An acute understanding of the environmental ramifications of improper e-waste disposal can lead to the implementation of comprehensive e-waste management strategies. Such strategies may involve partnering with certified e-waste recyclers or adopting environmentally sustainable practices in the disposal of electronic equipment. By embracing these practices, organizations can fulfill their corporate social responsibility and mitigate the environmental harm caused by e-waste.

In the policymaking realm, the role of awareness and knowledge is equally critical. Governments and regulatory bodies can design and enforce e-waste management policies and regulations more effectively when there is a widespread understanding of the environmental repercussions. This includes setting up e-waste collection and recycling programs, ensuring that manufacturers take responsibility for their products' end-of-life management, and promoting extended producer responsibility (EPR) programs. EPR initiatives, for example, incentivize manufacturers to design products that are more environmentally friendly and easier to recycle, thus reducing the environmental burden associated with e-waste.

E-waste awareness and knowledge also extend beyond the immediate environmental consequences. They encompass the broader implications for resource conservation and sustainability. E-waste contains valuable materials such as rare metals and plastics, and proper recycling can help recover and reuse these resources, reducing the need for virgin materials. Consequently, informed individuals, organizations, and policymakers recognize that responsible

e-waste management not only mitigates environmental harm but also contributes to the efficient use of resources and the preservation of the Earth's natural ecosystems.

Conclusively, awareness and knowledge regarding the environmental impact of e-waste play a pivotal role in influencing disposal and recycling behaviors. A well-informed populace is more likely to engage in responsible e-waste management practices, thereby reducing the detrimental effects of e-waste on natural environments. From individual consumers to businesses and policymakers, all stakeholders must prioritize and promote environmental knowledge as a means to enhance e-waste sustainability and contribute to broader efforts for environmental conservation and resource management.

Individual Responsibility

The environmental responsibility, encompassing both the natural and social aspects, is a critical factor influencing an individual's behavioral responses in specific situations or events. As Kumar (2019) postulates, the domain of e-waste recycling and disposal behavior, particularly among young adults, is significantly impacted by the level of individual responsibility. In this context, individual responsibility can be dissected into two primary dimensions: moral responsibility and conventional responsibility. These dimensions serve as pivotal measures that help gauge an individual's sense of responsibility in matters concerning e-waste management and disposal.

Moral responsibility, the first dimension of individual responsibility, is rooted in an individual's ethical considerations and values. It involves a deep-seated sense of duty towards environmental stewardship. Young adults who exhibit high levels of moral responsibility are more likely to take environmentally responsible actions in the context of e-waste recycling and disposal. Their actions are guided by a strong internal moral compass, driving them to make choices that align with their ethical beliefs, even when faced with competing factors.

Conventional responsibility, on the other hand, pertains to an individual's adherence to established societal norms, regulations, and expectations related to environmental responsibility. Conventional responsibility is influenced by external factors, such as legal obligations and social norms. Individuals who exhibit high conventional responsibility tend to conform to existing rules and norms related to e-waste recycling and disposal, ensuring compliance with environmental regulations and engaging in responsible behavior due to societal expectations.

In the realm of e-waste management, the interplay between moral and conventional responsibility is complex. Some individuals may be driven by their intrinsic moral values, leading them to take responsible actions, while others may be primarily guided by societal norms and regulations. Moreover, there may be individuals who align their behavior with both moral and conventional

responsibility, demonstrating a comprehensive commitment to environmentally responsible actions.

Understanding the nuanced dynamics of individual responsibility in e-waste recycling and disposal among young adults is vital for crafting effective environmental interventions and educational initiatives. By recognizing the multifaceted nature of individual responsibility, policymakers and educators can tailor their approaches to encourage responsible e-waste management and contribute to the broader goal of environmental sustainability.

Nexus between Attitude and E-waste Disposal Behaviour.

Attitude is a prominent factor affecting behavioural disposition of a consumer to certain product (Ghen and Liu, 2004). Individual's attitude is a strong predictor of behavioural intention (Bock and Kim, 2002). Attitude serves as an indispensable predictive construct for explaining behavioural intention (Huang and Chuang, 2007). Tweneboach-Kudoah, Adams and Nyarku (2019) assert that attitude is the strongest predictor waste disposal behaviour. It is on this premises we proposed as follows:

*$_{P1}$: Attitude has a positive and significant effect on e-waste disposal behaviour among young adults***.**

The Relationship Between Subjective Norms and E-waste Disposal Behavior.

Tsai (2009) opines that subjective norms can predict behavioural intention. The study of Tweneboah-Kudgah, Adams and Nyarku (2019) corroborates the opinion of Tsai (2009) that subjective norm is a major predictor of waste disposal behavior. Moreover, Vijayen et al (2023) assert that subjective norms is a strong and major predictor of e-waste recycling behavior. Based on the foregoing, we proposed that:

$_{P2}$: Subjective norms have a positive and significant effect on e-waste disposal behavior among young adults.

Perceived Behavioural Control and E-waste Disposal Behaviour

Ajzen (1991) states that perceived behavioral control simply refers to the perception of people regarding the ease or difficulty encountered in the course of performing certain behavior. If a person is to carry out a function, they are obliged to have control over the objective situations like time, money and other resources (Tsai, 2009). Perceived behavoural control is reported as a strong predictor of e-waste recycling behavior. (Vijayen et al, 2009, Fehegaray & Itansstein, 2016; Wang et al, 2019). Based on these assertions, we proposed as follows:

P3: Perceived behavioural control has a positive and significant effect on e-waste disposal behaviour among young adults.

Environmental knowledge and E-waste Disposal Behaviour

Awareness knowledge of the impact of e-wastes on the natural environments has a major influence on e-waste disposal and recycling behaviour (Alzubaodi, Slade and Dwivedi, Nid; Borthakur & Govind, 2018). Environmental knowledge is a situation whereby users and consumers of e-wastes are fully aware about the detrimental effects the improper disposal of e-wastes has on the prevailing environment. Based on the above assertion, we proposed that:

P4: Environmental knowledge has a positive and significant effect on e-waste disposal behaviour among young adults.

Effect of Individual Responsibility on E-waste Disposal Behaviour

The level of responsibility to the environment (natural and social) can influence one's behaviour regarding a particular situation or event. Kumar (2019) opines that in terms of e-waste recycling and disposal behaviour among young adults, individual responsibility level plays a significant role. Moral responsibility and conventional responsibility are the major measures of individual responsibility. Individual responsibility is a feeling that is attributed to one's deliberate resolution to act responsibly. Based on this foregoing, it is proposed as follows:

P_5: Individual Responsibility has a positive and significant effect on e-waste disposal behaviour among young adults.

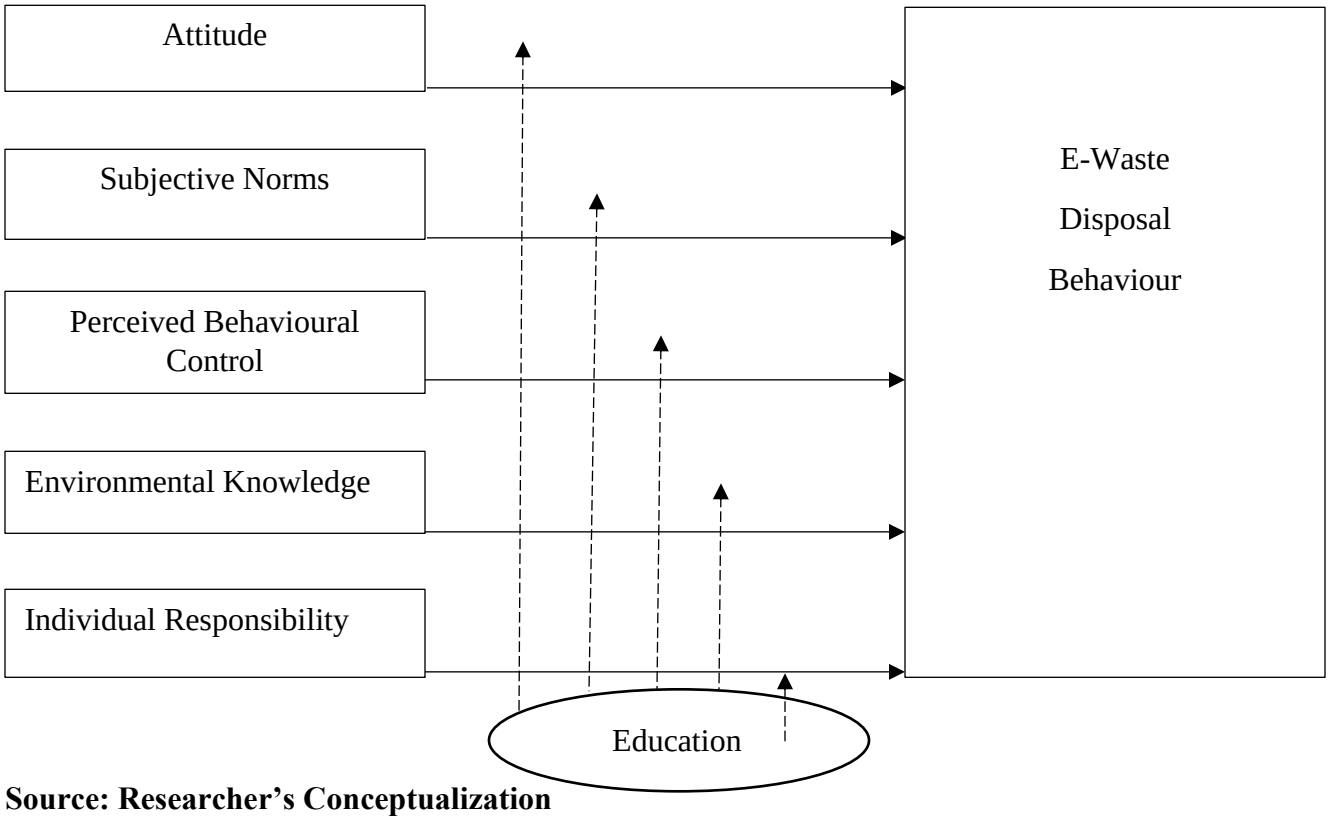
Moderating Effect of Education Status on the Predictors of E-wastes disposal behaviour

It has been revealed in the mainstream literature that the level of formal education/literacy has significant moderating effect on waste disposal behaviour (see. Meikle, 2014; Gatzov, 2020; Stoller, 2018; Langton, 2007; Ima, 2022, Kumar, 2020, Kolbe, 2019, Bora, 2021) In this study, education status is divided into two main categories: highly educated that includes tertiary-education qualifications (NCE, OND, HND, BSc and above) and lowly educated that covers secondary school education qualifications and below. In a typical developing economy with huge informality like Nigeria, empirical evidences that investigate the moderating effect of education status on the predictors of e-wastes disposal behaviour among the youths is under-reported. Based on the foregoing, we propose the followings:

P6a: Education has a moderating effect on the relationship between attitude and e-waste disposal behaviour.
P6b: Education has a moderating effect on the relationship between subjective norms and e-waste disposal behaviour.
P6c: Education has a moderating effect on the relationship between perceived behavioural control and e-waste disposal behaviour.
P6d: Education has a moderating effect on the relationship between environmental knowledge (awareness) and e-waste disposal behaviour.

P6e: Education has a moderating effect on the relationship between individual responsibility and e-waste disposal behaviour.

Proposed Conceptual Framework



Source: Researcher's Conceptualization

CONCLUSION

The improper disposal of electronic waste presents enormous environmental and societal concerns, particularly in developing economies such as Nigeria. This study stresses the crucial need to understand the factors that influence e-waste disposal behavior among young people, who are the primary users of electronic devices. Education emerges as a key moderator, changing attitudes and behaviors toward sustainable waste management. By incorporating findings from previous research, this study emphasizes the importance of developing and executing education-based interventions to successfully solve e-waste disposal challenges.

The proposed conceptual framework not only bridges a significant gap in the literature, but it also acts as a useful guide for policymakers and stakeholders. The framework addresses the unique

contextual components of South-South Nigeria and gives concrete recommendations for promoting appropriate e-waste disposal practices, ultimately contributing to environmental sustainability and public health.

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