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Management and Recycling of Secondhand Electronic Devices Case of Nigeria

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This is to certify that the doctoral dissertation by

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Walden University
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Abstract

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MPhil, Walden University, 2020

MSc, University of Liverpool, 2013

HND/BSc, Petroleum Training Institute, 1996

Dissertation Submitted in Partial Fulfillment

of the Requirements for the degree of

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Abstract

Approximately 60,000 tons of e-waste from new, secondhand, or used electrical electronics equipment/devices (UEEEDs) are disposed off at the end of their shelf life annually in Lagos, Nigeria. The purpose of this qualitative case study was to understand better how secondhand or UEEED e-waste was efficiently managed or recycled without resulting in environmental concerns. The study's conceptual framework was based on Machiavellian and transactional conceptual theories. The research question focused on what influences the choice of management and recycling of electronic devices. Data were collected from 28 participants through semistructured interviews with 8 business owners and 20 focus group UEEED users. Data analysis was through thematic content analysis, and ethnography. The prevailing themes findings of the study showed that 10,000 tons of e-waste from pocket PCs, laptops, computers, and household electrical appliances, were generated weekly, amounting to 120,000 tons yearly in Lagos from Alaba International Market and Ikeja Computer Village. This number had tripled yearly compared to previous studies in Nigeria in the past 5 years due to a lack of national e-waste policy and stringent enforcement, management, and product quality monitoring by regulatory bodies in Nigeria. The result indicated that a gap in e-waste generation, management, and recycling had social and economic implications for the unabating e-waste generation from UEEED, as the United Nations pointed out. The social implications for positive change are the precursors for efficient management and recycling of e-waste from UEEED and to assuage global and local concerns highlighted by WHO in preventing the possible longterm and negative biological consequences on the ecosystem and humanity.

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Dedication

I dedicate this dissertation to my children and loved ones, especially my mentor Nnene-Chidube (Mrs.) a strong-willed and focused leader. Under whose leadership birthed the idea and zeal to pursue my Ph.D. degree. I also want to dedicate this work to my indefatigable lovely wife, Angela Onokpise (Mrs.), who stood by me all through the thick and thin period the program lasted. I will not end this dedication without acknowledging the highest God who gave me the grace and strength to accomplish this remarkable feat of a higher degree.

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Chapter 1: Introduction to the Study

The growing concerns about e-waste management and recycling globally and locally are not abating. Each year, tons of e-waste generated from new, secondhand, or used electrical electronic equipment/devices find their way into society due to the information technology revolution. Gollakota et al. (2020) and Parajuly et al. (2020) pointed out that the advent of e-waste generated from electrical and electronic equipment in most parts of the globe, especially in Africa and Nigeria, could be challenging to manage. These authors foresaw a situation where e-waste generation would become a significant problem in developing economies like Nigeria. Adepojur and Sulayman (2019) noted that information communication and technology (ICT) used in the global mobile communication system are major electronic media components. These components were identified as a source of e-waste that requires managing or recycling. Srivastava (2020) posited that secondhand electrical, electronic equipment/devices (UEEED) could be challenging to manage or recycle once they reach the end of shelf life.

Deng et al. (2017) posited that these used devices often come with challenges of early failure, difficulty in fixing, and disposing of the UEEED when devices become disused or obsolete. Jamshed et al. (2020) and Giri and Adhikari (2020) highlighted issues with e-waste management that are related to health and environmental problems caused by radiation/emissions from the disused devices during the disposal phase by scavengers, who often used crude means of burning and acid baths to recover the nondegradable metals from the scrapped electronic equipment.

Odeyingbo et al. (2019) stated that an average of 60,000 tons of UEEED are improperly imported into Nigeria yearly. These secondhand or UEEED create the challenge of e-waste because of failure or obsolescence before their importation into the country. In essence, empirical literature reviews by several scholars suggest a constant concern with the usability and environmental compatibility issues with the management and recycling of UEEED (Alani et al., 2020; Gollakota et al., 2020; Parajuly et al., 2020).

According to the United Nations Environmental Programme (UNEP), Green Peace Movement Goal 17, the World Health Organization, and United Nations (UN) Millenium Goal 12 (2020), the increase in the volume of e-waste generated from UEEED across the globe raised e-waste management concerns. Isimekhai (2017) and Igbo et al. (2018) raised the concern of e-waste generation resulting in environmental challenges in Lagos city. Alani et al. (2020) agreed that managing these devices from the cradle to the grave remains unresolved and challenging in the Lagos metropolis, like Alaba and Ikeja.

This research study provided helpful information about the numerous challenges with the management and recycling of UEEED and recommends the role manufacturers and regulatory bodies could play in managing the risks of e-waste and the environmental challenges in Nigerian cities.

Background of the Study

Previous studies and empirical statistics on e-waste indicate that about 1.92 billion UEEED, such as cell phones, computers, electronic devices/equipment units, are globally recirculated, with an average life span of 18 months before they go into obsolescence (Lawlor, 2015). The empirical studies show that most UEEED find their way into Africa

purchased by low-income rural and city dwellers who cannot afford new electronic devices (Olla & Choudrie, 2014).

Studies by the UN Millenium Goal 12 (2020) and Nnorom and Odeyingbo (2020) note that most manufacturers and electronic users and business owners turn most African countries like Nigeria into e-waste disposal grounds, and they failed to address the public concerns of UEEED e-waste management. Instead, they focused on replacing electronic devices with new ones without defining a clear and firm policy that addresses e-waste management, recycling, and remanufacturing. Empirical evidence and industry experience showed that fixing defective UEEED is difficult or near impossible (Chen et al., 2019; Ibe et al., 2018; Wieser &Troger, 2018).

Nduneseokwu et al. (2017) identified gaps in Nigeria's e-waste management policy and enforcement issues. The authors pointed to empirical evidence of the e-waste challenge in Onitsha city in Nigeria without providing a proper management strategy for addressing UEEED concerns. The authors noted that the management and recycling of e-waste remain a concern in developing economies such as Nigeria. They recommend further studies to find local and global solutions to e-waste generated from electrical and electronic equipment since the current practice of e-waste management by stakeholders in Nigeria is inappropriate, considering the global concern raised by other scholars.

Odeyingbo et al. (2019) highlighted that about 60,000 tons of UEEED had found their way into Lagos in the past 5 years. The authors posited that the topic was not explored extensively in Nigerian cities like Lagos, where e-waste management was still a significant and growing challenge. Ohajinwa et al. (2018) noted that the e-waste problem

created by UEEED post-shelf life in Nigeria persisted, indicating possible environmental challenges posed by the disposal of e-waste generated from UEEED in Lagos metropolis, like Ikeja and Alaba International Market.

Amechi and Oni (2019) and Andrae et al. (2017) posited that the usage and management of UEEED going into obsolescence before being imported into Nigeria was a significant concern for most users and government agencies in charge of the environment and policies, especially in major cities like Lagos, Nigeria, which was considered a developing economy. Notably, these authors are concerned about the environmental implication of UEEED, especially in countries like Nigeria with weak regulations and e-waste enforcement and management strategy (Bridgens et al., 2019; Okorhi et al., 2019).

Studies by other authors established that in Asia, Africa, and Europe, indicated that UEEED such as cell phones and household and industrial electronic devices do not have comprehensive data on UEEED recycling and end-of-life tracking (Alani et al., 2020; Babatunde et al., 2020; Ogunseye, 2019). These authors made significant findings about illegal interboundary transactions of UEEED globally. Majorities of the secondhand UEEED find their way to Africa, complicating the e-waste management challenge in recycling and disposal (Odeyingbo et al., 2019; Prasad et al., 2020).

The gaps identified by these reviews include e-waste management challenges, weak legislation, poor record of dis-used electronic devices/equipment in developing countries, lack of recycling facilities to manage e-waste, and nonexistence of a cohesive synergy between original equipment manufacturers (OEM) and policymakers in

developing economies where e-waste poses a challenge. Other findings and reported results are behavior perceptions about e-waste disposal and deliberate importation of UEEED approaching the end of shelf life by business owners in Nigerian cities (Dhir et al., 2021; Parajuly et al., 2020; Olowofoyeku, 2020).

Parajuly et al. (2020) suggested using human behavioral science or theory to manage e-waste. The authors opined that if individuals can manage their taste and urge to own new electronic gadgets, then the rate of e-waste generation or concern will be minimal. However, that was not the case in the study conducted by Parajuly et al.; it was evident that more studies were required to find a better way of understanding the management of secondhand or UEEED in places where it remained a source of concern like Lagos.

This study was essential to understand better the public and global challenges associated with e-waste management and to add new insights to improve the efficiency of e-waste management and recycling practices in Lagos. The study's findings may be helpful to policymakers in conceptualizing e-waste management policies more realistically. Further, a better conceptualization of citizens' behaviors toward e-waste management may guide administrators to enhance their understanding of how local e-waste management decisions influence regional stakeholders' engagement.

According to studies by Dhir et al. (2021), Olowofoyeku (2020), and Parajuly et al. (2020), the challenge of e-waste management, weak legislation, poor record of dis-used electronic devices/equipment in developing countries, lack of recycling facilities to handle e-waste, and nonexistence of a cohesive synergy between original equipment

manufacturers (OEM) and policymakers in developing economies where e-waste posed e-waste management and recycling challenge that remained unresolved. This study can lead to a better understanding of dealing with the behavior perceptions about e-waste disposal and deliberate importation of UEEED with the near end of shelf life in Nigeria.

Therefore, focusing on the research gap of e-waste management and recycling of UEEED in Lagos helps amplify and further reiterate the concern of e-waste increase raised by the UN, WHO, and UNEP. Conducting this study could further improve the existing knowledge about better ways the public and electronic device stakeholders will manage the increase in e-waste in Lagos, Nigeria.

Problem Statement

Generation of e-waste from electrical, electronic devices/equipment sources was increasingly becoming a cause of worry in managing these used or secondhand electronic devices/equipment when they reach the end of shelf life in Lagos and its environs. Studies by Alani et al. (2020), Babatunde et al. (2020), and Ogunseye (2019) showed a consistent increase in e-waste generation in cities like Lagos, Nigeria. This study corroborates the findings of the UN Millennium Goal 12 (2020) recommendation for further studies confirming the rise in electronic equipment e-waste concern. Similarly, studies by Odeyingbo et al. (2019) and Prasad et al. (2020) raised concerns about secondhand or UEEED recycling and management in Lagos, Nigeria. Therefore, the empirical evidence by these authors and the United Nations called for further studies and an understanding of why the increase in electronic device waste is still snowballing.

The relevant gap I found in the studies was that the authors used conventional research methods without management theories in examining the root cause and consequences of managing electronic devices like computers, handheld devices (I-pads, cell phones), and household electronics. In contrast, other authors failed to highlight the growing concern of e-waste generation, recycling, and e-waste management (Dhir et al., 2021; Nduneseokwu et al., 2017; Ogunseye, 2019; Parajuly et al., 2020).

Likewise, previous empirical studies established the lack of awareness of human behavior in managing and recycling e-waste from UEEED in Nigeria. Meanwhile, previous research found that business owners and electronic attitudes could lead to e-waste management issues and recycling or disposal, which remained a growing concern in Lagos, Nigeria. Some scholars recognized that most UEEED users pay less attention to electronic gadget management and recycling once they stop functioning or become obsolete (Dhir et al., 2021; Nduneseokwu et al., 2017; Parajuly et al., 2020; Ogunseye, 2019).

According to the UN's (2020) Responsible Consumption and Production, Goal Number 12, there was a growing concern about managing electrical and electronic waste worldwide. Available empirical records show that electronic waste grew by 38% globally, yet less than 20% of the generated waste was recycled. The report reflects the volume of waste as "5.3 to 7.3 kilograms (Kg) per capita annually " (p.11-13). Additionally, only about 0.8 to 1.3 Kg per capita were recycled out of this volume, leaving a deficit of 7.3 -1.3= 6kg per capita. This e-waste figure was the worldwide

record from 2010 to 2019, as contained in the UN report under Sustainable Goal Number 12 (UN, 2020).

This study could fill a social gap created by the lack of knowledge on e-waste management, recycling, and the cost implications of using obsolete electronic devices such as handheld devices, domestic and industrial UEEEDs. Beyond the negative environmental consequences of these devices when wrongly disposed into the environment, e-waste was perceived as a source of income for business owners (Speake & Yangke, 2015; Szamalek, 2016).

Giri and Adhikari (2020) posited that the indices that drove secondhand or UEEED development depended on safety, usability, and durability. However, so far, evidence from previous studies (Alani et al., 2020; Bridgens et al., 2019; Igbo et al., 2018; Isimekhai, 2017; Parajuly et al., 2020) revealed that past research works could not explore and offer the best methods of overcoming these identified gaps in e-waste management, recycling, policies around UEEED usability, and disposal methods in Lagos, Nigeria. This study addressed the research problem of a lack of realistic e-waste management and recycling policies in Nigeria for secondhand electronic devices with e-waste implications at the end of device shelf life.

Purpose of the Study

The purpose of this qualitative content analysis case study was to understand further the intricacy of managing or recycling secondhand or UEEEDs from importation to their use and abandonment, which snowballs into e-waste management challenges in Nigerian cities like Lagos. The research methodology used was based on studies by Alani

et al. (2020), Babatunde et al. (2020), Nduneseokwu (2017), and Ogunseye (2019). These authors used the qualitative research method to conduct their studies. The authors asserted that using the qualitative approach was best for a case study of this nature that requires an in-depth understanding and managing the challenge of e-waste generated from secondhand electronic devices, a growing public concern in Lagos and the globe.

In the light of the above-highlighted e-waste concern, my study further supports creating awareness and understanding how to be providing information on the management and recycling implications of how e-waste affects society through the transactional activities of secondhand or used electronic devices that are no longer useful or are obsolete (Speake &Yangke, 2015; Wieser &Tröger, 2018; Jennings et al., 2016).

The participants of this study were drawn from two locations in the Lagos metropolis: Computer Village Ikeja and Alaba International Market. The choice of using Alaba and the Computer Village Ikeja is that both markets have the largest concentration of used electrical, electronic equipment for retail and repair (Chen et al., 2019). Additionally, the Computer Village and Alaba serve as a central hub for e-waste collection and recycling, aside from the Lagos State Waste Management Agency (LAWMA) dump sites. The focus of this study was to utilize the information and data extracted from the business owners, who themselves are the technicians, and obtain feedback from the experiences of UEEED users within the framework of this study.

Additionally, the participants in this study were respondents with relevant knowledge of secondhand or UEEED transactions and usage. This step was one of the measures I took to ensure the study's outcome was credible. I obtained my primary data

from the interview section with recruited respondents who used secondhand electrical, electronic equipment, device, and business owners known as dealers in UEEEDs. In the research strategy, I used one-on-one interviews and focus group discussions to extract the research data on e-waste management and recycling. The one-on-one respondents were the business owners who were mainly self-employed and acted as technicians. At the same time, the UEEED users formed the focus groups. The reason for choosing these respondents was to have a balanced view of the challenge of e-waste management and recycling in the Lagos metropolis.

The study was based on philosophical assumptions using the interpretivism paradigm and recursive data collection process to answer the research problem. According to Husam Helmi and Abraham Pius (2020), and Ravitch and Carl (2016), this research design was most suitable because using the stated methodology helped gather research facts on qualitative reasoning, among other research tools, available within the context of this study. Therefore, it is worth noting that similar studies were conducted using similar methodology to obtain credible research or study.

Research Question

Research Question: How do users and business owners of used electronic devices/equipment manage their e-waste at the end of product life, and what influences their choice of disposal or recycling method in Lagos, Nigeria?

The research question guided me in finding answers to the identified gap in the study boarding on the e-wasted management recycling problem created by used or UEEED in Lagos, Nigeria, which persists with an indication of a continuous rise in e-

waste generated from UEEED. The e-waste management gap also reinforces the importance of creating awareness through a better understanding of the research topic based on the global concern of the increasing volume of e-waste generation that were generated yearly across the globe and in developing economies (Olla & Choudrie, 2014; United Nations (UN) Millenium Goal 12 (2020).

Conceptual Framework

The conceptual framework of this qualitative case study was grounded in the situational and developmental theories using Jacobs's (2018) participatory action approach in dealing with the problem of e-waste management. Jacobs (2018) and Kemmis and Wilkinson (1998) posited that the beneficiary of this research method allowed participants to express their views regarding the research investigation. Creswell (2009) argued that qualitative research was consistent with exploring opinions and beliefs relating to individual experiences on UEEED and the business owners who are the technicians and provide technical and sales services for UEEED.

Similarly, Dhir et al. (2021) used the behavioral reasoning theory (BRT) to explore the reason behind the continuous act of generating e-waste by users, manufacturers, and government regulating agents. This theory explains how business owners use personal gain and interest to drive the growing concern of e-waste generation. They recommended further investigation using other human behavioral theories.

Nduneseokwu et al. (2017) adopted the theory of planned behavior in establishing the root cause of e-waste generation from electrical electronics in Nigeria. The authors alluded that further studies on the rational decision to acquire gadgets that could become

a public concern require further investigation. Parajuly et al. (2020) used behavioral science or theory to manage e-waste challenges in a similar qualitative case study. The authors noted that the theory of planned behavior (TPB) helped them in their studies but recommended that scholars use other human behavioral theories for future investigation.

Given the spectrum of theories reviewed in this study, I used the Machiavellian and transactional theories to examine the behavior of business owners, dealers, and users of electronic devices and what formed their choice of e-waste management, and what influences the business owners in the choice of managing secondhand or UEEED and their knowledge about recycling. This growing concern and the research findings unraveled how the end justifies the means influencing e-waste management and recycling practices in Lagos, Nigeria. I used the ethnographic method in collecting the research data based on interpretive descriptive analysis of respondents' encounters with secondhand electronic devices and the prevailing concern raised by the growing e-waste management and recycling challenges of UEEED that have exceeded their shelf life. This study has both professional and socioeconomic implications within the Nigerian space. The application and usage of UEEED come with environmental e-waste management concerns (Kreziak et al., 2016; Maulia & Halimatussadiah, 2018).

Conducting this study required physical meetings with users and business owners who were also the technicians and dealers of UEEED like handheld devices (cell phones), personal computers, printers, and TV sets, within the context of this study. I used the one-on-one interviews using 15 structured and open-ended questions and focus group discussion in answering the research questions derived from the study topic.

The gap found in this study was the abysmal management and recycling of e-wasted problem created by UEEED in Lagos, Nigeria, which persisted with an indication of the continuous importation of outdated electronic devices with unpredictable shelf life which ends up as scrap or e-waste. Similarly, the increase in e-waste generation and management/recycling gap found in Lagos metropolis by several studies in previous sections reinforces the need to answer the research question: How do users and business owners of used electronic devices/equipment manage their e-waste at the end of product life, and what influences their choice of disposal or recycling method in Lagos, Nigeria?

Answering this question underscored the salient issues of obsolescence awareness and the health implications of unlawful disposal or recycling and management of e-waste into the environment in Nigeria advocated by previous authors. I applied the qualitative method using an instrumental case study (see Creswell 2014). Further, Ishtiaq (2019) posited that qualitative research with an inductive case study, achieved using one-on-one interviews and focus group discussions, was applicable to research in Lagos city in Nigeria.

The inquiry involved participants recruited from Lagos, Nigeria's Computer Village, and Alaba International Market. The respondents were not recruited based on gender; instead, the criteria used were the experience of UEEED usage, electronic business owners who repair and sell used electronic devices within the Alaba International Market, and the Computer Village. The study involved investigative inquiry, using an ethnographic method to collect data from the field and by inclusion of one-on-one interviews and focus group discussions. Data collection also included review

of documents or checklists detailing types of electrical equipment and devices commonly used and sold within the market. The investigation likewise involved taking personal notes, audio recording, and qualitative interviewing of stakeholders' scrap dealers known as scavengers using the qualitative research methodology (Mishra, 2016; Ishtiaq, 2019).

Nature of the Study

A qualitative research methodology was chosen for this study. The rationale for choosing the transactional/management theories was that it best fits a dissertation dealing with social change and human interaction with technology. Following a study by Meyer and Peng (2016) on the significance of selecting a suitable research method, they argued that developing a conceptual or theoretical foundation was required in dealing with transactions, emerging economies, and business phenomena worldwide over the decades. Creswell (2014) and Ishtiaq (2019) stated that qualitative research is an inductive and phenomenological inquiry involving investigative, ethnographic interaction, field interviews, focus group discussions, and participatory observations. Therefore, I determined the qualitative method was appropriate for studying the e-waste management and recycling challenges posed by the activities of business owners and users of electrical, electronic equipment/devices currently generating global and public concern in Lagos metropolis as a situation of interest through an ethnographic approach.

An ethnographic study was most appropriate and effective for case studies because it provides the opportunity for a researcher to explore new insight into the phenomenon under investigation using semistructured interviews and a focus group approach while acquiring research data DeJonckheere & Vaughn (2019), Fountouki et al.

(2020), Liberati et al. (2019), Mishra (2016) and UKEssays (2018). Another research method used by other researchers was the quantitative and numerical data collection using structured research mechanisms such as surveys, larger sample sizes, closed-ended questions, and one or more hypotheses to obtain results (Apuke, 2017; Queirós et al., 2017).

I used open-ended questions in this study to examine the nonnumerical data from the field interviews and focus group discussions. Therefore, using a quantitative method did not apply to the current study, as Fourie and Meyer (2018) asserted. Although in some cases, qualitative researchers could use mixed methods to combine quantitative and qualitative methodologies (Sykes et al., 2018), using a quantitative study without defined variables would not suffice in this study since I did not assess different variables and their relationships using hypotheses or by gathering numerical data. Thus, a mixed method was also not appropriate for this study.

According to Fourie & Meyer (2018), quantitative research involves surveys, closed-ended questions, questionnaires, and deductive analysis limited to the researcher's scope within a defined hypothesis or theory, unlike qualitative studies that cover a more expansive research space. So, considering the e-waste management stakeholders' perceptions of business owners and electronic device users' behaviors regarding e-waste management and recycling in the context of this study. It was necessary to further conduct a qualitative study to strike a balance of research views or opinion. Therefore, a quantitative research design was not suitable for this study.

Thus, it was evident from the analysis above that three design methodologies in qualitative research could be used. Hence, I considered grounded theory, narrative research, and case study. After several research works and analytical reviews, a case study was selected for this study, as shown above. Nevertheless, some researchers use a theoretical framework to develop a theory using deductive and comparative analysis results. So, a framework was not proper for this research because creating a new theory about secondhand or UEEED on business owners and user's behaviors to mitigate the e-waste management and recycling requires an inductive analysis.

Qualitative researchers conduct a case study to gain a shared understanding between the participants through a critical contextual analysis of a situation or occurrence (Alani et al., 2020; Nduneseokwu et al., 2017; Nalini & Ghosh, 2020). According to Creswell & Poth (2017), Gehman et al. (2018), and Yin (2018), qualitative researchers conduct single or double case studies to investigate a phenomenon or situation to get a deeper understanding of conceptualizing a framework for the study. Consequently, using an interpretive descriptive analysis of respondents in a case study will provide in-depth knowledge about a study (Meyer and Peng, 2016). Thus, using the non-empirical or concepts framework classification in a qualitative study was supported since it emanated from the 1960s (Alasuutari, 2010).

Furthermore, a case study was appropriate for this research because I explored a unique situation using the similitudes and contrasts of the different groups of research cases. Besides, I established that the ethnographic generalizations aided me in understanding the role of business owners and electronic users' e-waste and recycling

management knowledge and what formed their beliefs and assumptions in influencing their choice of electronic business transactions. Subsequently, qualitative researchers use narrative research design in relating to the stories about a social situation as a group of approaches that appeared from the written or spoken storyline of individuals' experiences confirmed by the audience and extensive systematic inductive research (Lang et al., 2020).

Thus, I used ethnographic methodology and investigate inquiry to answer open-ended semistructured questions, focus group discussions, and individual interviews for data collection. I obtained secondary data from the empirical data of world health and UN yearly statistics reports on e-waste generation from electronics. Data analysis was done through the thematic and content analytical methods using the NVivo 12 qualitative analyzing tool to perform data patterns, data coding, and analysis. NVivo 12 was a reliable, computer-assisted qualitative data analysis software suitable for small samples, openended interview questions, research predictive outcome capability, removal of human error, and coding bias (Feng and Behar-Horenstein, 2019).

The convention, as mentioned above, allowed me to find meanings and insights into e-waste management and recycling as I assembled my themes, research findings, and results for consideration as additional research input into the existing body of knowledge. The coded themes reflected the research opinion on the role played by secondhand or UEEED business owners and users in determining how their activities contribute to the numerical increase of e-waste generation, management, and recycling policies within Lagos, Nigeria.

Definitions

The terms I used in this study are defined as follows:

E-waste: These are electronic waste materials like batteries, plastic, and lead form part of UEEEDs *Obsolescence* is the terminology used to describe disused electronic equipment or devices approaching the end of shelf life (Bridgens et al. 2019).

Electrical, Electronic Devices (EED): Electronic devices such as computers, cell phones, and TV household electrical devices are mentioned in the study by (Ogunseye, 2019).

Institute of Electrical Electronic Engineering (IEEE): transactions of electronic components were used in the study by *(*Jennings & Terpenny, 2016).

NVivo12: software for enhancing the analysis of openended responses in qualitative studies (Feng & Behar-Horenstein, 2019; Paulus et al.,2017).

Shelf life: the duration a piece of electronic equipment was designed to function before disposal. The environmental implications of using electronic equipment close to their shelf life and health implications (Jokela et al., 2006; Szamalek, 2016)

Secondhand: any equipment used, transferred, or purchased by a second user. "Secondhand electronic devices with e-waste implications at the end of their shelf life in Nigeria" (Teng, Ye, Handschuh-Wang et al., 2019); Okorhi et al., 2019, p.114-152).

Scavengers: e-waste or scrap material dealers. The activities of scrap dealers, or scavengers, are known as (Aboki) using the qualitative research methodology (Mishra, 2016; Ishtiaq, 2019).

Theory of Analysis of Demand (TAD): This theoretical foundation was required to deal with transactions in emerging economies and worldwide business phenomena over the decades (Meyer and Peng, 2016).

Behavioral Reasoning Theory (BRT): This referred to a framework used to test the attitude and behaviors of business owners and UEEED users (Dhir et al. (2021).

Assumptions

Facts in research that cannot be ignored are called qualitative assumptions, and sometimes they are taken for granted. These assumptions are the ones I used in the first chapter of this study inquiry. Negri et al. (2019) pointed out that assumption can influence the outcome of research work, including the theory or concept under investigation, the phenomenon under review, the instrument, methodology, and participants' proficiency.

In this study, as the researcher, I controlled my personal beliefs to overcome the negative impact of assumptions. The assumption considered in this study included the suspicion that some participants would not be honest in providing information about their experience using secondhand or obsolete UEEED: Another assumption I considered was that some of the respondents would not receive or welcome me or give me the required attention. I also assumed that respondents would like to give answers based on sentiments. Lastly, I assumed that my technical knowledge and training in electrical and electronic engineering helped me validate some of the technical information on UEEED as the research instrument in this study in Lagos city without any hitch or ambiguity.

Scope and Delimitations

The scope of this study involved conducting a one-on-one interview among business owners who themselves are the technicians and a focus group discussion among users of electrical, electronic equipment/devices users on interrogating the question of the e-wasted problem created by the continued use of UEEED in Nigeria with possible environmental implications/challenges posed by the management and recycling of the e-waste generated from UEEED. The identified gap in e-waste management and recycling reinforced the need for further inquiry and shelf-life awareness of electronic devices and the health implications of poor management or recycling of e-waste into the environment in Nigeria.

Chapter 1 included the introductory part of this study, including the primary dissertation focus on the effect of UEEEDs e-waste management. According to Donnelly (2017) and Randolph (2018), dissertation resources involved using a comparative analysis of researched materials categorized into an introduction of the research topic, evaluating literature sources, methodology, a summary of findings, and discussion for dissertation implementation and or further studies.

I used the semistructured and open-ended questions and the follow-up questions to answer the research questions until I attained data saturation. Data saturation was the converging point at which interview responses became redundant. Customarily, that was where data collection through interviews and observation peaked. I recorded six interviews with the business owner respondents and transcribed two. The population sample size for the study was 26, out of which 20 were electronic equipment/devices

users, and 6 were business owners who also are electronic technicians. I recruited 35 volunteers for the study. I attained data saturation (Glenn, 2016; Van Rijnsoever, 2017) after interviewing six business owners and 20 users of electronic devices. I recorded the responses, interviews, and focus group discussion sections using handwritten notes, and data were loaded into the NVivo12 software for analysis, as explained in the previous section.

Similarly, DeJonckheere & Vaughn (2019) posited that semistructured indepth interviews are most suitable for qualitative data sources since the researcher allows to collect data through open-ended means from recruited participants. Also, the scope and delimitation played a significant role in this study. One example is poor perception or lack of identification of human influence and belief systems, which could invalidate research work. For example, Theofanidis and Fountouki (2018) identified limitations in a study, including anomalies that could occur in an inquiry. Such as measurement errors, missing data, wrong interpretations of questions, and cultural and belief systems. The authors highlighted inappropriate formulation of theories and research questions as delimitations. Knowing the benefits of implications of research limitations and delimitations was beneficial. I identified the weaknesses below and addressed them before I commenced the case study.

Meanwhile, below were anticipated and identified limitations, challenges, and barriers I dealt with in the study.

- In the ability to get the UEEED manufacturers to participate in the research
- Overcoming personal bias about the study

- The unwillingness of participants to respond to open ended questions.
- Difficulty in accessing private and government e-waste project sponsors locations and sites.

I also identified the challenge of conducting separate case studies to reach respondents with a similar understanding of the research problem in other locations outside Lagos. However, I used social media to close this gap.

Meanwhile, here were anticipated identified limitations, challenges, and barriers,

- The possibility of recruiting manufacturers of used electrical and electronic equipment/devices to participate in the study as participants was beyond this study's scope.
- Difficulty in overcoming social bias in the study
- The unwillingness of participants to answer questions objectively
- Lack of access to government institutions, e-waste project recycling plants, and environmental management documentation.

Limitations

The study limitations were construct validity, internal and external validity, and reliability. The researcher based his validity and reliability on the complication of getting respondents to come to terms with e-waste management. Another limitation identified was the theoretical measurement and the validity construct based on the assumptions used in conducting the study. Jackson (2018) pointed out proper labeling or tagging of respondents' responses before measurement and accuracy of data acquired because validity and reliability are the threats that can invalidate a research work. However, here

are some anticipated limitations, challenges, and barriers that I may not have control over.

- In the ability to get the manufacturers of used electrical and electronic equipment to participate in the research
- Overcoming personal bias about the study
- The unwillingness of participants to answer questions
- Lack of access to e-waste sponsored sites.

Generally, the study's limitations are construct validity, internal and external validity, and reliability. I based my validity and reliability on the complication of getting respondents to come to terms with an e-waste management plan globally.

Another predicted limitation was the theoretical measurement and the validity construct based on the authenticity of the assumptions used in the study. Others include improper labeling or tagging of respondents' responses. At the same time, the unwillingness of participants to answer questions could affect the accuracy of data acquired because validity and reliability are the threats that can invalidate this study.

Messner et al. (2017) and Kyngas et al. (2020) suggested that the primary and secondary data collected from the field and the interpretation of the results in a study; should be validated based on data credibility and transferability dependability, and the verifiability repeatability of the inquiry this study, are as listed below:

- The credibility of the research,
- Is the research transferable,
- Can research be dependable on solving a problem?

- Can other researchers confirm the research? and
- Can the research be authenticated?

This inquiry aimed to add to the body of knowledge using the above criteria in the study without a variation in the problem statement's original thought, thematic and content analysis to ensure the study was trustworthy and transferable. In this study, I used data from the field interview and focus group discussion verified by inductive reasoning without bias since the study explores a known phenomenon UEEED e-waste management and recycling improvement. Moreover, the effectiveness of the existing e-waste policy would discourage the improper disposal of UEEED e-waste and encourage product recycling in Nigerian cities.

Significance of the Study

This study was significant in that it could bridge the gap of lack of product quality and retention policy in Africa, leading to the management of the importation of secondhand electronic devices with e-waste implications at the end of their shelf life in Nigeria (Gan, 2019; Okorhi et al., 2019).

My research strategy was to explore and close the existing gap in previous similar studies. Furthermore, to best understand the research concern of managing and recycling secondhand electrical, electronic devices, emphasized in UEEED e-waste management in Nigeria. The study's outcome could lead to a review or change in purchase and disposal policies of importing second-handed handheld electronic equipment/devices. The study could improve retention policy about electronic devices by standard organizations certifying used electrical and electronic equipment worldwide.

The earliest literature I reviewed did not proffer a solution for estimating e-waste recycling policies of e-waste outside countries like China and Singapore, with stringent e-waste management and recycling policies. It was essential to mention that electronic waste recycling was gaining prominence in the electronic industry. Meanwhile, the study suggests solutions or provides more information to guide policymakers and UEEED consumers on e-waste management awareness.

Yaazhmozhi et al. (2020) acknowledged that the concern was a credible and significant gap that should be addressed in developing economies like Nigeria, persuading my targeted audience that the expected result could translate into a revolutionary social change in the Engineering and technology environment by improving the maintenance and obsolescence management cost and a cleaner environment as identified by (Olla & Choudrie, 2014; Jennings et al., 2016).

Bridgens et al. (2019) and Deng et al. (2017) agreed with other authors that the negative impact of improper recycling or disposal of electronic waste generated from UEEED, and household electronic devices are problems. The authors opined that adopting a multidisciplinary approach could be a way out but were not assertive.

The research could fill a gap in the cost of managing UEEED by providing additional hidden costs associated with using electrical and electronic devices that have gone into obsolescence. Moreover, the inquiry result could also provide helpful information that will guide the choice of purchasing UEEED. The study's outcome could lead to sustainable e-waste management and recycling to provide public awareness,

health, and environmental protection by discouraging indiscriminate disposal of e-waste into the environment.

Moreover, the research study could fill a social gap created by the lack of knowledge about product recycling and non-destructive waste management of obsolete electronic devices such as UEEED. The awareness and understanding created by this research could potentially lead to addressing the economic and environmental challenges needed for the development of the society by users of secondhand or used electronic devices in Nigeria cities, as pointed out by (Speake & Yangke, 2015; Wieser &Tröger, 2018; Jennings et al., 2016).

The gaps that require further research are how manufacturers and policymakers would eliminate the risks posed by e-waste management and recycling of secondhand or UEEED into society when continuously using their products (Proske et al., 2019; Yaazhmozhi et al., 2020). The literature review showed that several authors partially addressed the gaps identified in the existing gaps associated with e-waste disposal or management.

Although, most authors focused on replacing UEEED with new ones without considering a policy that addresses recycling, remanufacturing, and e-waste disposal in developing economies like Nigeria. While some authors established that electronic devices like phone recycling were not a significant problem in Europe, most UEEED, such as phones and electronic equipment/devices, find their way to Africa as secondhand devices in major cities, using Lagos, Nigeria as a case study.

Significance to Practice

This study can make a significant contribution to the Engineering and Technology discipline. To corroborate this study, I referenced the study by Jennings et al. (2016). "*Forecasting Obsolescence Risk and Product Life Cycle with Machine Learning"* (p5) the study was a professional article published in 2016. The article suggested the usability/compatibility issue with predicting when electronic devices like mobile phones could go into obsolescence without hurting the users and the environment.

The study did not directly correlate with electronics post-usage management but dealt with pre-manufacturer issues. The study pointed to the current reality of e-waste concerns. The evidence was credible and cited by 26 scholars and peer reviews from relevant professional bodies regulating electronic devices. This article provided a valuable account of predicting electronic device shelf life. The study was linked to 46 references from similar studies. I observed that the views expressed by the authors were void of institutional biases and political but professionally objective.

Bradley (2014) and Szamalek (2016) argued that another challenge associated with secondhand or used UEEED was disposal at the end of their lifecycle. The authors raised e-waste concerns about how electronic devices could be managed from the cradle to the grave. The study explored the gap created by the obsolescence of UEEED and e-waste from electrical, electronic devices.

The research finding provided additional knowledge in technology and information management on gaps identified on lack of awareness by secondhand electronic devices/equipment users regarding e-waste management and disposal of or

recycling UEEED when they stop functioning. The inquiry identified the absence of stringent governing policy, both international and local, responsible UEEED e-waste disposal gap. These findings had local and global implications because of the green gas emission global concern.

My study recommends providing helpful information to help Standard organizations in Nigeria on best practice e-waste implementation policy prohibiting importing electronic devices near obsolescence from Europe to developing economies like Africa. The research evidence from the study would provide electrical, electronic manufacturers feedback, especially on the risk associated with used secondhand devices, allowing them to factor in policy that encourages recycling their products rather than shipping them to developing economies.

Significance to Theory

The logical connections between the framework presented and the nature of my study include the selected theory, which was related to my study because it could help explore the reason why cell UEEED manufacturers and people in business use the Machiavellian and transactional management theories to push forth their business interest forward without consideration for users.

According to Robinson (2005), the Machiavellian theory discussed the end justifying the means. This theory was selected for my dissertation because it described the view expressed by most manufacturers of cell phones and business owners.

Dorsch (2017) posited that dealing with human social life involves transactions at various levels, and researchers will require a transactional theory to deal with the

prevailing abysmal and indiscrete e-waste management alluded to the activities of "Aboki" and the business motive of business owners and users within Lagos environs.

After a critical review, I discovered that not all theoretical foundations applied to my study. Although, a preliminary analysis of the stated theories above showed that more studies were required to select the most suitable theoretical foundation for my dissertation. I also observed that previous studies did not state the theoretical foundation they used in their studies.

Therefore, since the problem statement borders on man and social change, economics, management, marketing, social psychology, and business communication are linked to customer interaction with electronic equipment device dealers and technicians who fix electronic devices when they become defective or go into obsolescence (Lee et al., 2016).

This theory agreed with the concern raised by several authors on the use and recovery of non-degradable materials used in the manufacturing of UEEED. Furthermore, whether these devices are properly managed or recycled using best international practices for e-waste management remains a concern. Bridgens et al. (2019) and Deng et al. (2017) agree with other authors that the negative impact of improper recycling or disposal of electronic waste generated from used electrical equipment/devices remains unresolved.

The rationale for choosing the Machiavellian TAD transactional management theories was that it is the best fit for a dissertation dealing with social change and human interaction with technology. Meyer and Peng (2016) argued that developing a theoretical

foundation was required to deal with transactions, emerging economies, and worldwide business phenomena over the decades.

The selected theory was related to the topic of my study because it would help explore why electronics manufacturers and people in business use the Machiavellian and transactional/management theory to push forward their business interests without consideration for users in developing economies. Although, the basis of the study was premised on epistemological assumptions using interpretivism to answer the research problem. This research design was most suitable because phenomena were acquired by observation and gathering facts and assumptions, like philosophical assumptions and inductive reasoning, among other research tools in answering the research question (Abu-Alhaija, 2019; Cuthbertson et al., 2020).

Significance to Social Change

The significance of this case study focused on the negative consequence of using relatively used UEEEDs imported from Europe without replaceable spares in Nigeria, Bridgens et al. (2019), Deng et al. (2017), Nalini & Ghosh (2020) and Szamalek (2016) argued that other challenges associated with used cell UEEED are disposal at the end of their lifecycle.

This study was significant because it could bridge the gap of lack of product quality and retention policy in Africa to manage the importation of secondhand electronic devices with e-waste implications at the end of their shelf life in Nigeria (Gan, 2019; Okorhi et al., 2019).

The study's outcome would change purchase and disposal policies for importing second-handed handheld electronic devices into African countries, including Nigeria. The study could improve retention policy about electronic devices by standard organizations that certify used electrical and electronic equipment worldwide.

The expected result would translate into a revolutionary social change in Engineering and technology by improving the maintenance cost, obsolescence management, and a cleaner environment as identified by Olla, & Choudrie (2014), Jennings et al. (2016), Bridgens et al. (2019) and Deng et al. (2017). These authors agreed with other authors on the negative impact of improper recycling or disposal of electronic waste generated from mobile phones and electronic devices are problems. This research could fill a gap in evaluating the benefits of using electrical and electronic devices that have gone into obsolescence. And the health and environmental implications of indiscriminate disposal of e-waste into the environment within society.

Second, the research study could fill a social gap created by the lack of knowledge about the cost implication of using obsolete electronic devices such as secondhand electrical and electronic equipment. The awareness and understanding created by this research could potentially lead to addressing the economic and environmental challenges needed for the development of society by users of relatively new (secondhand) or used electronic devices, from health to environmental issues caused by obsolescence (Speake & Yangke, 2015; Wieser & Tröger, 2018; & Jenning et al., 2016).

The gaps that required further research included how manufacturers would eliminate the risks posed by e-waste to society when continuously using their products (Proske & Jaeger-Erben, 2019; Yaazhmozhi et al., 2020).

Summary and Transition

In chapter 1, my study introduction proceeded with the concern raised by the United Nations on the globally growing concern of e-waste generated from used electronic equipment "cell phones, pocket pc, personal laptops, electrical devices," especially in developing economies like Nigeria.

My first chapter was structured into the background, research problem statement, purpose, research question, theoretical and conceptual framework, study nature, definitions, assumptions, scope, expected delimitations, and limitations. Others include the significance of the study to my professional practice and social change.

In Chapter 2, I review over 50 academic journals of similar studies with research relevance not more than 5 years of publication from 2022, to reinforce and establish the existing gap in my study. Chapter 2 provides supporting evidence, checking for adequacy of the methodology used by previous scholars.

Chapter 2: Literature Review

The research study problem was managing e-waste generated from UEEED in Lagos, Nigeria. These devices include computers, handheld devices (I-pads, cell phones), and household electronics. The concern is that these devices were near the end of their shelf life or had become obsolete in Nigeria and are thus disposed. According to UN Sustainable Development Goal 12, there are growing concerns about electrical and electronic waste worldwide (United Nation, 2020).

The research report and findings supported the earlier observation by Lawlor (2015) and Yaazhmozhi et al. (2020) on the management and recycling of UEEED or electronic equipment in circulation with an average life span of 18 months before degenerating into obsolescence. However, empirical studies from past literature and the United Nations showed that most used UEEED found their way into Africa and were purchased by low-income rural and city dwellers who could not afford new UEEED (Olla & Choudrie, 2014; United Nation, 2020).

Electronic practitioners and industry experience showed that fixing UEEED when defective was difficult or near impossible. Therefore, most e-waste players in developing nations use unsustainable disposal methods, like burning or using acid baths, to extract nondegradable metals from dis-used electronic devices. These activities were linked to environmental pollution with negative consequences on humans who interact with such a polluted environment; other challenges associated with using UEEED include disposal issues at the end of their life cycle. The lack of recycling facilities to manage waste generated from electronic devices in developing economies makes it cumbersome to

achieve the concept of managing waste from the cradle to the grave **(**Ogbuanya et al., 2019; Szamalek, 2016).

Literature Search Strategy

In this section, I explore the research information from the databases listed below. The inquiry quest was limited to literature/articles not older than 5 years from 2022. In addition, I reviewed peer-review journals and scholarly conference presentations that discuss the societal and environmental meanness of UEEED in Lagos, Nigeria. Using Walden University's library (Walden's Thoreau Multidatabase), the sources I used included the following:

- Emerald
- Google Scholar
- SAGE Journals
- ScienceDirect
- Springer
- World Cat
- Yahoo Search engine

The research keywords I used during this inquiry were *Secondhand electrical, electronic e-waste; electronic waste; used electrical, electronic device retention policy in Nigeria;* and *e-waste recycling & e-waste management*.

Using the keywords listed above in the Walden University database, retrieving significant literature on previous dissertations was difficult. I found less than 10 credible and related research literature that would deepen the research base. After several attempts

without any success, I decided to book an appointment with the Walden's Center for Research Quality. Through the engagement section with the Walden University research methodologist, I then located over 1,000 scholarly materials with links to most of the databases above and that were relevant and critical to the literature review section of this project.

Using these keywords in the google scholar search engine, I found 1,320 articles. After a narrow search with a date limitation for literature not older than 2017, 581 articles matched my search criteria of secondhand electronics e-waste disposal, secondhand electronic devices, and e-waste challenges in Nigeria.

My search focused on UEEED, handling of e-waste generated from UEEED in Lagos, Nigeria, and the awareness of obsolete UEEED before purchasing them. Moreover, the role of government agencies in enforcing relevant existing policies for prohibiting and or controlling the importation of UEEED into Nigeria was reviewed.

In this literature review, I used the CRAAP test concept to evaluate the research approach used, ascertain the relevance to the engineering and technological field and social impact, and recommend further studies or reviews by the various authors before considering their empirical studies. According to Meriam Library's (2021) definition, "C," representing currency, refers to the timelines of the published information, including a review or update and how it was published. "R" refers to the article's relevance to my research interest, the audience, and the credibility of citing such articles as references. "A" dealt with the authority of the source of literature, whether the author was a subject matter expert, the second "A" referred to accuracy, and whether the study was reliable

and could have possible linkage to similar literature. At the same time, "P" stands for passing the information by the author, whether it was for learning, entertainment, or providing information, and the writer's objectivity in the content of the message.

Given the above information, Nadelson et al. (2014) pointed out three questions that every researcher should consider, which I also asked myself:

1. Are the results of the literature review valid?

2. What are the results or outcomes of the study? and

3. How useful was the result? Was it relevant to study and can it be localized?

I also used a process called critical assessment of structure predictions (CASP) to answer the above three questions in evaluating the literature relevant to my study. Nadelson et al. posited that CASP was a simple tool or checklist for analyzing quantitative or qualitative data. Critical appraisal enables researchers to "assess the evidence and weigh the weakness and strength of the literature under review whether it meets the criteria of referencing it as a relevant, authoritative, accurate and purposeful currency (344-346) p. As such, CASP became handy during data analysis and interpretation as valid tools for conducting scholarly literature review.

Conceptual Framework

The conceptual framework grounded in this study includes an interpretive descriptive analysis of respondents' experiences with secondhand electronic devices, often referred to as used electrical, electronic equipment/devices (UEEED) in Lagos, Nigeria. In this study, I used the methodology and approach of a typical case study deployed by Meyer and Peng (2016) in dealing with business transactions like my study.

My research was based on the prevailing concern raised by the environmental impact of improper disposal and recycling of secondhand or UEEED that have exceeded their shelf life. This study has both professional and socioeconomic implications within the Nigerian space. The application and usage of UEEED comes with environmental waste concerns (Kreziak et al., 2016; Maulia & Halimatussadiah, 2018).

This study required meeting with users of new, secondhand, or UEEED like cell phones, personal computers, printers, and TV sets, to mention a few, in the street of Lagos. I explored the option of one-on-one interviews using structured and open-ended 15 questions to answer the research question derived from the topic, *Management and Recycling of SecondHand Electronic Devices in Nigeria*.

The gap in managing the increase in e-waste generated from used or secondhand electronic devices/equipment reinforced the need to answer the research question: How do users and business owners of used electronic devices/equipment manage their e-waste at the end of product life, and what influences their disposal or recycling method in Lagos, Nigeria?

Answering this question underscored the salient issues of obsolescence awareness and the health implications of unlawful disposal or recycling of e-waste management in Nigeria. I used the qualitative design approach using an instrumental case study reviewed by (Ishtiaq, 2019; Creswell & Poth, 2018). The authors stated that qualitative research was an inductive case study that could be achieved using group and focused discussion, which was applicable in the study in Lagos city in Nigeria.

The rationale connecting the framework presented in previous studies and the nature of my study included the Machiavellian and transactional/management theory that dealt with business interest by manufacturers of electronic devices without consideration for secondhand users. This theory agreed with the concern raised by several authors on the use and recovery of nondegradable materials used in the manufacturing of electronic devices. So far, whether these devices are adequately disposed off using best international practices for e-waste management remains a puzzle in the inquiry. Although Bridgens et al. and Deng et al. (2017) agreed with other authors on the negative impact of improper recycling or disposal of electronic waste generated from UEEED, problems were unresolved.

The inquiry involved participants recruited from Lagos, Nigeria's Computer Village. I did not recruit respondents based on gender; instead, the experience of UEEED usage and electronic technicians that repair and sell used electronic devices within the Computer Village was the basis of the selection criterion. The study was investigative, ethnographic, filed, and participatory observations.

Data collection was by *Focus Group Discussion* and qualitative documents or checklists detailing types of electrical equipment and devices commonly circulated within the market. The investigation outcome was monitored through audio recording and visual materials (pictures) and qualitative interviewing of stakeholders like government officials who enforce environmental laws and scrap dealers known as scavengers using the qualitative research methodology (Mishra, 2016; Ishtiaq, 2019).

Literature Review

The literature review was an extensive review of scholars' and researchers' works with similar ideas to my proposed research work, using an "effective synthesis" approach, supported by Whittemore and Knafl (2005) p 546-553. Although, this approach was slightly different from the annotated bibliography because it mainly summarized the literature content. The author established academic authority in a comprehensive literature review of the research topic under review.

Second, the literature review allowed the author to bring a broader audience into the research interest area or topic. It was worth mentioning that a literature review enhances the verification and laying of credence to the research assertions. Nevertheless, the need to conduct a literature review was very instructive and worth considering. This way, the reviewer could match the opinions of the various authors about the research topic and phenomenon under consideration. However, as chronologically reviewed below, it aided me in extracting useful information about the research work from empirical studies, such as the research problem, methods, findings, and areas requiring further investigations (Linnenluecke et al., 2020; Haddaway, Bethel, Dicks, et al., 2020).

In the long run, I sought relevant information about his proposed research's implication, whether it fits into future studies or how it intends to address a long-term problem, a postulation shared by Abbas et al. (2014).

E-Wastes From Used Electrical Electronic Equipment/Devices

Abalansa et al. (2021) posited that e-waste from used electrical, and electronic had become a growing concern globally, especially with the challenge e-waste posed to

developing economies in Asia and Africa, using Nigeria as a case study. Abalansa et al. focused on the unrestricted importation of used electrical, electronic equipment, which serves as a source of e-waste raw materials for industrial countries like China into Nigeria.

The positive side of this claim was that recovering e-waste provides jobs for people at the expense of the environmental consequences. Acknowledging that importing hazardous e-waste from other countries without a hindrance could portend environmental and ecological risk or danger if not addressed holistically. The authors developed a "Driver, Pressure, State, Impact Response (DPSIR) framework" to analyze the impact e-waste could cause on the ecological system if used electronic, electrical equipment end-of-life was not checked from the manufacturing date to the terminal point of disposal.

The study's weakness was the lack of sufficient data for assessing e-waste challenges in developing economies. Nevertheless, the study was vital to my study because it dealt with the phenomenon of interest that remained a global concern and unresolved in developing economies like Nigeria. The reviewed literature presents a good research case about used electrical, electronic equipment, and devices with an e-waste problem that requires further deliberation, especially in the lack of enforceable policies that could check transboundary importation of potential e-waste materials in the Africa continent without a recycling or recovery plan.

Adeola (2018) focused on the global concern of rising cases of e-waste and the consequences of improper disposal or management in developing countries without adequate recycling facilities. The authors cited obsolescence and end of shelf life of

electronic equipment imported into least resistant countries with weak legislation, especially developing countries. The author identified economic and job creation as reasons for the growing volume of waste electrical, electronic equipment without considering the adverse effect on public health and the ecosystem.

Another reason was the growing information technology needs that stakeholders fail to put measures in place to address the environmental concern of hazardous e-waste generated from used electrical equipment that finds its way into the environment while recovering the precious metals in the equipment. The authors did not specify the research method used, and the gap in the study was that the author generalized the concern of e-waste generated from electrical, electronic equipment in a developing country. This study was relevant because it would narrow my research work to Nigeria's peculiar e-waste management and recycling challenges.

Akpan and Inyang (2017) focused on the economic opportunity created by importing used electrical, electronic equipment/devices into sub-Sahara Africa and Nigeria with e-waste threats. The authors argued that there was no way the interest of economic value would surpass the negative implication and public health concerns generated by this used electronic e-waste. The authors pointed out that the e-waste dump in these African countries 28 years ago has become a significant environmental concern for people inhabiting close to waste dump sites.

According to the United Nations Environmental Programme (UNEP) and Green Peace Movement, the study's findings indicate that the transboundary transaction of e-waste harms the health of 10 African countries, including Nigeria. The authors adopted

the use of historical analysis to conduct their investigation. The study's gap centered around the demography of Lagos or any city in Nigeria. Therefore, it gave room for further inquiry. The study was relevant to my study because it covered the global concern of used electrical, electronic equipment e-waste. The study recommended finding a better way to manage or discourage rich nations from turning Africa into e-waste dump grounds.

Babatunde et al. (2020) researched southern Nigeria's e-waste generation among 300 household users. The authors obtained their data using a questionnaire: The authors based their study on e-waste and secondhand electrical electronics equipment. The demographic used was a secondhand electronic market. The authors' findings revealed the influence of the attitude of the users and waste collectors of e-waste. The study's gap was the authors' inability to narrow their research using a theoretical or conceptual framework that deals with factors that influence secondhand electrical, electronic equipment that form their choice of used electrical and electronic equipment.

The author asserted this was beyond their scope and recommended it for further studies. Nevertheless, the study was necessary and relevant to my study because it enabled researchers to determine why users make irrational decisions in purchasing used or secondhand electronic equipment/devices with a short end-of-life cycle that will eventually pose an environmental threat and e-waste management. Remarkably there are no recycling plants and structured e-waste management systems that encourage equipment buyback or exchange in Nigerian cities.

Deng et al. (2017) discussed obsolescence and electronic equipment end of shelf-life. Moreover, the impact of e-waste generated from cell phones in Asia countries often finds its way to Africa as secondhand electronic equipment or valuable devices. Unfortunately, this narrative does not address the abysmal disposal of used electrical, electronic equipment in Nigeria and other parts of Africa. Instead, these second electronic devices become a challenge to the environment because of the crude method of disposing of them. Deng et al. study focused on the household that uses electronic devices with less than 23 months of end of life, and the devices become e-waste.

The authors used the snowball sampling method in recruiting their respondents. The authors clearly state that the research methodology identified a research gap. However, the authors identified perception and susceptibility and lack of knowledge of obsolescence in secondhand electronic technology, recycling, and the implication of disposal into the environment as the main problem.

The literature review was relevant to my research because it highlighted the social problem of e-waste management emanating from secondhand electronic devices in Nigerian cities. Secondly, the method of data collection and the recruitment of respondents was valid in a qualitative case study.

Divine and Eng (2021) focused on the reason, usefulness, and challenges of importing used electrical, electronic equipment and devices into Nigeria from Europe. The author identified the advent of information and communication technology as the reason behind the unprecedented importation of used electrical, electronic equipment in good condition without a recurse to the e-waste management at the end of their shelf life.

The author noted that these electronic devices often pose environmental challenges because of poor management and recycling and after-use or end of shelf life of electronic devices/equipment.

The study had a gap in the methodology used, no mention of demography and the data collection method, and the scope of the study spread across seven states in Nigeria, which was a weakness because of data reliability instead of relying on secondary data. The study was relevant to my study because it dealt with the concerns of importing used electrical, electronic equipment with potential e-waste issues into Nigeria.

Ibe et al. (2018) focused on the negative consequences of toxic pollutants emanating from used electronic e-waste in the form of heavy metals like lead, copper, Zinc, and cadmium. The authors argued that these metals impact the environment and public health. This study was conducted in Owerri, Imo State, Nigeria. The study's findings revealed that dust particles from the environment contained hazardous dust particles harmful to public health and the ecosystem.

The study confirmed the daily exponential increase of e-waste pollutants to the environment, attributed to secondhand electronic technicians who use crude methods to extract some of these metals without a regulated and standard means of disposal. The study did not highlight the research methodology and theoretical framework used. However, the study was vital to my proposed research investigation because it covered significant e-waste stakeholders and electronic business owners' roles in generating and recycling e-waste from used or obsolete electronic equipment or gadgets. The study also

allowed further studies on better ways of controlling or minimizing the negative environmental and public health impact of e-waste.

Igbo et al. (2018) reviewed the environmental and social concern of the impact of e-waste generated in the form of heavy metals that finds their way into the ecosystem with the potential to cause harm to aquatic and marine life. This study focused on the inability of states like Lagos and Osun in Nigeria to pay close attention to the impact of heavy metals like lead, copper, cadmium, and Zinc, to mention a few.

The authors related the activities of waste scavengers who use crude methods to dispose off e-waste without considering social and negative environmental implications. The findings of these authors gave credence to the study of e-waste from used electronic devices. The study's weakness was the inquirer's inability to use a known research methodology for the study. However, the authors used a scientific method to identify the potential inherent danger in the solid e-waste generated from UEEED in Nigeria.

The study also failed to find recommendations for the e-waste management problem in the cities mentioned. However, the study was relevant to my research because it was localized to Lagos and deals with e-waste and environmental challenges in Nigeria which was still a social concern.

Isimekhai (2017) focused on the risk associated with e-waste in Lagos, Nigeria. The author used the risk assessment framework to study the extent of pollution resulting from e-waste materials. As mentioned in his study scope, the author investigated e-waste challenges in West Africa instead of localizing to Lagos, which I considered a gap. The

study would have made more impact if the author concentrated on the inquiry in Lagos. No mention of demography and the theory behind the research being a quantitative study.

The study was essential to my research because it dealt with the challenges of e-waste as a global and local challenge. The author established that e-waste could pose a health and environmental threat to humanity if not adequately managed. The gap identified in the study would allow me to carry out further studies using Lagos as a case study with known demography and recommendation for further studies by Isimekhai.

Ogunseye (2019) focused on the waste generated from electrical, electronic equipment in Ota, Nigeria, a city close to Lagos. The author used a quantitative research method to investigate Nigeria's consumption pattern and the relationship between used electrical and electronic appliances. The author's findings revealed that income, individual taste, and behavior could affect the growing volume of e-waste in Ota. The author noted that 81.5% prefer purchasing new electrical electronics equipment, while 20.3% of users prefer to discard their product by selling instead of recycling. The study's gap was the author's inability to use a theoretical and conceptual framework to ground his study.

The author used Microsoft for data analysis. Using SPSS/ANOVA could produce a more accurate and validated survey result in a quantitative statistical case study (Novansa & Ali, 2017). Also, the number of respondents was large but covered a small population in selected areas for data collection, which was not an accurate representation of the population of the chosen demography. The author recommended an extensive investigation into other sources UEEED and users like industries, institutions, and

business houses to improve the study. The recent study was relevant to my research because it allowed me to contribute to the current study by exploring appropriate theoretical and conceptual frameworks that will add to its credibility and validity.

Ohajinwa et al. (2018) focused on the presence of multiple sources of electronic waste and its impact in three cities (Aba, Ibadan, and Lagos) in Nigeria. The authors pointed out over 100 sources of pollutants like heavy metals, dust, and fumes in the environment during recycling methods using the crude method of burning and acid bath.

The authors used a comparative cross-sectional study to investigate the impact of e-waste pollutants on the environment and soil, including locations of e-waste or recycling sites. However, the findings from the study show worsening conditions and severe environmental and public health concerns. The authors recommended strict follow-up on the policymakers and government enforcing agents. The study's gap is the authors' inability to formulate a theoretical or conceptual theory.

Moreover, they provided a generalized solution instead of a holistic or global and localized solution that could address the growing concern of electrical and electronic wastes in Nigeria. The authors did not focus on the root cause of e-waste generated in the selected cities. The findings were essential to my study because they covered the area of interest of UEEED in this study. It also gave room for recommendations for further studies regarding how the menace of e-waste could be addressed holistically in Nigerian cities.

Okorhi et al. (2018) viewed e-waste generated from used electrical, electronic equipment/devices as means of livelihood for some less privileged Nigerian families. The

authors focused on over 128 types of used electrical, electronic equipment categories into ten different waste types, namely lighting fittings, household appliances, entertainment and consumer equipment, electrical, electronic tools/machines, electronic medical devices, automation, and control devices/equipment and automatic dispensers. The author used quantitative methodology to conduct their study, although there is no mention of theoretical and conceptual work to ground the study.

The authors focused more on the economic aspect of e-waste generated from UEEED without considering the adverse effect of the unprofessional and unsafe manner and e-waste extracted from electronic devices and equipment. Another gap in the study was the inability of the authors to recommend a final solution to the menace of e-waste concern.

The study was credible and essential to my study because it captured the classes of used electrical, electronic equipment as the significant sources of e-waste generation in Nigeria's major cities. Further studies on this current investigation would add to the management of e-waste in Nigeria and the conservation of electronic devices and equipment in my professional field.

Ojha (2020) focused on the international implication of e-waste challenges globally, focusing on Asia, the Americas, Europe, Oceania, and Africa. The author posited that most parts of the world have recycling plants but lack the same in Africa. He noted that e-waste was becoming a growing concern requiring concerted effort. The author mentioned recycling and re-using electrical, electronic equipment/devices to help

manage e-waste. However, the study failed to address the adverse effect on developing economies like Nigeria.

Although Ojha asserted that e-waste is increasing on an average 2.2 billion metric tons of solid e-waste at the rate of 3-5% annually globally without accurate data to help individual countries manage their e-waste challenges. The gap in this study was that the author generalized his study without focusing on Africa as the end-users of electrical, electronic devices.

The author did not mention the demographic setting used and the research theory. The study was relevant because it gave the global and local perspectives on electrical and electronic equipment developing into e-waste and the need to effectively manage the negative impact on the air, water, environment, and soil globally.

Olowofoyeku (2020) identified electrical, electronic equipment, and devices as a significant contributor to e-waste generation globally, especially in developing economies where these devices emanate as secondhand or used electrical, electronic equipment near the end of shelf life. The study focused on the attitude of e-waste workers in a scrap market in Nigeria and how they conduct their activities, raising environmental and public health concerns. The author used the Pearson correlation coefficient to analyze the questionnaire data.

The study's findings included a lack of e-waste knowledge and best-in-class disposal and recycling methods. The gap in the study includes the absence of a theoretical framework and appropriate research methodology that deals with human behavior in a market setting.

The study was vital to my study about used or obsolete electrical, electronic equipment not appropriately handled during disposal and recycling. The study created room for further studies since the authors did not propose a solid solution to end e-waste challenges in Nigerian cities.

Odeyingbo et al. (2019) focused on and identified the unabated inflow of used electronic devices into Nigeria. The authors focused on the problem of secondhand or UEEED imported in large quantities from Europe to Africa to create illegal e-waste trading or transactions that create environmental challenges in Nigerian cities.

The authors noted that about 60,000 tons of UEEED were imported into Nigeria through Lagos for five years. The authors identified weak regulations were responsible for importing dis-used or secondhand devices. Although, the author did not specify the specific demography used and the research methodology. The study was essential to my research because it deals with electrical and electronic equipment that creates e-waste as an environmental and social challenge in Nigeria.

Ogbuanya and Yekinni (2019) centered their study on the negative consequence of e-waste on the health of electrical, electronic technicians exposed to e-waste hazards due to poor recycling and e-waste management system in their local workshops. The authors used quantitative methodology and credible research approach in data collection and selected the study population and respondents.

The authors posited that most electrical, electronic technicians in Nigerian face hazards ranging from fire, exposure to fumes, and toxins from e-waste to fixing UEEED

and during disposal to the environment. The gap in the study is that the authors did not formulate a theoretical framework to support the methodology used in their study.

However, the study was relevant to my research because it allowed me to conduct further research based on the author's recommendations. Furthermore, why UEEED remained attractive to both the users and technicians in Nigeria without finding a solution to end or reduce the e-waste challenge by policymakers and business owners in Nigeria and other African countries.

Peluola (2016) focused on the problem created by the cross-border importation of e-waste considered hazardous to Nigeria from Europe. The author faulted existing laws and policy in Nigeria for dealing with the importation of used electrical, electronic equipment near their end of shelf life, identified as contributing to e-waste generated in Nigeria. The author found that laws lack international collaboration with the country of origin of such devices/equipment. The research gap included non-mention of the sampling methodology, the demographic setting, and the population size.

The study was helpful in my study because it allowed me to research and create awareness among UEEED users on the need to boycott the purchase of equipment with e-waste potential imported into Nigeria and other African countries.

Prasad et al. (2020) focused on the impact, and the emerging worries of used electrical and electronic equipment, referred to in this handbook as *waste electrical and electronic equipment* (WEEE). The handbook has 24 chapters dealing with each aspect of global e-waste challenges and management, particularly in Asia countries like China, India, and Nigeria in sub-Sahara Africa.

Prasad et al. asserted that e-waste had become a significant source of worry because of the astronomical increase recorded in the past six years, emphasizing previous studies' recommendation that it seems to work for a developed economy. The authors alluded that these developing nations are under international pressure to receive fairly or used electrical, obsolete electronic equipment at the end of life through illegal importation by businesspeople.

The study highlighted that lack of credible data sources and weak government policies in developing economies are major delimiting factors against successfully managing e-waste in developing economies. The study posited that low-income earners in the affected countries where e-waste is a challenge are the most affected because they live close to e-waste dumpsites with inadequate recycling facilities.

The study is significant to study because it covers all aspects of e-waste, requiring further studies with widespread empirical data. Chapter 1 highlighted the overview of e-waste, Chapter 4 deals with e-waste policies across the globe, Chapter 5 talks about the effect of e-waste on the environment and ecosystem, and Chapter 6 dwelt on waste from electrical and electronic equipment. Chapter 14 discussed electronic waste challenges, recycling issues, importation of used electrical, electronic equipment without accurate data, and e-waste management practice in Nigeria, which corroborate my case study reviewed.

Raval et al. (2020) fused their study on the awareness level of medical students about e-waste generated from the electrical, electronic gadgets they regularly used since the advent of digital medical tools and appliances that have reached the end of shelf life.

Moreover, whether electronic equipment users know the disposal method of such obsolete equipment, or the recycling system remained a contending issue. The authors used a student demography of a medical college to conduct their study using a universal sampling technique. The study's findings showed that 86% of the students interviewed lacked knowledge about used electronic e-waste recycling and management system.

Nevertheless, the authors alluded that users change their electronic gadgets like cell phones every two years without knowing how they are disposed off or recycled. The authors posited that most electronic gadget users lack basic knowledge of the risk of managing and recycling devices/equipment reaching the end of life. The research gap was the inability of the authors to define the research methodology and theoretical framework relating to the study.

The study was relevant to my research because it dealt with human interaction and e-waste recovered from used or secondhand electronic devices or gadgets medical students use. The study also allowed further investigation since the challenge of e-waste is still growing in developing economies.

Szamalek and Galos (2016) identified e-waste materials as electrical, electronic equipment that had deteriorated or disused. The authors mention metals used in UEEED as the leading sources of e-waste. Szamalek and Galos focused on the disposal of the electrical, electronic waste generated from cell phones and PC/laptop materials. The authors found that the average life span of phones is 18 months. Furthermore, once they are beyond their shelf life are resold and become environmental nuisances to the rural and city dwellers in low-income economies like Nigeria.

The study has a research methodology gap. The study emphasized e-waste recycling and management generated from cell phones and other electrical, electronic devices and equipment that often become an environmental and ecological threat. The study was vital to my research because it highlighted e-waste management and environmental challenges, with the opportunity for further studies.

E-Waste Management and Recycling/Policies

Adepojur and Sulayman (2019) focused on the impact of the growing smuggling of information, communication, and technology (ICT) equipment into Nigeria as secondhand or e-waste. Furthermore, e-waste management emanates from device replacement without considering recycling and endpoint collection center. The authors posited that when new electrical, electronic equipment, or gadgets are manufactured and released, the old ones become secondhand. The authors raised a concern about how secondhand electronic equipment were already deciphered into e-waste before they are shipped to developing economies. They argued that these devices are poorly recycled or managed because of poor recycling infrastructure.

The research gap found in the study was the inability of the author to use relevant social science research methodology. The absence of an appropriate research methodology would affect the study's outcome. However, the authors mentioned a comparative analysis of three countries and Nigeria but centered their study on Sweden and Japan, which already had an advanced, functional e-waste management system. The study was relevant to my research because it focused on Nigeria's unresolved e-waste challenge from domestic, industrial, and personal handheld devices.

Adeyi et al. (2019) examined the impact of e-waste from used electrical and electronic equipment indiscriminately disposed into Lagos city's environment. The authors focused on the concentration of heavy metals extracted from these used electrical, electronic equipment devices as primary e-waste sources. Their study covered scrap sites and markets where recovered e-waste metals are sold for economic gain. The study's findings included informal recycling methods, poor e-waste management centers, facilities, evidence of heavy metals in the ecosystem, and polluted air. The authors asserted that the continuous indiscriminate disposal of e-waste to the environment could pose public health and environmental challenges if the current unprofessional e-waste recycling methods were controlled. The gap was that the authors did not mention the research methodology but collected data from specific demographic settings in Lagos. The study was relevant because secondhand or used electrical, electronic e-waste remains a growing concern in Nigerian cities. The authors also recommended more studies on minimizing or eliminating the menace of e-waste generated from used electrical, electronic equipment, and handheld devices that find their way into the Nigerian space.

Ahirwar and Tripathi (2021) focused on the growing concern of e-waste across the globe, and the authors raised the concern about the environment, public health, and a host of other challenges e-waste management poses, including recycling. The authors are worried that if nothing was done to curtail the incremental growth of e-waste generation from solid and electronic heavy metals and toxic substances, the effect of e-waste could negatively affect the ecosystem, including public health. The authors did not specify the research methodology and demography used. Another gap in the literature review was

that the management of e-waste using a generic approach was irrelevant to the Nigeria case study. The literature was relevant to my study because it dealt with e-waste as a growing and global concern that needs fixing by all stakeholders.

Ajaelu and Agu (2020) focused on the environmental impact of indiscriminate disposal of e-waste materials in a Nigerian city. The authors based their inquiry on the void created by the lack of enabling or enforceable laws leading to an increasing rate of e-waste disposal to the environment. The author did not mention the research methodology, nor a theoretical or conceptual framework used. However, the author mentioned a null hypothesis and the use of questionnaires in their study. The study's findings indicate that e-waste was harmful and hazardous to the environment and has reached a significant level that is unhealthy for the ecosystem and public health.

Therefore, the study benefited my research because it allowed me to improve on the methodology and lend credence to the growing concern of the environmental impact of heavy metals recovered from secondhand or used electrical, electronic e-waste management systems without adequate recycling plants and facilities in Nigerian cities.

Alani et al. (2020) conducted a mixed method evaluation of the impact of heavy metals in the e-waste disposed of in Lagos cities of Alaba and Ikeja. The authors tested hazardous metals in the soil and borehole water source, the method of disposal, and possible public health concerns. The authors, in their findings, established that heavy metals found in e-waste have substantial traces of hazardous effects that could pose health and ecological challenges. The authors also mentioned that illegal and

unprofessional means of recycling e-waste could be responsible for the health issues in the research demography.

The authors used a mixed method in conducting their study. The gap was the lack of statistical analysis software such as SPSS/NVivo to analyze their data accurately. Moreover, research focused more on determining the health and environmental impact of e-waste management, disposal, and recycling without emphasizing the root cause and how to eliminate or reduce the sources of e-waste generated in Nigeria.

The study was vital to my research interest because it referred to secondhand or UEEED e-waste management, recycling, and poor implementation of enabling legislation connected with used electrical and electronic equipment in Nigeria. Although, the authors did not mention the theoretical method used in conducting the study. Another gap noticed was no mentioned recommendation for further studies since e-waste remains a global challenge and a menace in developing economies without UEEED waste management plants or a firm recycling policy that will discourage e-waste disposal to the environment.

Amechi & Oni (2019) focused on the unabated movement of hazardous e-waste from other countries without a hindrance. A scenario presumed to lack enforceable policies that can check transboundary importation of dis-used electronic equipment into Africa, especially Nigeria with weak regulations on importing secondhand electronic devices. The authors noted that most imported electronic devices are non-functional at the point of entry to their destination.

Amechi and Oni believe that the lack of local and international regulating laws was responsible for the proliferation of used imported electronic devices that become

environmental challenges due to obsolescence. The study was essential to my research interest because it examined electrical and UEEED e-waste management rules and legislation directly connected with used electrical and electronic equipment in Ghana, a close African neighbor to Nigeria. Although, the authors did mention the specific method used in conducting the study. Another gap noticed is the non-mentioned recommendation for further studies.

Andrae et al. (2017) focused on the life cycle challenges of electronic equipment such as mobile phones. The authors discovered that e-waste recycling, management, and identification of obsolete electronic equipment are problems requiring further investigations. The authors used established e-waste measurement methodology such as the "Open Eco-Rating" (OER) to identify the issues of electrical, electronic equipment/devices. Andrae et al. used a quantitative methodology in conducting their study. The study's strength lies in the method used to compute the electronic device's end life.

Nevertheless, the weakness in the study was the inclusive nature of finding a solution to the problem of e-waste recycling in developing economies like Nigeria. The study was vital to my research because it focused on how equipment becomes an environmental challenge at the end of its life cycle. Given that research still exists in the inquiry. The study was essential to my research because it highlighted the cell phone issues becoming an environmental concern due to the absence of product recall or recycling at the end of the shelf life in Nigeria.

Angaye et al. (2018) focused on the negative consequences of e-waste pollution occurring by burning used electrical, electronic equipment in an uncontrolled manner into the environment as a means of disposal. The authors posited that this practice was a growing trend that must be discouraged because of the long-term effect of e-waste toxins on the ecosystem and public health.

As a case study, the authors used verifiable testing methods to determine the toxic level emanating from e-waste using Bayelsa state, Nigeria. The study's findings validated the evidence from past empirical studies on used electrical, electronic equipment/devices. The authors used quantitative methodology to conduct the study. The study recommended effective policies for managing e-waste generation and disposal by relevant government enforcing agencies in Nigeria and across the globe to discourage indiscriminate burning and e-waste disposal.

The gap in the study was that no framework or conceptual framework was used in the study. The method of data collection was also not mentioned. Nevertheless, the study was relevant to study because the study provides room for further studies and gives credence to the growing concern of used electrical, electronic equipment, e-waste, and disposal systems or recycling methods.

Asante et al. (2019) focused on the global concern of rising cases of e-waste management in developing countries without adequate recycling facilities. The authors cited the uncontrolled importation of electrical and electronic equipment into developing countries because of growing information technology needs. However, they failed to put measures in place to address the environmental concern of hazardous e-waste generated

from used electrical, electronic equipment that finds its way into the environment while recovering the precious metals in the gadgets.

The authors did not specify the research method used, and the gap in the study was that the author generalized the concern of e-waste generated from electrical, electronic equipment in developing countries. The study was related to my research because it allowed me to narrow my research work to Nigeria's peculiar e-waste challenges.

Bridgens et al. (2019) focused on e-waste emanating from electronic devices and the circular economy. The authors found a lack of waste management strategy. Recycling secondhand electronic devices such as cell phones have a high turnover rate of disused e-waste not adequately disposed of into the environment in developing countries like Nigeria.

The authors did not state the methodology used in conducting the study. However, no suggestion to address e-waste disposal in developing economies like Nigeria and the Africa sub-region was advised. Although, the authors acknowledged the challenge faced by developing economies without a structured framework to manage the challenge of e-waste from UEEED as a side of the strength in the "current take-make-waste economy." According to the authors, the system allowed users or individuals to invest in buying up used electrical and electronic equipment for economic benefit without considering the environmental impact, which is common in Nigeria.

The study was essential to my research because it underscored the importance of the obsolescence of electronic equipment and the need to have a holistic methodology of

recycling or recalling UEEED devices from users in collaboration with original equipment manufacturers of electronic e-waste potential in developing economies. The gap in defining the best approach to overcoming the effect of e-waste makes it relevant to my phenomenon of interest.

Davis et al. (2019) focused on the significant e-waste dumpsite in Asia and Africa that has gained prominence over 20 years without considering the negative impact on the beneficiaries of the e-waste transborder businesspeople. The authors posited that this unending act was due to cheap labor and weak legislation on used electronic equipment in developing economies. Davis et al. wondered why developed economies and original equipment manufacturers are reluctant to help African countries combat the challenge of e-waste generated from their disused and obsolete equipment/gadgets.

The study identified countries like Ghana, Lagos, Nigeria, China, Karachi in Pakistan, and New Delhi in India as central hubs for the e-waste business. The gap of the study was in the research methodology with few details about the e-waste hubs. The study was relevant to research because the study considered a further investigation into the policy aspect of e-waste transborder transactions growing without a solution in sight. Moreover, why do Nigeria and other African countries remain attractive destinations for UEEED? This question/concern was focused on in this study.

Dhir et al. (2021) focused on the behavioral reasoning theory (BRT) regarding the reasoning behind the continuous practice of generating e-waste rather than recycling used electrical, electronic equipment in countries where such facilities are available. Dhir et al.

pointed out that over the years, several scholars have made recommendations on how to handle the generation of e-waste, but the challenge remained a growing practice.

The authors opined that cultural background, individual behavior, and lifestyle or societal status could influence e-waste disposal of used electronic equipment or gadgets. The study's findings showed that environmental and personal benefits are some behaviors that drive the disposal of e-waste. Others include the intention behind the practice of users not being willing to exchange their obsolete electronic equipment for newer ones where such opportunity exists for reasons of monitory gain.

The study further reiterated the increasing adverse effect of e-waste pollutants on the environment and public health. This recent empirical evidence further laid credence to the challenge of allowing uncontrolled disposal or recycling of used electronic devices in developing economies like Nigeria. The gap in the study was that the authors used a global e-waste index to evaluate the worse countries, using Japan as a case study for other parts of the world as posited by Dhir et al. The study was valid, well researched, and summarized recommendations from previous studies.

The authors came up with human behavior as a possible reason for the unabating e-waste challenges requiring further investigation. The study was relevant to my study, and it gave room for further studies on how scholars can find ways to create more awareness of e-waste management of secondhand or UEEED recycling without causing environmental damage.

Giri & Adhikari (2020) focused on eliminating the negative consequences of poorly managed disposed e-waste in the environment in developing economies. Giri &

Adhikari acknowledge that the problem of electrical, electronic e-waste has come to stay because every household owned one form or the other of electronic gadget or equipment with potential e-waste challenges to the environment.

The authors discover that attention was not given to e-waste management yet did not address the recycling of e-waste in developing countries. The authors raised a growing concern about the nondegradable, toxic, and hazardous leftover from the e-waste after disposal to the environment. The study, however, identified poor synergy among stakeholders at the local and international levels.

The authors did not specify the research methodology, collected data, or demography. The authors predicted that electronic equipment before disposal. The study was valid and relevant to my research about the challenges of secondhand or UEEED with global e-waste concerns.

Gollakota et al. (2020) focused on the challenges of e-waste management systems in developing economies. The authors posited that developed countries had found a way around the challenges of e-waste generated from UEEED with or without minimal environmental impact. The finding revealed that most developing countries still struggle with controversial and weak legislation to manage the growing technological need of their people without considering the environmental and public health implications of e-waste activities.

The study identified improper recycling methods and a lack of standard recycling processing plants in developing economies. The study also suggested that countries with weak legislation and substandard recycling plant and e-waste management systems could

learn from EU countries like Ukraine with standardized e-waste management systems. The study was well investigated and published in the journal of environmental management with a transparent research methodology and theoretical conceptual framework.

The only gap was that not much was said about Africa aside from referring to it as a dumpsite for e-waste and Nigeria as one of the African countries with inadequate regulatory frameworks and poor recycling facilities. The study was worth replicating in my study since it allowed me to find ways of addressing the growing concerns created by secondhand and used electronic equipment/devices periodically imported into Nigerian cities as e-waste. The study was relevant to study because it deals with the e-waste unresolve context sub-Sahara Africa and Nigeria being my case study.

Jamshed et al. (2020) reacted to the increasing global impact of e-waste, described as a "tsunami of e-waste" by the United Nations. The authors focused on the growing concern in developing countries like Nigeria, with weak institutions, e-waste recycling plants, and management systems. The authors are worried UEEED was the primary source of e-waste generation with environmental and public health implications.

Jamshed et al. asserted that e-waste stakeholders must create awareness of the impending danger of indiscriminate disposal and the continuous dumping of secondhand or used electrical and electronic equipment into developing countries like Nigeria because of the global implication of environmental pollution and its negative impact on the life of people exposed to them. The authors concluded that since several scholars have identified e-waste, the developed economies must work closely with electronic

manufacturers and policymakers to find a lasting solution to the upcoming global challenge e-waste will create.

The authors argued that about 80% of e-waste generated across the globe finds its way to countries with weak legislation like Ghana, Nigeria, India, and the Philippines as recycled used electrical equipment or devices with e-waste potential at the end of the equipment shelf life. The gap in the study was that the author generalized the problem of used e-waste with a significant focus on a definite solution to the problem in developed economies. The study was relevant to my research because it provides a comprehensive foundation for further studies on e-waste generated from electronic equipment/devices in Africa.

Jennings et al. (2016) focused on the importance of obsolescence prediction of electronic equipment before disposal. The authors argued that electronic devices like cell phones are given less attention before becoming obsolete and disposed off. The study did discover that attention was not given to e-waste management yet did not address the recycling of e-waste in developing nations. The gap in this literature review was the extent of coverage. The authors based their research on developing countries, limiting the findings without localizing the e-waste problem to Nigeria.

The literature reviewed was credible and relevant to my research because it allowed me to replicate and localize the study to Nigeria's situation since the authors did not narrow their research with a known qualitative research methodology that defines e-waste as a challenge. The study was relevant to my inquiry because it deals with the improper disposal of electronic waste in developing economies like Nigeria.

Maphosa and Maphosa (2020) conducted a qualitative study to determine the effect of e-waste in Sub-Africa. The authors based their demographic study on Ghana, Nigeria, And South Africa. The study focused on the growing concern of continuous e-waste shipment to developing economies without adequate recycling infrastructure to manage e-waste. The authors reviewed 25 papers from 151,558 pieces of literature using a systematic review process. The concern raised in the study includes the perception that secondhand electrical, electronic equipment, or devices are reusable. Instead, these devices were shipped to Sub-Africa, which eventually became challenging to manage.

The gap in this literature review was the extent of coverage. The authors based their research on three countries, limiting the findings without localizing the e-waste problem. The literature reviewed is credible and relevant to my study because it allowed me to localize the study to Nigeria's situation since the authors did not narrow their research.

Moletsane and Venter's (2018) study focused on the growing concern of e-waste transborder transactions becoming challenging to manage in developing economies in African countries. The authors are worried that the uncontrolled way used electrical, electronic equipment, and handheld devices find their way into African countries like Ghana and Nigeria was severe, especially with the growing environmental and public health concern. The authors posited that e-waste is a lucrative business with an estimated revenue of US$ 65 billion being metals extracted from electrical, electronic equipment, or devices because of the growing demand for modern electronic gadgets that slips into obsolescence in short periods.

The authors also raised environmental and public health concerns warning that stakeholders must manage the recycling and management of e-waste concerns. In their findings, the authors projected an astronomical 21% increase in e-waste generation in African countries by 2021. E-waste could be a significant challenge to manage by these countries because of the poorness or absence of practical e-waste framework and policies with inadequate recycling infrastructure or e-waste management system.

The gap in the study was that the authors did not mention the theoretical framework and research methodology used, and the demographic used was too generic. The study was credible and relevant to my research because the publisher Institute of Electrical Electronics Engineering (IEEE) source is credible and has authority in electrical, electronic engineering. Moreover, the study will allow me to make scholarly input into the ongoing e-waste study recommended by the authors.

Nduneseokwu et al. (2017) focused on the growing concern of e-waste generated in Nigerian cities without abating. The authors found out that consumers mainly collect e-waste for economic gains rather than the environmental impact of their action, which was an ineffective implementation of e-waste policy by government agencies. Nduneseokwu et al. used the "theory of planned behavior" to establish the root cause of e-waste generation from electrical electronics in Nigeria.

The study was limited to the phenomenon of interest in study. Since it dealt with e-waste generation and inappropriate disposal, the authors could not land their findings on a walkable solution that could eliminate the means of e-waste in Nigerian cities. The authors developed a credible theory for their study dealing with behavioral, disposal, and

recycling habits or attitudes towards users' electrical electronics devices. Data collections align with the proposed study using primary and empirical data from a similar study in Onitsha, a city in Nigeria.

The study was relevant to my research because it focused on electrical and electronic e-waste challenges and was also a case study. However, the authors did not address social and environmental impact issues and how they could be controlled or managed by the government of Nigeria using existing control frameworks by agents of the Nigerian regulating bodies. The solution provided by Nduneseokwu et al. requires further investigation using the global e-waste indices and concerns raised by other scholars.

Nnorom and Odeyingbo (2020) focused on Nigeria's dumping ground for used electrical, electronic equipment/devices (UEEED) generated e-waste. The authors alluded that about 60,000t/y of non-useable electronic equipment/devices form part of the e-waste challenges in developing nations like Nigeria. The authors found that metals like copper and gold are proponents of environmental pollution, inadequate legislation, or regulation banning equipment near the end of shelf life. They insisted on Nigeria's lack of recycling infrastructure for e-waste management, leading to environmental contamination.

The study acknowledged that in 2011 a National Environmental law regulating the electrical, electronic sector was passed but seemed infective, so there are still growing concerns about the e-waste challenge in Nigeria. The study was vital to my research because it addressed the driving force behind importing secondhand or UEEED equipment into Nigeria.

Ogunsola & Shobajo (2017) focused on the factor that determines e-waste generation from used electrical, electronic equipment already defective or obsolete. The authors posited that electronic equipment users influence e-waste determinant factors because of their appetite for new gadgets, increased information communication technology (ICT) infrastructural demand, peer pressure, and artisans who use e-waste as spares to fix defective secondhand devices and equipment government regulation, and e-waste management and organizational culture.

The authors used quantitative research methodology and collected data from among the determinant factors. The study's findings reveal weak government regulation and a lack of standard recycling plants and waste management facilities in Ibadan, Nigeria.

The authors used the "model of factorial determinants of e-waste" to ground their theory. The study was relevant to my research because it fitted into the outlook of the e-waste challenge facing Nigerian cities. Furthermore, the study will enable me to lend credence to the existing knowledge on overcoming the growing e-waste concerns in Lagos and other Nigerian cities.

Okposin (2020) focused on the adequacy of e-waste management and existing laws in Nigeria. The author identified the threat posed by e-waste and the environmental challenges importing used electrical, electronic equipment, or devices (UEEED) into Nigeria without effective law specifically to manage UEEED. However, the author identified a lack of public awareness on the users' side of the danger of e-waste. The

study was essential to my research because it dealt with the flawed regulatory framework for importing UEEED into Nigeria.

Nevertheless, e-waste management and possible environmental and health effects persisted among people exposed to e-waste. For example, Okponsin posited that it costs an average of $30 to dispose off a TV monitor Cathode Ray Tube (CRT) electronic waste unit, yet they are still shipped to Nigeria even when it is evident that used electronic equipment had reached the end of shelf life.

The author identified a lack of an adequate regulatory framework to manage the recycling of e-waste. The study was essential to my research phenomenon and professional concern about used electrical, electronic equipment that becomes a potential source of e-waste. However, the author did not provide a methodology for conducting this study.

Okorhi et al. (2019) conducted a quantitative study using an investigative approach to investigate why electrical and electronic waste management remains challenging in the eastern part of Nigeria. The authors used a purposive method to select their respondence. However, no mention of intervals or questionnaires used was found. Data were gathered from empirical studies across the 36 state government agencies in Nigeria. The gap in this study was the inability of the scholars to find a credible solution to the problem of used electrical, electronic equipment waste and the generalization of the demography used. The author posited that the challenge of dealing with electronic e-waste was due to insufficient policies or governing laws in Nigeria.

The authors identified the weakness in managing electrical electronics wastes by government-mandated agencies with such responsibilities across the 36 states and local councils. The study was relevant to my research interest because it covers my primary case study in Lagos state. Moreover, the authors recommended that the Nigerian government do more work to stop the growing concern of e-waste across the globe.

Orisakwe et al. (2019) focused on Africa's health and environmental burden created by e-waste recycling activities. The authors posited that recycling and disposal of UEEED into the environment had created toxins from heavy metals, brominated flame retardants, non-biodegradable petrochemical waste, and substances capable of distorting the ecosystem and public health.

The authors relied on data obtained from empirical studies and demographic evidence obtained from Nigeria and other African countries. The study's findings reveal that the pollutants from electrical, electronic e-waste manifested in people's health exposed to these toxins over time. The authors argued that it was evident that e-waste recycling and electronic equipment/device end-of-life management are critical concerns that could be addressed locally and globally.

The authors noted the population explosion and lack of e-waste handling facilities in sub-Sahara Africa. E-waste management has become a significant challenge. The study's research gap is the inquirers' inability to mention the methodology used in data collection and research framework. The study was relevant to study because the study provided room for further studies and gave credence to the growing concern of the health and negative environmental consequences of used electrical, electronic equipment e-

waste and the lack of improper disposal systems or recycling methods in developing economies.

Parajuly et al. (2020) focused on human attitude towards devices and used behavioral science or theory to manage e-waste challenges. The authors examine the production chain to the end-of-life of electronic equipment, arguing that a better understanding of this process could help solve the e-waste management and equipment recycling challenge. Parajuly et al. asserted that going by the current rate of e-waste generation, if nothing was done to stop the trend, it could have doubled by 2045.

Therefore, the authors suggested that further investigation should be conducted on behavioral research on the life cycle of an average electronic device or equipment to manage the generation of e-waste. The author used the theory of Planned Behavior (TPB) to conduct their investigation. The finding reveals that human behavior affects his/her consumption pattern, affecting e-waste disposal and recycling. The study was vital to study because of the similarity of research theory.

The only difference was that I explored the Machiavellian and transactional theories to examine the behavior of electronic users and their choice of disposal and knowledge about recycling.

Yaazhmozhi et al. (2020) conducted a qualitative study on the impact of electrical, electronic equipment waste, mainly from the metals used in manufacturing them. The authors argued that when most electronic devices go into obsolescence, such electronic equipment was disposed off improperly to the environment, thereby creating

environmental and health issues for the inhabitants. The authors focused on e-waste management and recycling, citing global environmental challenges as a case study.

The authors used Singapore among users and some selected cell phone manufacturing industries in their demography. Data was collected from IT and telecommunication sectors and private institutions, including e-waste recyclers. The authors find that most electronic equipment users prefer to exchange their old devices with a newer version with little financial involvement, unlike their African counterparts, who do not have such facilities. Yaazhmozhi et al. noted that Singapore firms buy off old cell phones and recycle them.

Meanwhile, some of these phones find their way to third-world countries and developing economies like Nigeria. The authors acknowledged that the concern is a credible and significant gap that be addressed in developing economies like Nigeria. This research work also applied to my study and allowed me to localize the research in Lagos, Nigeria, where e-waste management, health, and potential environmental issues are a growing concern.

Summary and Conclusions

Chapter 2's sections emphasized global and local concerns on Nigeria's e-waste generation, management, and recycling of used electrical and electronic equipment/devices. Over 50 empirical reviewed series of literature established that in Asia, Africa, and Europe, UEEEDs such as phones and household and industrial electronic devices do not have comprehensive data on UEEED recycling and end-of-life tracking (Alani et al., 2020; Babatunde et al., 2020; Ogunseye, 2019). Findings from the

literature also showed a significant variance of inter-boundary transactions of UEEED across the globe find their way to Africa as secondhand used electronic equipment that becomes challenging in recycling and disposal (Odeyingbo et al., 2019; Prasad et al., 2020).

The gaps identified in the literature review include e-waste management challenge, weak legislation, poor record of dis-used electronic devices/equipment in developing countries, lack of recycling facilities to handle e-waste, and nonexistence of a cohesive synergy between OEM and policymakers in developing economies where e-waste poses a challenge. Other reported findings are behavior perceptions about e-waste disposal (Dhir et al., 2021; Olowofoyeku, 2020; Parajuly et al., 2020) and deliberate importation of used electrical, electronic equipment/devices with the near end of shelf life in Nigerian cities.

I explored the Machiavellian and transactional theories to formulate a conceptual framework that would review the economic reasons why the responsible stakeholders of electronic equipment/devices fail to key into the global concern raised by policies makers on the negative social impact of disposing UEEED into the environment in Lagos and other cities in Nigeria.

In Chapter 3, the focus of the study centered on the methodology used in inquiring into similar studies, ethnographic means of data collection, the type of statistical software used for data interpretation, and how data were stored, like electronic means of storage using a flash drive or memory card. In the light of the above, the underlisted gaps were identified and required further inquiry. For example, some gaps

arose from the research method used and the projected increase in the volume of e-waste generated from second or used electrical electronic devices/equipment (Parajuly et al., 2020).

Dhir et al. (2021) focused on the BRT to explore the reason behind the continuous act of generating e-waste by users, manufacturers, and government regulating agents. The author posited that business and personal gain above public interest drive the growing concern of e-waste generation. Moreover, it recommended further investigation using other human behavioral theories.

Nduneseokwu et al. (2017) adopted the "theory of planned behavior" in establishing the root cause of e-waste generation from electrical electronics in Nigeria. Nevertheless, no mention of ethnographic means of data collection without referring to the software used in data analysis was considered a research gap requiring further exploration in chapter 3.

Parajuly et al. (2020) focused on using behavioral science or theory to manage e-waste challenges. The author used the TPB to conduct their investigation. The only difference was that I used the Machiavellian and transactional theories to examine the behavior of electronic users, their choice of disposal, and what influences their knowledge about recycling.

Ogunseye (2019) reveals that income, individual taste, and behavior are possible factors affecting the growing volume of e-waste in Ota but did not point to any theory or framework to support his assertion. The second gap in the study was in data collection, which did not reflect the ethnographic approach and was most suitable for a qualitative

case study. Ogunseye used Microsoft excel manual method to analyze his research data instead of qualitative analysis software such as the Statistical Package for the Social Sciences (SPSS) or NVivo qualitative software.

Given the above-identified research e-waste management gaps, Amechi, and Oni (2019) and Andrae et al. (2017) argued that the usage and management of UEEED should be analytically reviewed to unravel the reason for the continuous increase in e-waste being generated from UEEED yearly. Especially in developing economies like Nigeria, where the problem of e-waste management persists. Bridgens et al. (2019) and Okorhi et al. (2019) expressed concern about managing the negative consequences of UEEED e-waste, especially in countries like Nigeria with weak regulations and e-waste enforcement and management strategy (Bridgens et al., 2019; Okorhi et al., 2019).

Nonetheless, the results and findings from the empirical studies I reviewed in Chapter 2 supported and gave credence to my study of e-waste management generated from secondhand electrical, electronic equipment/devices. Although, most of the authors suggested that e-waste management required further research study on how UEEED users and stakeholders could eliminate the risks posed by e-waste to society when continuously using their products, as asserted by (Alani et al., 2020; Jaeger-Erben, 2019; Proske & Jaeger-Erben, 2019; Yaazhmozhi et al., 2020).

Chapter 3: Research Method

The purpose of this qualitative content analysis case study was to understand further managing and recycling of UEEED from the point of importation to their use and abandonment snowballs into environmental challenges in Nigerian cities like Lagos. The research methodology was based on similar studies (see Alani et al., 2020; Babatunde et al., 2020; Nduneseokwu, 2017; Ogunseye, 2019). These studies used the qualitative research method and asserted that using the qualitative approach was best for a case study of this nature that requires an in-depth and further study on why managing the challenge of e-waste generated from secondhand electronic devices is a growing public concern in Lagos and the globe.

Although past scholars focused on the growing concern of e-waste generation without looking at e-waste management and recycling aspects and sources, in this study, I explored ways of managing or recycling e-waste the moment I established some credible sources of e-waste generation traced to secondhand used electrical, electronic devices whose usage and abandonment snowball into management issues in Nigerian cities like Lagos.

I start the chapter by restating the research question, my qualitative research design, and the methodology's rationale. I discussed my role as a researcher and the methodology I used for the study. I end Chapter 3 by highlighting the trustworthiness issues and summarizing the chapter.

Research Question

How do users and business owners of used electronic devices/equipment manage their e-waste at the end of product life, and what influences their choice of disposal or recycling method in Lagos, Nigeria?

Research Design and Rationale

The research design and rationale was based on the research question. According to Harrison et al. (2017), a case study is suitable for empirical, content, and textual analysis. The authors asserted that this process enables data collection and analysis. I conducted this case study using a qualitative inquiry to explore the challenges of e-waste generated from UEEED recycling, UEEED post-end-of-life phase, or obsolescence post design, manufacturing, and disposal. I used the ethnographic method through interviews to investigate why most people still used secondhand or UEEED despite the management and recycling challenges and the negative impact it could cause on the environment and public health.

Therefore, linking the research interest to Walden University's vision supports having a healthy and safe environment. This study supported and highlighted the challenges of e-waste management and recycling of UEEED faced by low-income earners in Africa in all intent and purposes. The inquiry about used electrical, electronic devices, or secondhand electronic equipment could provide an overview of the environmental implications of using electronic equipment close to their shelf life and health implications (Jokela et al., 2006; Szamalek, 2016).

Bridgens et al. (2019) used the qualitative research method in their study. The authors believe that adopting a multidisciplinary approach to recovering the nondegradable materials used in manufacturing electronic equipment and properly disposing of them could provide some level of e-waste management. Bridgens et al. (2019) agree with other authors on the negative impact of improper recycling or disposal of electronic waste generated from UEEED.

A theoretical foundation is a theory that describes the evolutionary thread in psychology, social sciences, and or management. Hoffman & Klein (2017) posited that an academic foundation is a "taxonomies of causes and effect, of beliefs, decisions, actions, and so" (p. 68-73). According to Wolf (1996), management theory deals with historical evidence of how things interact, especially in a phenomenological inquiry.

Given that the study was a qualitative case study, it would not be appropriate to use a quantitative method because it would require a theoretical framework, while a conceptual theory would be most suitable for qualitative studies. Therefore, it would not be applicable because quantitative studies examine the relationship between two variables. So, using other qualitative designs such as phenomenology, ethnography, narrative, historical, and descriptive conceptual framework is tenable. Nevertheless, I used the ethnographic method in this study. The ethnographic inquiry method is the most suitable method to conduct this typical case study because I was able to observe participants during the focus group discussion and interact with respondents in the research environment during the one-on-one interviews.

In addition, an ethnographic study is most appropriate and effective for case studies because it allows a researcher to explore new insight into the phenomenon under investigation using semistructured interviews and a focus group approach while acquiring research data (Fountouki et al.,2020; Liberati et al., 2019; UKEssays, 2018).

Thus, I used the qualitative design approach, which recommends using myself as the research instrument. The study was based on philosophical assumptions using the interpretivism paradigm to gain further depth into the research problem (Husam & Abraham, 2020). This research design was most suitable because knowledge of any phenomenon was acquired by observing and gathering facts and assumptions from the respondence, just like the quasi-experiment, postpositivist philosophical assumptions, and inductive reasoning, among other research tools used in answering the research question.

My research data collection was through one-on-one interviews with electronic technicians/business owners and users of electronic equipment in Computer Village Lagos and some selected electronic workshops and an e-waste dumpsite in Lagos State. The structured interviews and focus group discussions with the sample population of 28 participants continued until data saturation. This purposeful sampling strategy was achieved through inductive grounded and emergent theory sampling methods.

Role of the Researcher

The role of a scholarly practitioner in an ethnographic qualitative case study was described as an observer, participant, and observer-participant involved in visiting the research designated area directly with the sole intention of data collection and as the research instrument. According to Roulet et al. (2017), a researcher's role could be an

observer and a participant-observer. The authors posited that other roles of the observer-participant include identifying and locating the correct research location and establishing a link between him and the research participants and the type of data collection. In contrast, by ensuring the safety of his respondent and moral rights and protection. Furthermore, Roulet et al. asserted that the role of the researcher includes that of an observer through an overt or covert involvement during the research inquiry. Therefore, my role in this study was as an observer and researcher, seeking to acquire data from the field.

Frasso et al. (2018) and Hammer et al. (2017) identified the role of a researcher-participant in coordinating the research so that his/her interest in the study does not violate the right and privileges of the participants, especially in a community setting where the study would take place. This empirical study was relevant to my study because of the peculiarity of the Computer Village and Alaba International Market where I conducted the study. The authors also asserted that "community-based participatory research (CBPR)" would help narrow the professional gap between the researchers and respondents. Boccagni and Schrooten (2018) noted that the researcher's presence as an observer could also boost the participants' confidence during the data collection process. Additionally, the researcher as an observer participant was the best method of ensuring that a qualitative study was conducted effectively while ensuring suspicions and doubts about the study's aim was ascertained before commencing the research interview sections and group discussions through his observatory role.

My relationship with the respondents was strictly that of an inquirer and observer. There was no professional relationship with participants, resulting in any conflict of interest. The study was conducted outside my professional place of work and environment. One of the ways I overcame professional and research bias was by being objective and not subjective about receiving participants' feedback about their experience with electrical, electronic equipment usage and disposal, which is the research phenomenon under focus. Another control to check research bias is ensuring all participants are recruited voluntarily without offering any incentives or violating their rights.

Avoiding bias in research was one central area most inquirers failed to consider when conducting a qualitative study. Although my concern was the unconscious professional bias, researchers sometimes exhibited when inquiring about their field of study. Fassiotto and Girod (2020) identified unconscious bias in dealing with situations. The authors agreed that unconscious bias could negatively influence the mindset or opinion of researchers. Therefore, I did my best to avoid exhibiting any form of bias when I collected the data as a social scientist.

In the same way, Button et al. (2016) pointed out that bias often leads to the wrong research outcome, mainly where the study relied on evidence-based results. Therefore, I avoided every element of bias during my research to give credence to the outcome of my inquiries.

Additionally, I applied to obtain IRB approval before data collection. Meanwhile, Walden university made it mandatory for doctoral students to attend the ethical coaching course that upholds ethical professionalism during any study.

Haines (2017) posited that to overcome ethical research issues, the researchers should ensure he meets all the requirements of the university ethical committee using credible and transparent methods in recruiting participants and during data collection, analysis, and interpretation applicable to an ethnographic and case study inquiry.

Methodology

The study was a qualitative case study using the ethnographic method in data collection. The basis for selecting this research approach was that my inquiry was a case study and conceptual purposive research design. The selected qualitative study suits my research phenomenon because it requires an in-depth analysis of the phenomenon under investigation with a specific research methodology. That enabled me to inquire about the unabating use of secondhand or UEEED and what drives the interest in known environmental effects of e-waste, disposal, recycling policies, and users' awareness level in Lagos city, Nigeria.

Frankfort-Nachmias et al. (2015) supported using a defined research methodology in conducting a social science qualitative case study inquiry. Therefore, developing this research methodology was critical to the outcome of the case study. The authors posited that a research method would state how the inquirer tends to conduct their study and its location.

Developing a conceptual research framework for my study required understanding how it provided insight into the research design. The qualitative research method was based on the origin of unstructured and non-numerical data analysis. The study relied on interviews, end-to-end questions, focused group discussions, participant observation, audio recording**,** and benchmarking of relevant data from previous research.

Tong et al. (2007) advocated using a specified setting/venue where the interview will hold during data collection to avoid unnecessary distractions throughout the interview section, using a predetermined population size that supported the data collection method and interpretation (Beins, 2017).

Alasuutari (2010) posited that case studies emanated from the classification of "non empirical or theoretical concepts," Alasuutari opined that qualitative study started in the 1960s. Nevertheless, Mises (1951) argued that qualitative research methodology evolved from "Positivism" and would be explored using phenomenology or a case study approach.

Meanwhile, phenomenology study requires an individual to use his experience and area of subject specialty to answer the problem statement's research question. Giorgi (2009) asserted that qualitative research was the best way to research human sciences. Its origin was from the early works of "Edmund Husserl."

According to Comte (1998), positivism deals with information derived from the dominant experience leading to the evolution of new knowledge that validates a reasoning or research opinion. Furthermore, an early discovery was by "Henri de Saint-Simon, Pierre-Simon Laplace, and Auguste."

The chosen conceptual theory was appropriate to my study because it helped explore why the study was essential by engaging participants using the life experience of electronic device users. The methodology found in previous studies was specific to the research problems in view but could address the identified gaps in my study. At the same time, retrieving the social impact it has on the content of the inquiry was vague. The selected framework aligns with my study because the chosen methodology can marry the problem statement, purpose, and research question, making it easy for me to conduct the study (Dawidowicz, 2016; Osanloo & Grant, 2016).

My sample size was 35 respondents. The expected data samples include audio-recorded voices from interviews, and data collection shall be from primary and secondary sources. I obtained primary data through interviews, which formed part of the study discussion section published in a monographic format. Secondary data was from published scholarly and peer review journals, public bodies/institutions, or companies that served as references. Since most of the archived articles, such as historical records and research materials, are consistent with my study. These data enabled me to generate new and original insights into the research topic. Data coding and analysis were carried out using the latest version of the NVivo 12 software, which was considered most appropriate for qualitative studies. Salehyan (2015) argued that when individuals conducted data collection and specialized coding software, they overcame personal coding bias and established better intimacy between the research question and the issues under investigation.

Tong et al. (2007) advocated that using a specified setting/venue where the interview was held during data collection helped to avoid unnecessary distractions throughout the interview section when using a defined population size supporting the data collection method and interpretation (Beins, 2017).

Meanwhile, my research data and analysis could be repeated using the stated methodology mentioned above and making it verifiable by other researchers, thereby validating my research data credibility. So, to achieve repeatability, Maxwell (2021) suggested analytic and nonstatistical generalization to obtain data from a group or a population of the research setting to validate data for qualitative studies obtained from the field.

Participant Selection Logic

Population

The strategy to conduct the research was to recruit respondents from the Computer Village and Alaba International Markets within the business owners' site or premises, focusing on secondhand or used electrical, electronic market in Lagos State, Nigeria, because that was where the largest concentration of used electronic equipment and gadgets and business owners and electronic users were located. I engaged the union leaders in the market to preinform them about the importance of the inquiry and the type of research support, which was to identify the respondents/participants voluntarily.

Data collection lasted four weeks and two days. Data was collected through interviews using voice recording and scripting devices and pictures at the end of the survey; collected data was stored in a dedicated flash drive for coding and analysis.

Given that qualitative sampling includes convenience, purposive, theoretical, selective, within case, and snowball sampling, I used the purposive and random sampling method to select my respondence once I found a suitable location for the inquiry (Creswell & Poth 2018; Higginbottom, 2004; Polit & Beck, 2012; Ritchie, & Elam, 2013).

However, Van Rijnsoever (2017) posited that the sample size must be appropriate before the investigation. I recruited 35 volunteers for the study among participants in Lagos Computer Village who best represent or know the research topic or the phenomenon UEEED. I limited my sample size to 28 participants to avoid coding and data analysis complexity. According to Van Rijnsoever, the coding process in qualitative/quantitative research is laborious and time-consuming, especially for researchers with scarce resources who may not want excessive sampling once the data saturation point was reached. Therefore, Van Rijnsoever suggested that qualitative studies' most appropriate sample sizes were between 25 and 50 participants.

This study required using the snowball method to select participants from a population of electronic users and business owners relevant to the study who do not want physical contact but were identified through recommendations from coparticipants. The study was based on investigations through interviews and discussion, selecting the population and volunteers of electronic equipment/devices.

According to Parker et al. (2019), the snowball sampling method could be used as a virtual method involving structured social media like Facebook or any other credible source such as a Skype communicator. Other Sampling methods are Realist sampling,

Causal pathway case sampling, Sensitizing concept exemplars sampling, Principles focused sampling, Complex dynamic systems: case selection: ripple effect sampling,

For example, an Instrumental case study used multiple-case sampling and systematic qualitative evaluation reviews. Others include sequential and emergence-driven sampling strategies during fieldwork, snowball or chain sampling, respondent-driven sampling, network sampling, link-tracking sampling, emergent phenomenon or emergent subgroup sampling, opportunity sampling, saturation, or redundancy sampling (Patton, 2015). However, none of these sampling methods best suited my selected research method.

Data saturation was the converging point, and the outcome of interview responses became redundant. However, Van Rijnsoever (2017) posited that most researchers consider codes observed more than once as a redundant value once no new or additional information can be added to the proposed data. That is where data collection through interviews and observation has reached its peak. I attained saturation point after 8 business owners for the one-on-one interview sections and 20 focus groups.

Glenn (2016) and Van Rijnsoever (2017) argued that data saturation was the maximum amount of information acquired during data gathering. At the same time, saturation of data was the average most occurred result in the sample population. The authors advised that researchers could use "Random chance, Minimal information, and Maximal information" to select data saturation (Glenn, 2016).

- Random chance allowed researchers to select information sources based on probability. This method was most suitable for quantitative studies.

- Minimal information also works similarly to random chance but adds as an extra condition. However, at least the addition of a new code should be observed following the sampling steps. Alternatively, such information source was discarded and should not be included in the data sampling methodology.
- Maximal information was regarded as the first set of data information sources with a substantial observable number of unobserved codes. The data set could be an insignificant number of data information sources, randomly selecting an information source (Van Rijnsoever, 2017).

Although I recruited 35 participants, 25 for focus group discussion and 10 business owners for one-on-one interview responses, the final population size was 28. Meanwhile, it was necessary to interview all after the saturation point because the larger the number of participants, the more complicated it becomes to interpret. Given the above requirements, there were two reasons why the minimum size of a purposive sample deserved attention. First, theoretical Saturation seems to call for a "more was better" sampling approach, as this minimizes the chances of missing selected data codes.

However, the coding process in qualitative research was laborious and time-consuming for researchers with limited resources to achieve an oversample or too much data. Some scholars gave tentative indications of sample sizes that often remained between 20 and 35 or below 50 participants. The theoretical mechanism on which these estimates were based was "unknown." Furthermore, it is always best to limit research data to avoid outliers and redundancy (Van Rijnsoever 2017).

Instrumentation

Fountouki et al. (2020) asserted that using myself as an electrical, electronic engineering instrument in the data collection provides the best option when the phenomenon under investigation falls into the researcher's professional discipline jurisdiction. Provided the researchers can deal with ethical issues of culture of the respondence in ethnography study, Fountouki et al. posited that data collection was achieved through interviews, observations, documents, media review, or questionnaires.

The author noted that validity was achieved using universal laws guiding the phenomenon under investigation. In this study, the universal law guiding e-waste was scientific in the generation and disposal methods that would not harm the environment and cause danger to public health. I used two types of data sources classified into primary and secondary.

Primary Source

I obtained my primary data through interviews and observations of group discussion of 5 respondents using observation protocol and how business owners of electronic equipment/devices manage the interface between e-waste management, recycling, and storage within Alaba International Market and Ikeja Computer Village. Interviews were conducted among secondhand and electronic individual users. The findings and data obtained were documented in the spreadsheet as part of my records, forming part of my discussion section published in a monographic format. I also used an audio recording device during the interview but will let the respondents know about it before using it; most respondents objected to it.

The data collection strategy was to engage representatives of the electronic device located in the Computer Village in Lagos, Nigeria. The data collection was focused on participants who used different brands of obsolete electrical, electronic devices that technicians find difficult before disposing or retailing them to e-waste scrap dealers. I used the underlisted steps to achieve my data collection.

1. I used a one-on-one interview method of selected electronic equipment brands, users, and technicians, and participants will include local Computer Village local e-waste collectors, buyers, and second-hand electronic equipment/devices, dealers.
2. I would retain all data entries from legacy journals throughout the research before comparing notes with similar studies for five years before destroying them.
3. Analyze electronic equipment/devices documents, obsolescence reviews, and periodic trials of fixed electronic devices before going bad as evidence.
4. Examine content relating to various sources of electrical, electronic e-waste extracted from the research data repository and,
5. Assemble past scholarly investigation findings and Validation of research findings and final report.

According to Moyo (2017), data collection instruments in a qualitative study or social sciences could be in the form of a questionnaire, and observation will be collecting data. Therefore, I will use the structured questions I developed below to answer the research question in this proposed study. Respondents were mainly male, aged 18 and

above, familiar with secondhand electronic equipment/devices, and electronic technicians who fix defective used electrical and electronic equipment/devices (UEEED) in the Computer Village. The interview questions were Open-ended and divided into parts A and B.

Furthermore, data collection was taken seriously to enhance confidentiality and possible intimacy between the interviewer and interviewee (Cleary et al., 2014). Conclusively, data collection should be solely driven by the intent of the research memo and not by the researcher's perception of the researcher or phenomenon under review.

Secondary Source

I did not use secondary data sources for the study. The essence of referring to the secondary data source was to provide me with an overview of what was done in previous studies. The secondary source was obtained from published scholarly and peer-review journals, e-waste generation, and retail records from the Computer Village where they exist. Sherif (2018) and Notz (2005) posited that secondary data sources are meant to give me insight into what was done in past studies. Since substantiating validity and reliability would be a challenge, it would be better to generate new research data that can be validated. Although, some of these materials may also consist of archived articles such as historical records, Technical and annual reports from original electronic equipment manufacturers, reviews from electrical, electronic online merchants like Amazon, Alibaba, eBay, and online shops in Nigeria like Jumia and Konga. These data enabled me to generate new ideas and original insights into the research topic. I relied on the data I

collected from the field during my interview with recruited participants in Lagos city, Nigeria.

Procedures for Recruitment, Participation, and Data Collection

I used the study strategy to conduct the research by recruiting respondents from business owners' sites from the Alaba International Market and the Computer Village in Lagos State, Nigeria. The Computer Village and Alaba International Market have the largest concentration of used electronic equipment and gadgets, technicians/dealers, and the product market.

Next was to locate 10 credible business owners within the chosen locations willing to participate in the study and where I had access to identify and recruit focus group participants who are potential users and buyers who came around to fix or replace their old electronic gadgets.

The first step I took was to issue the recruitment flyers before obtaining the consent of the potential participants. After agreeing to participate in the study, I approached them and delivered my proposed consent form to those who could read it. Alternatively, I read the content out to those who cannot read simultaneously, requesting their willingness and acceptance to participate in the study, explaining the study's purpose in the consent form, and indicating that participation would be strictly voluntary.

After successfully recruiting participants, the next step was to identify a temporary rented chat room with a conducive environment that could seat five Persons within the Computer Village and Alaba International Market. Consequently, I conducted

interviews and one on one discussion during the data collection duration within the Alaba market and the Computer Village.

The next step was to arrange and organize my data collection and electronic real time voice recording & timing device, field hand notes, and data storage materials. After that, I developed a schedule for each participant and focused group, and acceptable to all for four weeks until data saturation. My observation steps followed the open and physical contact with participants and business owners' outlets as listed below:

- Listening and observing body language and eye contact with the participant,
- Recorded voice and took note of responses of participants to interview questions,
- Maintained and observed the reaction and ensured the concentration of participants to interview questions, and stuck to the allotted interview time of 20 to 35 minutes,
- I observed how Technicians/dealers interact with electronic devices, scavengers, and customers in the Computer Village.
- Observed and recorded how e-waste materials were generated and disposed off at the designated waste site at the Computer Village.
- Took pictures of generated e-waste and observed and recorded findings at the end of the observation steps.

Data collected were secured and prepared for analysis and interpretation before issuing final dissertation reports and research findings. The data source included individual experiences relating to using secondhand or used electronic devices and the

knowledge of technicians that fixes electronic devices. The study also reviewed the benefits of properly disposing of electronic equipment such as obsolete cell phones and the cost implication of repairing such devices over time. I deduced my findings through interviews with selected participants via random sampling. My source of data collection was classified into primary and secondary sources, as stated above.

Planned a group interview of 5 subgroups, and data collection was from 35 volunteers, including business owners, users of electrical and electronic equipment/devices, new or old, and business owners who sometimes double as dealers of electronic devices at the Computer Village Lagos. I used nine openended and follow-up questions and five responsive and follow-up questions to extract the data from respondents.

The data I collected from participants during the interview formed the basis of exploring the challenge of using secondhand electrical and electronic devices that are obsolete and improperly disposed into the environment. The feedback I received from the various participants helped form the research opinion during data analysis and interpretation/coding. I used the under-listed steps to achieve data collection,

1. I used the “one on one” interview method for selected electrical, electronic users, dealers, and technicians.
2. I conducted focus group discussions with five participants per subgroup, including electronic equipment representatives in the Computer Village.
3. I planned to retain all entries retrieved from legacy journals throughout the research for five years before destroying them.

4. Analyzed documents relating to electronic equipment obsolescence reviews and evidence of used electronic devices undergoing test trials after repairs will serve as evidence.
5. I examined content relating to secondhand electronic equipment extracted from research data repositories like Amazon, Alibaba, Ebey, and Jumia.
6. I assembled past scholarly investigation findings and validated my research findings and final report.

I used four weeks and two days to collect data between 10 am and 4:30 pm during the data collection. The frequency of the data is five times a week. My interview time with each participant was an average of 10 to 15 minutes. At the same time, the focus group discussion lasted 20 to 35 minutes. My data acquisition target was achieved by interviewing five focus group participants each day for the specified duration or period of data collection.

Recruitment of respondents was after discussing and obtaining approval from the leaders of the amalgamated union's electronic equipment users and business owners located in the Alaba International Market and Computer Village Ikeja. Data collection was through interviews and observation of focus group discussions. At the end of each interview section, recording and data collection, audio recordings extracted from my recording devices, writing material, and a camera for pictorial evidence were stored using standard software data (SD) memory cards. Part of the measure I adopted in quality checking of my interview recordings have a separate review section on each interview recording through playback before leaving the research sites.

Errors resulting from poor recording were deleted and repeated until the correct data were captured. At the end of each section, I thank the participants for their time and willingness to participate in the research data collection. Participants' feedback of satisfaction or dissatisfaction was acknowledged before departing the field. The fallout of favorable feedback informed me of my decision to continue or terminate the data collection daily.

The last week of the data collection was reserved for follow-up interviews and clarifications on respondents' ambiguous responses about e-waste management, recycling, and transactions requiring the intervention's critical stakeholders in both research sites.

Data Analysis Plan

An iterative means of data analysis was deployed for coding using abstract coding and keywords that appear repetitively until the main findings were deduced using the most occurred phrase in the form of “word cloud” and related results from the NVivo version 12. The data source included empirical evidence, respondent experiences relating to using secondhand or used electronic devices, and the knowledge of business owners that fixed and sold electronic devices. Others included common types of electronic devices and equipment.

The study focused on the benefits of adequately disposing off e-waste from obsolete electronic devices and the cost implication of repairing such devices over time. Data review, coding, and transcribing followed the purposive strategy using convenience

and selective sampling or descriptive and memo coding using the first and second cycle methods. (Rubin & Rubin, 2012; Laureate, Week 7&8 video, 2016).

I used an iterative software (NVivo12) for data and abstract coding using keywords that appear repetitively before analyzing the result. According to Van Rijnsoever (2017), most inquirers considered codes that repeatedly occur redundantly when no added information would be obtained from the data analyzed. Also, Perrier et al. (2018) asserted that data discrepancies arising from the ethnographic method were best resolved by discussion among the respondent.

The authors opined that those researchers are encouraged to do a follow-up clarification review with a participant to understand the phenomenon better, aside from using the NVivo12 software for data interpretation and analysis. I treated discrepancies in data collected for analysis as errors emanating from multiple conflicting answers. I used the NVivo12 software for data analysis for straightforward interpretation and delineated the various data acquired during the openended qualitative questions/interview section (Paulus et al., 2017; Feng & Behar-Horenstein, 2019).

Issues of Trustworthiness

Hammarberg et al. (2016) posited that most students often confuse the requirement for quantitative research with qualitative. Hammarberg et al. (2016) posited that a trustworthy study must have, as a minimum, credibility transferability, confirmability, and dependability to avoid confusing what was required. In this investigation, I focused on these highlighted criteria above because I used the

ethnographic method in data collection during the interview section of the qualitative inquiry.

Therefore, I benefited from paying attention to the credibility and repeatability of my research work in line with the thought shared by Leung (2015), which ensured that research or an inquiry is trustworthy when it meets the stated criteria above. Elo et al. (2014) also submitted that research trustworthiness covers "credibility transferability, confirmability, and dependability" in their view, the inquirer must ensure that every study process was trusted, from data collection and interpretation to data collection and interpretation to the result and analysis. Elo et al. opined that research work should, at minimum, pass the credibility and dependability test if such research inquiry added value to the body of knowledge and could be referenced in future studies.

Credibility

The most effective yardstick for measuring a reputable research work is its credibility and validity in the body of knowledge. However, based on experimental and inductive studies, most research inquiries rely on tested theories and philosophies. Although, qualitative investigations were based on new evidence or changes in earlier evidence, which may also require further proof. To ensure my study was credible, reliable, and dependable. I followed tested qualitative ethnographic methods and proven procedures, especially during the recruitment of participants and data collection, interpretation, and analysis (Solutions, 2017).

Hafeez-Baig et al. (2016) argued that data credibility was one way of assuring that a research study is credible and reliable, and based on my findings from empirical

studies, it was evident that without first establishing trust in any research work; the credibility of the entire work would be in doubt. Therefore, the credibility of every research depends on the completeness of the process that throws up such a study. For example, the participant's report must be without any reproof and certify a true reflection of what transpired in the field.

Arguably whether a research gain prominence or not depends on its acceptability and the level of trust and importance accorded to it by the targeted audience. Consequently, it was essential to set the criteria for trustworthiness in any qualitative research.

Elo et al. (2014) submitted that research trustworthiness requires credibility transferability, confirmability, and dependability. In their view, the inquirer must ensure that every study process was trusted, from data collection and interpretation to result in analysis. Elo et al. opined that research work should, at minimum, pass the credibility and dependability test if such research inquiry adds value to the body of knowledge.

Conclusively, a qualitative study would be recognized to meet the set research criteria that promote credibility and transparency in arriving at a research opinion. Additionally, credible research should meet internal validation required throughout the study, with every research design meeting its applicability, repeatability, and methodological consistency.

Transferability

Daniel (2019) posited that a qualitative study must withstand the four critical litmus tests before being regarded as transferable. "Trustworthiness, Auditability,

Credibility, and Transferability (TACT)." The authors argued that using a standardized methodology and framework will enable the repeatability and transferability of any credible research work. The knowledge and experience gained in the study or inquiry are transferrable to other areas of life with similar challenges or needs to help.

Dependability

Any researcher who can conduct a study that achieves a recordable success in line with social change principles is dependable because he or she has demonstrated trustworthiness and diligence in doing his or her business. For research work to be dependable, it must pass the minimum repeatability test or inquiry. Additionally, completed research should achieve a recordable success in line with the principles of trustworthiness and diligence in investigating (Daniel, 2019).

Confirmability

Korstjens & Moser (2018) asserted that consistency and neutrality are the main features of qualitative research confirmability. The authors argued that once the proper research methodology, framework, and theory are employed. The research result and outcome often come out the credibility unless the researchers try to influence personal or professional bias. However, Korsjens & Moser noted that researchers should not base their studies on opinion but on proven research methodology so that the approach used in the study is auditable and could be dependable when compared with similar studies.

I followed laid down procedures, such as fulfilling the requirement of the IRB in the recruitment of respondence and data interpretation using established statistical research software like the NVivo version 12 and strict adherence to the conventional

rules as defined in the research methodology. Adopting this approach was meant to ensure the research result conformed with the internationally recognized standard, provided such research fulfilled the requirement of the IRB and ethical values set for such inquiry, and strict adherence to the approved research methodology by Walden University institutional review board.

Ethical Procedures

Recruitment of research participants was as important as the study itself because wrong participants would affect the credibility and validity of the research work. Therefore, it behooved the investigator to legitimize the recruitment process. Though participant volunteers may be difficult to deal with in some cases, that cannot discountenance the vulnerability of study reliability and credibility. In some cases, ethical issues can void the entire process. To avoid raising ethical issues and credibility concerns, the researcher must seek relevant approvals and necessary support in meeting his/her research participant requirement without committing any breach of the process (Killawi et al., 2014).

I successfully achieved this research process by using the following approach to accomplish the aim of the study.

1. Applied and obtain the Institution Review Board (IRB) approval before embarking on data collection and the recruitment of participants.
2. Once I secured IRB approval, the next thing was to arrange to identify participants who would be willing to participate and consent to the

recruitment process based on the research aim research and all legal/ethical implications involved (Sahay et al. 2014).

3. I did not entice/induce participants with offers or cash rewards to win their support,
4. The study did not require indemnity regarding the participant's information protection and privacy right.

The complexity of conducting qualitative research requires a holistic approach, particularly in data collection. Therefore, since most empirical research findings and data credibility relies on participants' inputs, either recruited or volunteers Biesecker, (2014), it was evident that recruiting credible and knowledgeable participants is essential. So, getting it right at the point of recruitment was vital in the first phase of this inquiry, especially during the recruitment of users of used electrical, electronic participants. It was essential to state that the research process was not manipulated by inquiring about suiting the researcher's interest (Brandon, 2013).

Finally, working with the IRB and the right target participants was the right way to conduct research without trouble (Namageyo-Funa, 2014). Empirical research evidence suggested that if researchers duly follow the prescribed procedures in line with proven research methodology as stated above, no ethical issue would arise from the recruitment process of research participants.

Summary

Chapter 3 focused on harmonizing and aligning the research questions and methodology. This chapter paved the way for choosing the suitable research methodology

for deploying the research tool during interviews and data collection in Lagos's Computer Village. The selected method gave credibility to the study. Chapter 3 broadens the scope by highlighting the role and importance of obtaining the institutional review board approval while addressing ethical issues that emanated from participants and the research instrument. This qualitative case study aimed to fulfill the research purpose of promoting and achieving a credible research opinion that would void ethical and professional bias when analyzing data and results in chapter 4.

Additionally, credible research should meet internal validation required throughout the study with the selected and approved research design, which could meet the applicability, repeatability, and methodological consistency in fulfilling the research aim and objective of the most effective ways of managing used electrical, electronic equipment/devices without posing environment and public health challenges.

This chapter provided a multidisciplinary social science approach to discussing the issues of secondhand or UEEED by viewing the study from a behavioral and business principle using the Machiavellian theory of the end justifying the means of every behavior or action. The data collection and interpretation concern using the NVivo12 was extensively defined. Chapter 3 culminated in Chapters 4 and 5 after obtaining the IRB approval to conduct my final study.

Chapter 4: Results

The purpose of this qualitative case study was to understand further managing and recycling of e-waste from used or secondhand electrical electronics equipment/devices from the point of importation to their use and abandonment, which snowballed into e-waste management challenges in Nigerian cities like Lagos. Successfully conducting this study may address the literature gap in the management of e-waste and recycling challenges emanating from the use of secondhand electronic equipment/devices identified by many researchers (see Babatunde et al., 2020; Ogunseye, 2019; Ohajinwa et al., 2018; Prasad et al., 2020; NESREA, 2011; Techcrunch, 2018; Adepojur &Sulayman, 2019; Monsurat et al., 2019).

Also, the outcome of this study would help create public awareness and understanding of how this research could potentially lead to providing information on the management and recycling implications of how e-waste affected society. Another noted outcome was through the transactional activities of secondhand or used or new electronic devices/equipment that are no more useful at the end of the equipment shelf life and how such equipment were removed from circulation when they become obsolete (see Speake &Yangke, 2015; Wieser &Tröger, 2018; Jennings et al., 2016).

The research question for this study was: How do users and business owners of used electronic devices/equipment manage their e-waste at the end of product life, and what influences how they manage their disposal or recycling method in Lagos, Nigeria?

The research question guided me in finding answers to the identified gap in the study bothering on the e-wasted management recycling problem created by used or

secondhand or UEEED in Lagos, Nigeria, which persisted with a sign of a continuous rise in e-waste generated from secondhand or UEEED.

I got approval for the research topic and collected data from the field using the qualitative design approach in an instrumental case study. I analyzed the collected data using thematic analysis from 8 Electronic business owners and 20 Electronic users.

This study aligned with the findings of other recent studies on the unabating rising and e-waste (see Abalansa et al., 2021; Ahirwar & Tripathi, 2021; Nnorom & Odeyingbo, 2020). Additionally, these studies found that the challenge of e-waste management and recycling was compounded by a lack of standard e-waste disposal methods and regulations. I have segmented Chapter 4 into trustworthiness of data, credibility, transferability, dependability, confirmability, results, evaluation of research findings, and summary and transitioned to Chapter 5.

Research Setting

The research site compromised business owners and electronic equipment users, and to gain unfelted access to the research sites. It was expedient I got advice and support from the market nonaffiliated body overseeing the safety and peaceful coexistence of multiple electronic equipment/device transactions in the Alaba International Market and Computer Village, Lagos. The representative of the market nonaffiliated body gave a hint about the research site that aided in recruiting my participants without any conflict or hitches between me and the respondents. Their support laid credence to my research activities from the recruitment data collection in both locations. This gesture of kindness and morals was an exciting moment and a booster for my student's studies. They also

offered security protection because I felt threatened or intimidated by market tugs or union members while conducting the research. The unsolicited support I received from members of electrical and electronic dealers known as business owners was also helpful in narrowing my targeted research population and time spent on finding credible business owners and users of electrical and electronic devices using the snowball sampling method. Most of those who had appreciable knowledge about e-waste management and recycling of electronic equipment/devices, new or old willingly volunteered to participate in the research. Their interview and discussion inputs made it easier for me to interpret and analyze data.

Demographics

The demographics of this study covered participants with background and knowledge of e-waste management and recycling, transaction of new, old, or secondhand electronic equipment within the chosen site found in Lagos who were 18 years and above. I recruited 35 participants. The participants were grouped into two groups: 10 business owners and 25 users of electronic devices/equipment, new or old.

The business owners were private persons who undertook the sales and repairs of electronic devices/equipment within the selected sites, like Alaba International Market and Ikeja Computer Village in Lagos. The common understanding was that none of the business owners had international affiliations with manufacturers of the electronic equipment and devices they deal with daily. Their educational background was not a consideration for the study. Although most business owners could read and write, they were not interested in disclosing their educational background.

The exciting part about the business owners was that all the respondents had a minimum of 5 years and up to 40 years of experience in their various business areas. The business areas included in this study are secondhand, used, or new electronic devices.

The users of electronic devices/equipment were private individuals recruited in the market environment within the business owner's sites but were not related to them. Their educational background and social status were not pertinent to the recruitment process. However, most respondents were 18 and 65 years old and lived in the Lagos metropolis. The respondents were all male and had over 5 to 15 years of experience in electronic device usage and transactions but had limited e-waste management and recycling challenges.

Finally, none of the focus group respondents knew each other, nor were they affiliated with the business owners or manufacturers of electronic devices, but they knew the type of electronic devices or equipment they preferred using. None of the participants were vulnerable, which was a substantial criterion for the IRB approval and ethical complaints for the study.

Table 1

Business Owner Demographics

B/O	Age at Interview	Gender	Business Type	Years in Business	Location
1	45	Male	Secondhand electronics	25	Alaba Int'l market
2	50	Male	Secondhand electronics	30	Alaba Int'l market
3	65	Male	Secondhand electronics	40	Alaba Int'l market
4	55	Male	Secondhand electronics	28	Alaba Int'l market
5	45	Male	Secondhand electronics	23	Computer Village Ikeja
6	33	Male	Secondhand electronics	12	Computer Village Ikeja
7	25	Male	Secondhand electronics	3	Computer Village Ikeja
8	21	Male	Secondhand electronics	2	Computer Village Ikeja

Table 2

Focus Group Demographics

F/G	Age at Interview	Gender	Type of Electronics	Ave. No of years Using Secondhand Equip/Devices	Location
Group A	18- 45	Male	Secondhand electronics	15	Alaba Int'l market
Group B	18 - 50	Male	Secondhand electronics	21	Computer Village Ikeja
Group C	21- 52	Male	Secondhand electronics	25	Alaba Int'l market
Group D	25- 55	Male	Secondhand electronics	18	Computer Village Ikeja

Ten business owners and 25 users of secondhand electrical, electronic equipment/devices were recruited for the study. I attained data saturation after interviewing 8 business owners and 20 focus group respondents. The age of the business owners ranged from 21 to 65 years, while that of the electronic users ranged from 18 to 55 years, as shown in Tables 1 and 2.

Data Collection

Before collecting data for this study, I obtained Walden University's approval number for this study was 05-08-22-0469492. It expires on May 8, 2023. Part of the requirements for the data collection was that all participants were required to sign the consent form. I began data collection on May 30, 2022 and completed collection on June 5, 2022. The collected data for the study was from the business owners and users of electronic equipment/devices, new, old, or secondhand. This process comprised one-on-one interviews with business owners and focus group discussions with electronics users.

Initial Contact with Participants

The participant selection was cumbersome, and I overcame it through the advice and support I received from the market nonaffiliated body overseeing the safety and peaceful coexistence of business owners and transactions by electronic users in the Alaba International Market and the Computer Village. The representative of the market non-affiliation body gave me orientation and insight about the research sites, which aided me in recruiting my participants without any conflict or hitches between me and the respondence.

The support I received at both sites emboldened my confidence in conducting the recruitment of the research participants and data collection in both locations. I considered this gesture of kindness and moral support an exciting moment and a booster for my studies. Aside from the security protection from market tugs or union members while conducting the research, most respondents were friendly and accommodating. The unsolicited support I received from members of electrical and electronic dealers known as business owners was also helpful in narrowing my targeted research population and time spent on locating credible business owners and users of electrical and electronic devices using the snowball sampling method. Most of whom had appreciable knowledge about e-waste management and recycling of electronic equipment/devices, new or old, willingly volunteered to join the research. Their interview and discussion inputs made it easy for the data collection.

Interview Section with Business Owners

I began the interview sections with the business owners in a secured meeting room I rented. The essence was to avoid distraction and interference from non-participants (Marques et al., 2021). Most respondents were uncomfortable with voice recording during the interview sections. So, I documented my comments in a handwritten note, though it was cumbersome. The interview sections progressed accordingly after introducing the research topic, aim, and objective.

Interview Section with Focus Group

The interview section with the focus group followed the same procedure I used for the business owners. I began the interview sections with the focus group participants

in the same secured meeting room I rented with the business owners at the end of the interview sections. Using a scheduled venue would prevent distraction and interference from nonparticipants (Marques et al., 2021). Most respondents were uncomfortable with voice recording during the interview sections. During the interview sections, I played the role of a nonparticipant observer (Barrett & Twycross, 2018). I did this by observing the respondents' body language and facial expressions to each of the reach questions. So, I documented my comments in a handwritten note, as commented above. The interview sections progressed accordingly after introducing the research topic, aim, and objective.

Field Experience During Data Collection

The frequency of data collection was from the business owners and lasted five days. I collected data between 10:00 am and 4:30 pm, and an average of two business owners were interviewed daily for five days until reaching saturation after six respondents. Data collection was carried out daily and lasted four weeks and two days. At the same time, the data collected from a set of 5 Focus groups of 25 participants started after 6 days of collecting data from the business owners.

The entire data collection was done daily between 10:00 am and 4:30 pm for four weeks and 2 days. I recorded my research data by hand notetaking because the respondents were uncomfortable using a real-time audio recording device. Interviews with business owners took 15 minutes, and focus group discussions lasted between 20 to 35 minutes for each subgroup of 5 respondents. The participants recruited for this study were 10 business owners and 25 focus group volunteers.

Data collection lasted 6 Weeks after attaining saturation with eight business owners and twenty users. The business owners constituted the one-on-one interview sections, and the focus group was subgrouped into five participants per section. Combining the two data collection methods gave me a balanced view of the challenge of e-waste management and recycling in the Lagos metropolis. Data collection lasted 4 weeks, 2 days.

Furthermore, the participants in this study were respondents with relevant knowledge of secondhand or UEEED transactions and usage. This combination of participants was one of the measures I took to ensure the study's outcome was credible. The data obtained from the business owners and users of electronic equipment/devices provided insight into better e-waste management and recycling alternatives. The type of data I collected are interviews and focus group discussions.

The participants of this study were drawn from two locations in the Lagos metropolis, that is, Computer Village Ikeja and Alaba International Market. The choice of using Alaba and the Computer Village Ikeja was that both markets have the largest concentration of used electrical, electronic equipment, retail, and repair Centers (Chen et al., 2019). Additionally, the Computer Village and Alaba served as a central hub for business transactions for new, old, or secondhand electrical electronic equipment/devices and a significant source of e-waste generation in Lagos.

There was no variation in obtaining my primary data, as earlier stated in chapter 3. Although the business owners initially felt it was a waste of time discussing the e-waste management challenges during the data collection, they later cooperated with me

when they discovered the study was credible and worth conducting. While the focus group participants complained that the duration of the discussion was too long, eventually, when the group discussion commenced, they asked for more time. I obtained the required data from the interview sections and the focus group participants within the allotted period. I recorded my data using personal notes against each respondent's responses.

Given the previous field experience in this study, the chosen data collection method conforms with the philosophical assumptions of using the interpretivism paradigm and recursive data collection process to answer a qualitative research problem. According to Husam & Abraham Pius (2020) and Ravitch & Carl (2016) this research design was most suitable because using the stated methodology will help gather research facts on qualitative reasoning, among other research tools, available within the context of this study. Therefore, it was worthy to note that similar studies were conducted using my research methodology to obtain credible research study data.

Data Analysis

I used descriptive, non-statistical, and unstructured using the thematic and content analysis and ethnographic methods discussed in Chapter 3. I chose these methods because of their flexibility and robustness in dealing with data analysis in a qualitative case study (see Akinyode & Khan, 2018; Lawless & Chen, 2019; Vaismoradi & Snelgrove, 2019; Lang et al., 2020).

Thematic Analysis

The thematic data analysis required me to familiarize myself with the data I collected from the field during the interview and focus group discussion sections (see Castleberry & Nolen, 2018; Mackieson et al., 2019). These data were transcribed from interview notes I recorded. Using content analysis, I created my precodes from the data pool while collating the codes I transcribed and grouping them into themes after reviewing them to merge and harmonize duplicated themes before loading them into the NVivo12 software (Kleinheksel et al., 2020).

Upon identifying the themes, I commenced drafting my narratives and making inferences from the leading research words derived from the research topic, which snowballed into my interpretive analysis and findings required for validating my study.

To achieve my data analysis, I used the transcript from the “one on one” in-depth interviews and focused group discussions structured into themes and patterns suitable for using the NVivo 12 analytical tool. The qualitative coding tool helped me increase data validity, decrease bias and increase the accuracy of participants' responses and the transparency of the study (see Mackieson et al., 2019; O'Kane et al., 2021). The thematic analysis and data coding were done using the inductive, deductive, descriptive, and structural approaches in NVivo12. Meanwhile, Coding was the act of ascribing labeling that describes an extract from the content or section of the text derived from the interview or focused group discussions using inductive or deductive methods (Xu & Zammit, 2020).

Inductive Coding

Using the inductive coding method enabled me to extract key research words into preestablished codes from the interview scripts, like e-waste concerns, e-waste management, recycling, e-waste disposal types and sources, secondhand, old, or new electronic devices, swabbing/scraping of used of old electronic devices and equipment drawn from the research question (see Chandra & Shang, 2019; Skjott Linneberg & Korsgaard 2019; Kyngäs, 2020).

Deductive Coding

I used the deductive coding method to capture new codes not captured in the pre-coding listing. This method required screening each transcript for new phrases or terminology (Ahrendt et al., 2018; Xu & Zammit, 2020).

Structural Coding

I used the structural coding method to identify the respondent response, which I labeled as follows: The one-on-one participants were labeled numbers "1 to 8", and the focus group participants were labeled "A to E." These labeling delineations helped me categorize and profile each participant. (Jackson & Bazeley, 2019; p70 &124).

Descriptive Coding

The descriptive Coding enabled me to navigate between each data collection question and research main words without confusing me during Coding. The combination of the various highlighted coding methods helped me to turn the code extracts into themes from the responses of participants' knowledge during the “one on one” semi-structured interviews and focus group discussions and feedback (Khadimally, 2022).

Additionally, before I analyzed the expert codes and themes, I obtained from the participant's own words that conformed with the research keywords described in the gap as e-waste management and recycling concerns. I used the NVivo12 software to simplify the codes into three segments, that is, "*Topic coding, Analytical coding, and Case coding*." The essence of the topic coding is to highlight the research keywords discussed. While analytical coding enabled me to link my research keywords and relates to the research gap under review, the case coding enabled me to identify and assign demographic information and the location of participants speaking.

Evidence of Trustworthiness

Credibility

The research was conducted as specified in chapter 3 and measured against the goal of finding answers to the research questions. That is the management and recycling challenges of e-waste generated from UEEED in Lagos, Nigeria. This inquiry was achieved by applying trustworthiness, credibility, transferability, dependability, and confirmability concepts (Rose & Johnson, 2020). So, to ensure the study was credible, reliable, and dependable. I used tested qualitative ethnographic methods and proven procedures, especially during the recruitment of participants and data collection, interpretation, and analysis. According to Solutions (2017), the most effective yardstick means of measuring a reputable research work was its credibility and validity applied by the research instrument (O'Kane et al., 2021).

Using myself as the instrument, I aligned the study to the issue of e-waste generation, management, and recycling within the research sites. A qualitative research

instrument may also be the researcher (see Dodgson, 2019; Ishtiaq; 2019; Rose & Johnson, 2020). According to Wa-Mbaleka (2019) and Yoon & Uliassi (2022), the researcher's knowledge of the research topic was crucial in validating the result data, as cited by several authors. The authors asserted knowledge of the researcher could provide the needed authentication in acquiring research data and analysis.

Conclusively, a qualitative study could be recognized to meet the set research criteria that promote credibility and transparency in arriving at a research opinion. The research was credible because it met the internal validation required for the study, with the research design meeting its applicability, repeatability, and methodological consistency.

Transferability

The results I obtained using the purposive, random sampling standard methods established in selecting and recruiting my participants are transferable and applicable to other studies. Daniel (2019) posited that a qualitative study must withstand the four critical litmus tests to be considered transferable. "Trustworthiness, Auditability, Credibility, and Transferability (TACT)." The authors argued that using a standardized methodology and framework will enable the repeatability and transferability of any credible research work. The knowledge and experience gained in the study or inquiry are transferrable to other areas of life with similar challenges or gaps that need fixing.

Dependability

The study's dependability was established through a known data collection procedure of "one on one" interviews and focus group discussion among the selected

volunteer participants using reality and based on the assumption of e-waste management and recycling challenges in Lagos, Nigeria. According to Daniel (2019), any researcher who can conduct a study that achieves a recordable success in line with social change principles was dependable because he or she has demonstrated trustworthiness and diligence in doing his or her business. The research work was dependable because it passed the minimum repeatability test required in an inquiry. Additionally, the research achieved a recordable success in line with the principles of trustworthiness and diligence in investigating (Daniel, 2019).

Confirmability

The confirmability of the qualitative case study was established by the information on e-waste management provided by Lagos Waste Management Agency (LAWMA) on the validity of the data I acquired from Alaba International Market, Computer Village Ikeja, and Alaba Rago, where most e-waste ends their shelf life. I also used the NVivo-12 software to analyze the verified data collected from the field for consistency, neutrality, and avoiding bias.

Korsjens and Moser (2018) asserted that consistency and neutrality are the main features of qualitative research confirmability. The authors argued that once the proper research methodology, framework, and theory are employed. The research result and outcome often come out with credibility unless the researchers try to influence personal or professional bias. Korsjens and Moser noted that researchers should not base their studies on Opinion. However, proven research methodology so that the approach used in the study was auditable and dependable when compared with similar studies.

To further ensure the confirmability of the study was achieved, I followed the laid down procedures in conducting qualitative research by fulfilling the requirement of the IRB in the recruitment of respondence, data collection, and interpretation using established statistical research software and strict adherence to the conventional rules as defined in the research methodology. At the same time, I ensured that my research result conformed with the internationally recognized standard, fulfilling the approved Walden University IRB and ethical values set for this inquiry.

Study Results

The focus of the research study was on further understanding why e-waste generation, management, and recycling challenges remain a global and local concern in Lagos. To achieve this study, business owners and users of electronic equipment/devices, new or old, were interviewed. The field data indicated that most of the e-waste was generated from the used electrical, electronic equipment/devices imported as secondhand or used electronic devices and sold to consumers. The emphasis of the results was based on used or secondhand electronics, source & types of e-waste generated, management and recycling, disposal as scraps, and regulating bodies.

The study results relied on two data collection methods, that is, interview and focus group discussion with specific questions in Part A and Part B sections. The analysis from the NVivo12 software helped in analyzing the answers provided in the research questions.

Content Analysis Method

Upon the completion and translation of code extracts into the theme. The next step was to analyze the theme using the content analysis and the NVivo 12 software (see Scott et al., 2022; Copes et al., 2020; Kleinheksel et al., 2022). The authors asserted that content analysis was the most suitable method for analyzing qualitative data derived from coded written texts, an audio transcription based on research questions, and text derived from data collection questions based on one-on-one structured interviews and focus group discussions.

The NVivo12 enabled me to summarize the various leading short words or phrases I used as codes in the form of a "word cloud." This method supported me in developing a code log assigned to a set of codes I developed from my research questions. These codes were translated into my final research narrative and findings. So, using thematic and content analysis coding, I validated my conceptual framework to support my study in the form of themes and patterns across my qualitative data set on responses from the two data collection methods. That is, “one on one” structured interviews and focus group discussions.

However, I had a few discrepancies in the terminology some respondents used. For example, the words like "Tokunbo and Belgium…" referred to secondhand or used items. So, matching such words during Coding was difficult for me. So, what I did was transcribe such unconventional colloquial or local jargon into my precoded formats.

Themes

The most occurring word search from the respondents' one-on-one interviews and the focus group discussions are "management, secondhand, electronic equipment, devices, business and e-waste," which conforms with the study's key research words. These extracts are found in Figure 1, with prevailing words of "secondhand electronic equipment, device, management, and policy," which are consistent with the research topic.

Figure 1

Themes Coding Extract of Most Used and Prevailing Words by Business Owners

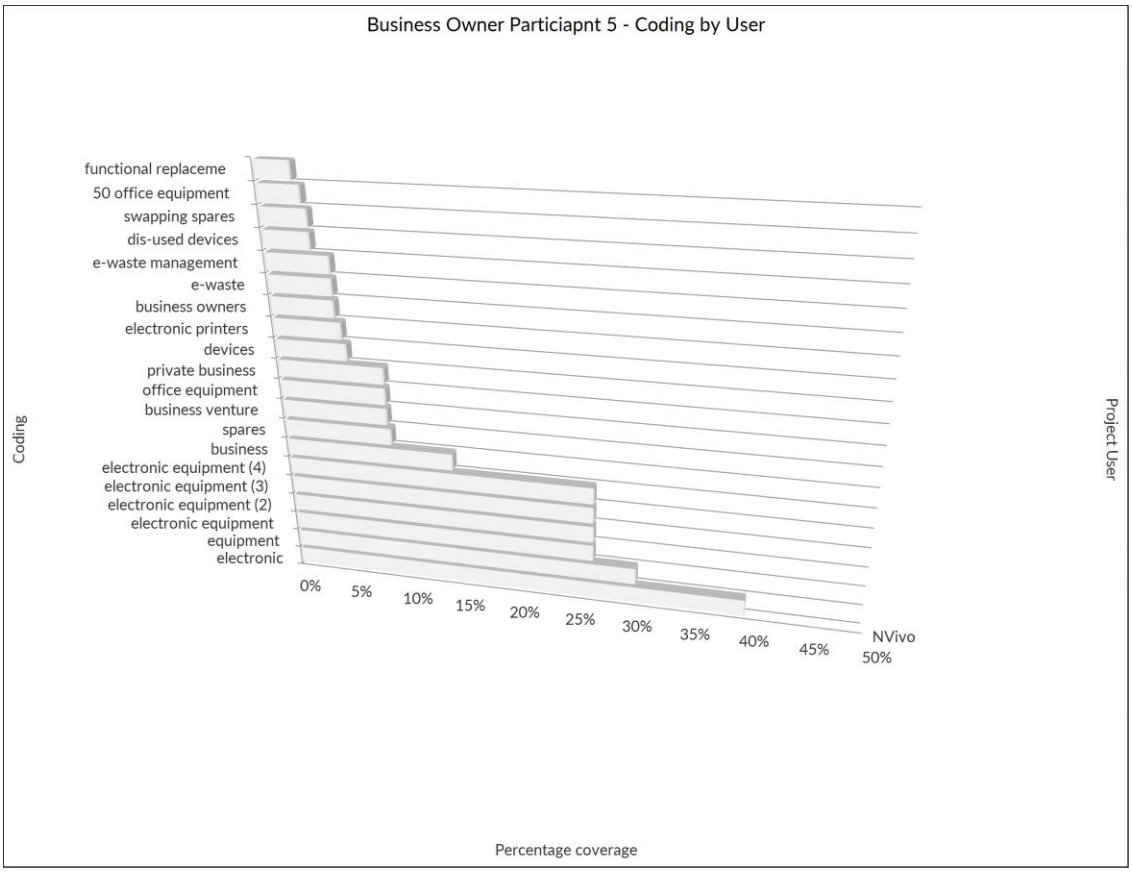

Figure 1 represents themes coding that showed the various sources of e-waste materials found in Lagos, which also depicted the research-focused most used words, that is, electrical electronic, devices, equipment, spares, office equipment, business owners, and users of electronic devices.

Figure 2

Themes Coding, Extract of Most Used and Prevailing Words by Business Owners

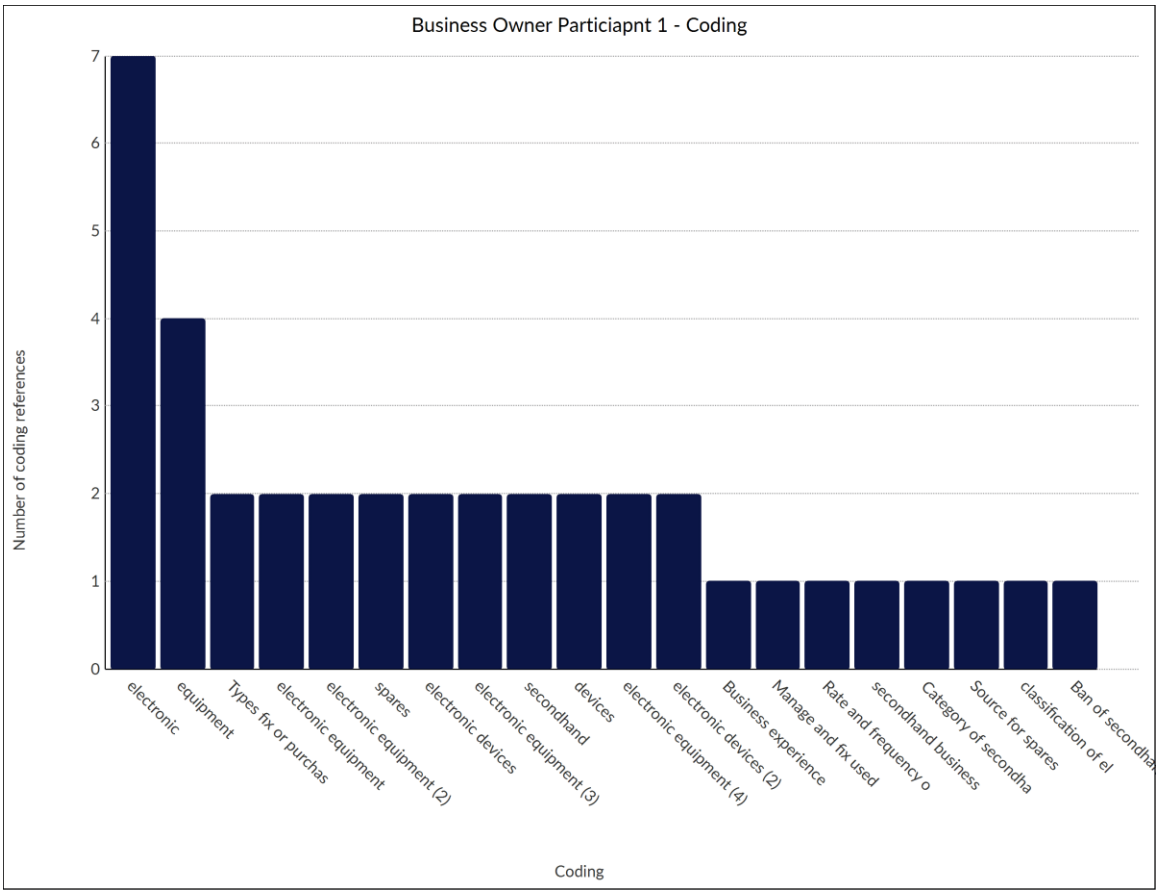

Figure 2 shows themes generated using NVivo12 software, and the result indicated that 40% of e-waste sources are traceable to electronic devices/equipment that is either imported by business owners or purchased as used electronic devices by users.

Figure 3

Themes Coding, Extract of Most Used and Prevailing Words by Focus Group Participants

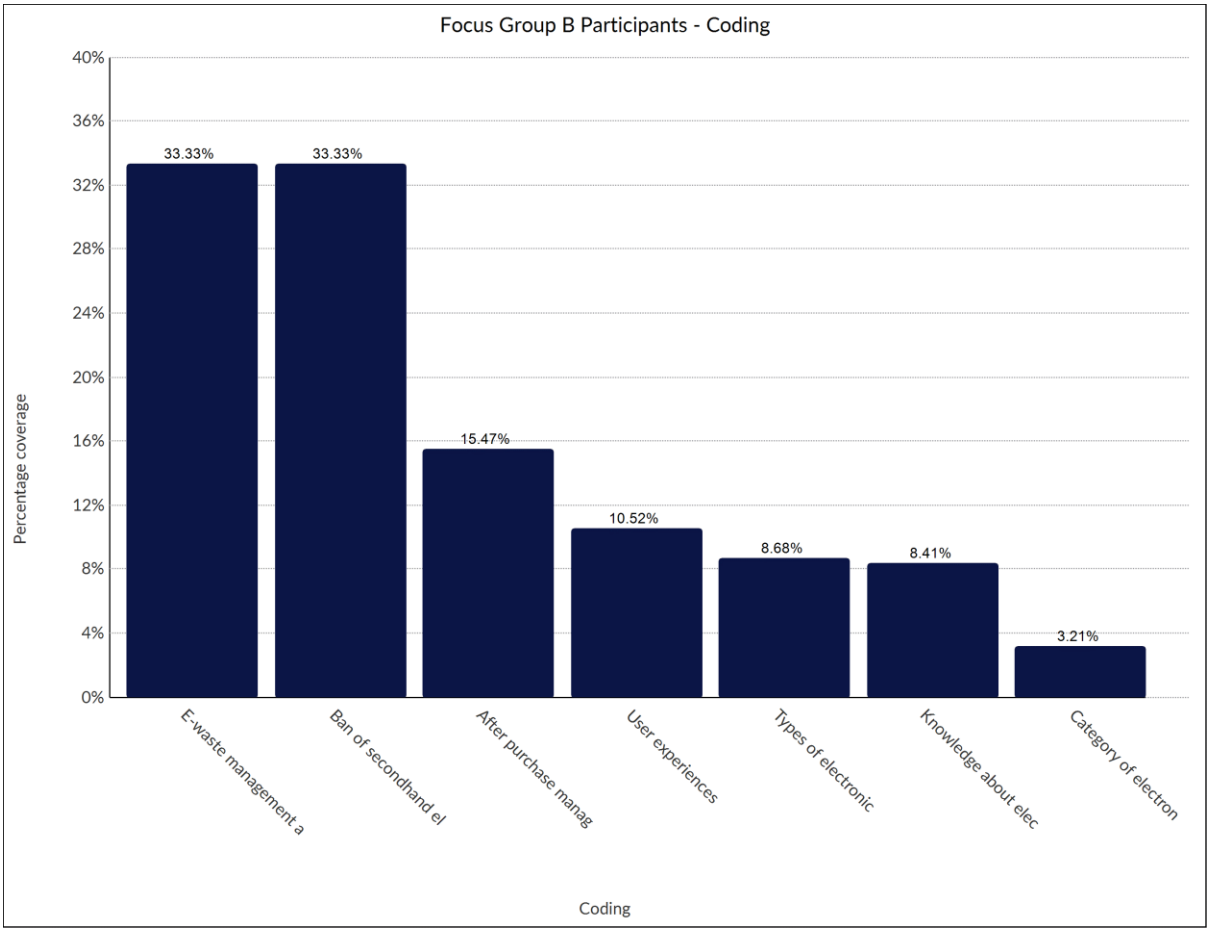

Figure 3 shows that 33.33% of the research focuses on e-waste management and recycling issues. While 33.33% represents the opinion of users who objected to the ban of the importation of used or secondhand electrical electronic equipment/devices in Lagos strongly indicates an economic and social benefit in electronic transactions by business owners and users of secondhand electronics equipment/devices.

Figure 4

Word Cluster Extracted From Interview Sections With Business Owners

Figure 5

Word Cluster Extracted From the Interview and Focus Group Discussion

Figures 4 and 5 show the NVivo word cloud based on data coding and analysis, indicating the leading research most used words and relevant to the themes extracted

from the interview sections among business owners and focus group participants. Figure 1 shows that the business owners and the main focus in the word cloud are "management, secondhand, electronic equipment, devices, business and e-waste," which conforms with the study's key research words. In figure 1, the prevailing words are "secondhand electronic equipment, device, management, and policy" and indicate that the focus group's responses aligned with the aim of the study, which was to understand further why the challenge of e-waste persisted in Lagos cities.

Part A-Main Questions are for UEEED Business-Owners (One-on-One Responsive Interview)

Q1. Can we introduce ourselves? The introduction was done with eight (8) business owners and the investigator before the data collection.

Q2. Are you comfortable discussing secondhand electrical, electronic equipment? The eight business owners I interviewed were comfortable discussing the aims and objectives of the study. Although, some of the respondents were initially skeptical about the study's purpose. But eventually happily participated.

Q3. What type of electrical, electronic devices do you deal on? [TV, Iron, Cell phone, refrigerator, music box, etc.]. Four (4) business owners confirmed they were dealers of TV and music boxes, two (2) were dealers of printers, other two (2) were dealers of computers, GSM handsets, and power electrical, electronic units (refrigerators and Air-conditioning units).

Q4. Did you purchase them as new or secondhanded? Eight business owners confirmed that Ninety five (95%) percent of purchased secondhanded electronic devices

were imported from Europe and sold as used electrical electronics or Tokunbo to users at Alaba International Market and Computer Village Ikeja.

Q5. Tell me about your experience in the business of secondhand electronic equipment? Four of the eight business owners have over thirty-five (35) years of experience, one had forty (40) years, and two had less than 30 years of business experience. The respondents' experiences ranged from selling and repairing electronic equipment/devices and challenges. For example, business owner Participant 2 said, "I have seen the good days and bad days in this business. Selling used electronics is not easy; sometimes, you buy your goods 20% are already damaged or not working. So, I have to fix them before selling as secondhand to my customers. I buy these Tokubo goods from Alaba International Market or Apapa Lagos".

Participant 3 stated "The only challenge was that you can import goods, and all that arrived here are not working or functioning. So, in order to sell them, I have to spend money to repair them before selling them" Participant 4 noted, "I have difficulty in selling some of my products because of obsolescence and lack of functional sets." Business owner Participant 4 went on to note, "I buy used electronic printers and copiers from customers who feel the devices are old and require replacement or outright disposal." Participant 8 said, "I sell and fix all kinds of communication gadgets; I import most of them from abroad. I can only tell you that I am enjoying the business".

The respondents' responses were inclined toward business opportunities rather than meeting the needs of the users. The study has confirmed that secondhand electronic equipment/devices have obsolescence and recycling management challenges.

Q6. How do you manage or fix defective secondhanded electrical, electronic devices when they are returned for repairs or recycling? Most business owners alluded those fixing defective secondhanded electronics is cumbersome. Therefore, they dispose of dis-used electronic parts and components as scraps to scrap dealers popularly called "Aboki." Analysis using the NVivo12 corroborates the continuous practice of generating e-waste without a formidable method of managing or recycling the scrap materials associated with electronic devices that become e-waste across the Lagos environment.

Q7. How often do you receive defective, used electrical, electronic equipment/devices (UEEED) for repairs? The study findings confirm that generation e-waste is an offshoot of defective electronic/devices received from users by business owners and purchased consignments from importers once such types of equipment become defective. An excerpt from participant no.7 suggests he receives close to sixty (60) units of defective electronic devices weekly *"I receive up to 60 units of electrical, electronic equipment/devices weekly --- fixing and replacement*". Some participants also claimed that it was an additional cost for them to deal with defective electronic devices because the chances of these pieces of equipment turning into scrap and e-waste are high. So, these business owners prefer an outright sellout as scrap by users, which was profitable.

Q8. What type of UEEED do you fix most of the time, new or secondhanded? Field findings revealed that most business owners fix secondhand electronic equipment/devices before selling them to users. I also discovered that most e-waste

sources come from electronic dis-used spare parts referred to as scraps. Intriguingly, each business owner specializes in different aspects of the electronic business, some specialize in fixing the TV screen, and others fix power packs, electronic cards, power, and motherboard.

Q9. How do you source your spares to fix secondhand electronic equipment? The reason why business owners source spares was to enhance their business strategy. Most of the respondents complain that one of the problems of their business was the turnover rate of after-sales return, which some consider a nightmare. Generally, the business owners source their spare parts from disused electrical and electronic equipment/devices sold to them as scrap by previous users.

Follow-up Questions

QA: Do you think secondhand electronic equipment/devices be banned from being imported into Nigeria? The issue of secondhand electronic equipment has generated controversies and much interest among the research population. At first, it was difficult for them to discuss the challenge of e-waste management due to the business inclined activities of secondhand electronic business. The general belief of the business owners was that they were using their business to provide social benefit to society and the customers who patronize them. The most debatable topic was whether they would support banning used electrical, electronic equipment/devices imported from Europe.

All respondents favored continuing the importation of electronic devices and equipment because it provides a source of livelihood for them. See an excerpt from one of the respondents "*Ah! Why will I support the banning of used electrical electronic*

equipment/devices in Nigeria when that is my only source of income. In fact, I am also helping customers who cannot afford new ones". Such comments were common among the participants. Invariably, the views and opinions of the business owners strongly indicate that if nothing was done to regulate the importation of used electronic equipment/devices into Africa and Lagos, the issues of e-waste would continue to be on the rise. This thought validates the conspiracy theory that Africa was the dumping ground for used products from cars to electronics devices and equipment.

QB: How will you manage the e-waste generated from the electronic equipment regarding recycling policies in your locality? I learned about the management of e-waste across the respondents that e-waste management is all about selling dis-used electronic spare parts and major components to scrap dealers known as "Aboki." This new trend of selling scrapped spares or practice was prevalent among business owners and users. In contrast to previous practice, years back, making money from scrapped electronic disused components were not a big deal.

QC: What will be your recommendation for business owners of electrical, electronic equipment regarding e-waste management and recycling policies in Lagos? The recommendation across the respondents for business owners was similar. Most participants believe that e-waste management was over reported or escalated out of proportion without considering the financial and economic implications of the secondhanded electronic business in Africa and the Lagos environment. See an excerpt from a participant "*I have nothing to recommend other than that the government should just leave us alone. Nothing is working here".* However, some of the recommendations

include:

- The manufacturer should increase the shelf-life of electronic equipment/devices beyond 5 years.
- Government and relevant waste management agencies and regulatory bodies should find common ground for managing e-waste material in Lagos.
- The effort of business owners in e-waste management should be encouraged and incentivized with monetary rewards by the original equipment manufacturer (OEM) of electrical electronics equipment to encourage proper e-waste segregation, management, and recycling.
- OEMs should establish recycling plants in Lagos, a significant outlet for the African electrical and electronic market.

Part B Questions are for Users (Focus Group Interviews)

Q1. What do you know about secondhand electrical, electronic equipment? Most respondents described secondhand electronics as devices that gave them a sense of belonging to the population that uses electronics. To some, secondhand electronics are devices and equipment used to enhance their business and personal entertainment at home.

Q2. What type of electrical, electronic devices do you own and use? [TV, Iron, Cell phone, refrigerator, music box, etc.] Respondents' choice of electronics varied from TV, music boxes, cell phones, laptops, electrical Iron, Home theatre, Electrical cooker, and desktop computers.

Q3. Did you purchase them as new or secondhanded? The respondents said they bought their electrical, electronic equipment/devices secondhanded or Tokunbo/Belgium. Tokunbo and Belgium mean "used or secondhanded," according to the participants. That was the terminology they used in Lagos and across Nigerian cities.

Q4. What are your experiences of using secondhand electronic equipment? The participants had mixed feelings; some revealed that secondhand equipment/devices are not easy to manage or recycle. Most respondents said that once their devices or equipment stopped functioning, they are sold to scrap dealers known as "Aboke or Mallam." In contrast, some respondents expressed frustration in trying to fix defective devices and blamed the situation on the lack of strong legislation and policy on using and managing secondhand electronics with e-waste generating potential.

I found out in the study that most of the respondents wished to purchase new electronic devices but could not afford to buy new ones; hence, they used secondhand. The implication was that this trend would continue unless there were cheaper and new electronic alternatives with reduced e-waste implications.

Q5. How do you manage defective secondhanded electrical electronic devices after purchase? Most respondents said they either fix the defective devices, sell them to scrap dealers, or return them to the business owners who also buy, or swap used electronics. Such cases are rare. Instead, the business owners prefer buying them as scrap from users. According to respondents, most of the electronic equipment do not have spares for fixing them.

Follow-up Questions for Focus Groups

QA: Do you think importing and using secondhand electronic equipment/devices should be encouraged or banned in Nigeria? All respondents disagreed with a ban option in Nigeria, and the participants feel banning used electronic equipment and devices will place a financial burden on them to purchase new equipment, which they cannot afford in most cases. See an excerpt from a respondent, *"For me, I do not support a ban"* This was the response I got across the focus group. I also observed the reaction and body language, which suggested a genuine opposition to outright banning without providing cheaper and better alternatives.

QB: What are your views regarding e-waste management and recycling policies in your locality? The responses from the participants indicated a significant gap in e-waste management. Most of the respondents were surprised when I asked them about their views on e-waste management, recycling, and policies. See excerpts from respondents *"I am not sure I know any e-waste policy in my locality; I am not sure I can remember any e-waste policy in my locality, thank you; I only know of LAWMA, I do not know of any e-waste policy in Lagos; I am not sure if any policy exists. But I will find out after this section"*. The follow-up questions pointed to the fact that most electronic users are unaware of the e-waste implications of secondhand electronics, which was confirmed in this study as one primary source of e-waste generation in Lagos.

Figure 6

A Section of Dis-Used Secondhand Electrical Electronic E-Waste

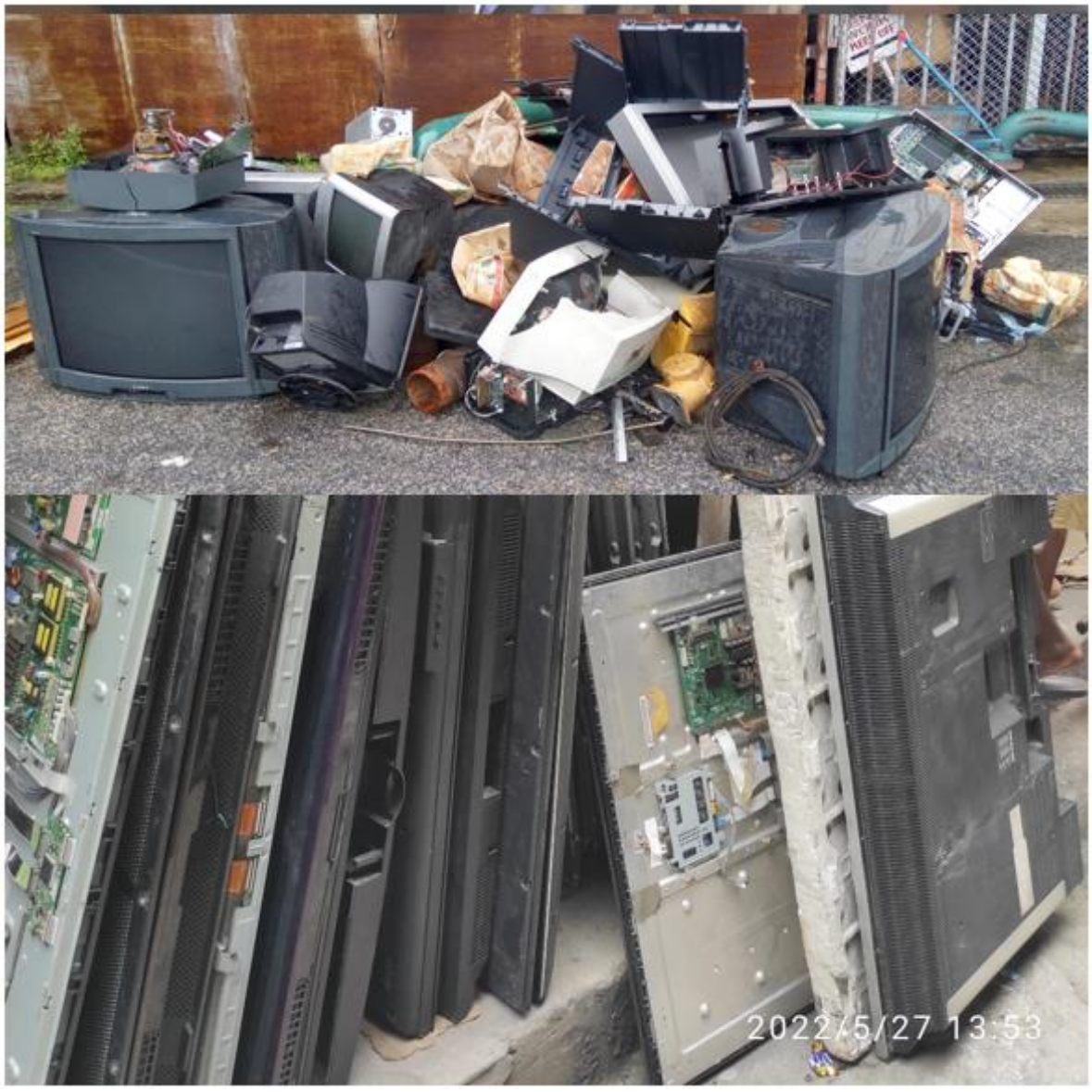

Figure 2 was a snapshot of a sample of e-waste generated in the Alaba International Market and Computer Village Ikeja.

Table 3

Extract Of Field Findings of Typical Used Electrical Electronic Equipment/Devices (UEEED)

s/n	Description of UEEED	Quantity imported Weekly	Sources	Classification	Location	E-waste Management and Recycling
1	TV Sets	5000	Imported as secondhand	Potential Domestic E-waste	Alaba Int'l market	Aboki/Scavengers
2	Home Theater	3500	Imported as secondhand	Potential Domestic E-waste	Alaba Int'l market	Aboki/Scavengers
3	Desktop Computers	2500	Imported as secondhand	Potential Domestic E-waste	Alaba Int'l market	Aboki/Scavengers
4	Desktop Computers Visual display units	2500	Imported as secondhand	Potential Domestic E-waste	Computer Village Ikeja	Aboki/Scavengers
5	Electronic Printers	1200	Imported as new and secondhand	Potential Domestic E-waste	Computer Village Ikeja	Aboki/Scavengers
6	Laptop Computers	1500	Imported as new and secondhand	Potential Domestic E-waste	Computer Village Ikeja	Aboki/Scavengers
7	Communication types of equipment (mobile phones, I-pads, Telephones boxes	3000	Imported as secondhand	Potential Domestic E-waste	Alaba Int'l market	Aboki/Scavengers
8	Computer and TV Accessories	5000	Imported as secondhand	Potential Domestic E-waste	Alaba Int'l market	Aboki/Scavengers
9	UPS units and power pack	2000	Imported as secondhand	Potential Domestic E-waste	Alaba Int'l market	Aboki/Scavengers

Table 2 summarizes the types and quantities of secondhand electrical, electronic equipment/devices found in Alaba International Market and Computer Village Ikeja.

The study underscores the role of LAWMA in e-waste management. LAWMA was the Lagos State Waste Management Agency responsible for solid waste management within Lagos state. Unfortunately, the agency does not have an e-waste section that monitors the management, recycling, and disposal within Alaba International Market and Computer Village Ikeja. To validate these findings, I visited the LAWAMA head office and designated solid waste dump sites, and the agency confirmed my research opinion.

Summary

Chapter 4 comprises data collection, analysis using NVivo12, interpretation of results, and the verification of trustworthiness in my research study. I adopted a pre-coding method to enable me to select and define my themes from the interview hand notes. The main themes that appeared most were secondhand electronics devices, e-waste management, and recycling challenges. The respondents complained about the rate of tons of e-waste generated weekly in Lagos. According to participants' responses, each business owner generates an average of 2Tons of various categories of e-waste, including defective electronic circuit boards, transformers, metal frames, plastics, and electronic components sold for scrapping dealers without a defined means of disposal.

Most of the respondents were excited about the study and hoped it would help address the issue of e-waste management and the recycling challenges they are facing. I will discuss further details about my findings and results in Chapter 5 and how it translates to negative concerns for the electrical, electronic users and positive social benefits to the business owners. If nothing was done to curtail the rate of e-waste generation, the upward trend of e-waste from UEEED and dis-used or obsolete electronic

devices, as reported by the world health organization, remained unabated. Chapter 5 encompassed expansion of the research interpretation of findings, limitation of the study, the social and professional implications, and recommendations for future study and conclusions.

Chapter 5: Discussion, Conclusions, and Recommendations

This qualitative case study's purpose was to understand better how e-waste generated from UEEED were efficiently managed or recycled in Lagos without resulting in environmental concerns, a concern that was raised by the World Health Organizaiton, the United Nations, and public interests in Lagos Nigeria.

The first significant finding in this study was that each business owner generates an average of 2 tons of e-waste weekly due to their business activities around secondhand or UEEED. The findings corroborated the findings of an earlier study by Odeyingbo et al. (2019), who identified the unabated inflow of used electronic devices into Nigeria. The authors noted that about 60,000 tons of UEEED were imported from Europe to Nigeria through Lagos for 5 years. From my research findings, there was an increase to a yearly average of 120,000 tons of e-waste generated in Lagos due to the problem associated with secondhand or UEEED, which remained a challenge in Nigerian cities like Lagos, as projected by Parajuly et al. (2020).

The second significant finding was that most respondents were unaware of Nigeria's e-waste regulatory bodies like the National Environmental Standards and Regulations Enforcement Agency (NESREA), Federal Environment Protection Agency (FEPA), and the Lagos State Environment Protection Agency (LASEPA). Another finding was the discovery of the establishment of two e-waste private firms (E-TERA and HINCKLEY) by EPRON, a nonprofit organization.

Further findings include a lack of e-waste management and recycling knowledge by business owners and users of electronic devices, nonavailability of an e-waste

recycling plant in Lagos, poor appreciation of existing e-waste legislation, increase in the hunting of precious metals in e-waste materials by scrap dealers known as Aboki for commercial reasons. I also established that the practice of smashing and burning e-waste had not abated.

Interpretation of Findings

An average of 25,000 tons of UEEED are imported into Lagos weekly. Moreover, about 10,000 tons of e-waste are generated weekly from Alaba International Market and Ikeja Computer Village and end up in substandard informal 30 Scrap sites across Lagos State. One of the significant findings was that most respondents were unaware of Nigeria's e-waste regulatory bodies. It is worth mentioning that EPRON set up two e-waste private firms (E-TERA AND HINCKLEY). Although their activities are unknown to the business owners and scrap dealers, presently, they only serve as a collection center, not as mining or recycling plants.

Additionally, two redemptions centers for managing new but defective office electronic equipment/devices owned by LG and HP exist. However, their activities include fixing their products or equipment/devices under 1-year warranties. In contrast, electronic devices older than 2 years are outrightly rejected and find their way to the market as used or secondhand, repaired and resold to users who cannot afford new ones.

My findings of e-waste sources include laptops, TV sets, music boxes, printers, mobile handsets, air conditioning units, refrigerators, power cords, TV antennas, and rechargeable electronic lamps. An effort to locate a recycling plant that handles the listed e-waste was unsuccessful, although it was not required to validate the study. However, to

lay credence to the study, I visited the Lagos Waste Management Agency (LAWMA) head office to substantiate my research findings further. A discussion with a representative of LAWMA confirmed that my findings and assumptions on e-waste management and recycling were correct. The representative affirmed that there was no established e-waste recycling plant in Lagos besides the general waste collection sites across Lagos. Interestingly, Alaba Rago and the Ogofili Isheri Igandu general waste dump sites were among Lagos's most mentioned dumpsites for solid waste.

Part of my findings indicated that LAWMA was working to partner with the Global Environment Facility (GEF) to manage the e-waste challenges, but it has not yielded any result. Additionally, a nonprofit organization known as Electrical and Electronic Producers in Nigeria (EPRON) was identified as another body responsible for checking that UEEED imported into Lagos meet the minimum environmental standard before reaching their shelf-life. Regrettably, this body was not visible and known to the business owners and users of electronic devices among the respondents I interviewed during the “one on one” and focus group sections. Other bodies included the National Environmental Standards and Regulations Enforcement Agency (NESREA), Federal Environment Protection Agency (FEPA), and the Lagos State Environment Protection Agency (LASEPA). Unfortunately, the activities of these bodies are not visible and effective.

Furthermore, the prevailing practice across both locations on e-waste management was the outright disposal of disused and obsolete electronic components/equipment as scrap to buyers, popularly called "Aboki." The commonly scraped electronic parts/bad

units of printers, TV sets, electronic device/equipment mother & power boards, TV metal, plastic frames, defective power units, TV screens, cables, and related electronic accessories. Subsequently, these scraps were transported to a site called "Alaba Rago." A visit to the site confirmed that the scrap dealers used crude and nonenvironmental practices through burning and smashing/crushing to extract precious metals from the scraps. These findings are consistent with previous studies recommendations and e-waste concerns.

The study validated the existing concern the WHO raised regarding e-waste management and recycling challenges in developing economies such as Nigeria. The research finding also corroborated Nnorom & Odeyingbo's (2020) study on e-waste management practices in Nigeria. Although, their study was limited to the effect of e-waste on the environment in Lagos. Nevertheless, the study by Nnorom & Odeyingbo did not capture the e-waste management practices through the disposal of scrap by selling to scrap merchants and exporters. However, I could not reach out to these merchants because this was beyond the scope of this study.

Furthermore, my research findings confirmed that the prevailing practice of recycling and managing e-waste in the research site was by outrightly disposal of disused assorted UEEED e-waste to scrap buyers who are into the business venture of exporting precious metals from the e-waste scraps to countries like China. In contrast, the supposable noncommercial viable scraps are burnt or disposed of indiscriminately at the public waste site without adequate solid waste segregation. Therefore, LASEPA needs to step up its awareness campaign on the management and recycling of e-waste due to

electronic equipment/devices' end of shelf life and its environmental and societal negative impact.

Meanwhile, here are some concerns extracted from most business owners and electronic device users' responses "we do not know what the Nigerian government is doing to help us stop the influx of unusable new and secondhand electronic devices; please help us to talk to the government. We would be happy if the government could ban poor quality electronic devices and secondhand nonfunctional electronic equipment imported from overseas." Another concern raised was that the government agencies responsible for regulating the standard and shelf life of electronic devices, new, old, or secondhand, should be more visible to enforce existing laws and enact regulations in line with global trends and best practices on e-waste management and recycling that would limit the importation of electrical, electronic devices/equipment to 4 years from the date of manufacturers in Nigeria.

The research methodology I used conformed to a similar study by (Alani et al., 2020; Babatunde et al., 2020; Nduneseokwu, 2017; Ogunseye, 2019). These authors used the qualitative research method to conduct their studies. The authors asserted that using the qualitative approach was best for a case study requiring an in-depth inquiry. Additionally, Ojha (2020) advocated for further study on why managing the challenge of e-waste generated from secondhand electronic devices was a growing public concern in Lagos and the globe.

Besides, I used the qualitative design approach using an instrumental case study, as asserted by Creswell (2014), and reviewed by Ishtiaq (2019), which stated that

qualitative research was an inductive and phenomenological inquiry involving investigative, ethnographic, field, and participatory observations. Data collection was through "one on one responsive interview and Focus Group discussion" and the use of qualitative documents, real-time audio recording and visual materials (pictures), and qualitative interviewing of stakeholders (Mishra, 2016; Ishtiaq, 2019).

Empirical evidence showed that the nature of a study was determined by the research method used by Queirós et al. (2017). This method enabled me to understand the complex problem of e-waste management and recycling challenges after carefully engaging selected participants in interviews and focus group discussion sections. I observed that their responses were tailored toward the main research questions on new, used, or secondhand or UEEED, unlike the quantitative research method that used accurate measurement in the form of comparative data analysis in answering research questions. In the same vein, Queirós (2017) argued that a researcher could choose a qualitative or quantitative research method to accomplish his/her research inquiry provided he/she is able to achieve the research goal or objective.

During this inquiry, some of the challenges I identified were the inability to connect with multiple site locations across Nigeria with similar e-waste challenges. However, most respondents affirmed that Lagos (Alaba and Computer Village), where the most significant electronic devices deport, predominantly markets for used electronic devices, household electronic devices/equipment, and handheld devices like smartphones and laptops. A disconfirming of the study was the wrong impression that secondhand

electronic equipment was better and cheaper than acquiring electronic appliances within the context of this case study.

However, this erroneous belief was encouraged by social media advertisements and market agents. These findings validated some of the arguments in chapter 2 of the in-depth literature review analysis typical of qualitative and case studies. The significant findings in the study were that most participants do not believe that e-waste, recycling, and improper disposal of used electronic equipment and devices have existing e-waste policies governing the used electrical, and electronic equipment/devices in Nigeria

In this section, the entire process and methods used in arriving at the research findings were through empirical observation, devoid of personal and professional biases. Results discussions were consistent with APA 7th and conform with copyright laws and ethical considerations of Walden University. Discussing the research result followed the dissertation templates. The discussion of the qualitative study result emphasized the study's summary based on the peer review and the conceptual frameworks, limitations, recommendations, implications for future studies, and conclusion.

I noted other limitations in the study, including delay in receiving consent from the respondent and unwillingness to allow a voice recording device during the discussion sections. I noticed that respondents had wrong assumptions and biases about the study because of the lack of e-waste management recycling knowledge. This postulation manifested in the wrong responses and assumptions about Lagos's e-waste management and recycling gap. Nonetheless, respondents had limited knowledge about regulating bodies and standard e-waste management strategies. The delimitations of the study

included following procedures without compromise to result in conclusions of the study. The result included infographics and diagrams explaining the findings of the study. The study recommended future research and social implications as it affects e-waste management and recycling in Lagos.

Limitations of the Study

This study was limited to a population of business owners and users of secondhand electrical, electronic equipment/devices. The study was limited to six business owners and twenty users of secondhand electronics within two locations (Alaba International Market and Computer Village Ikeja). I had time limitations. I planned data collection for 2-3 weeks. However, the distance between both locations took me more than 3 weeks. The other limitation was difficulty in assembling the participants in the designated venue for the interview and focus group discussion. Lastly, data collection took me 4 weeks and 2 days to conclude with the under-listed challenges and limitations I addressed during the conduct of the research:

- Push back from electronic equipment users, who will not be willing to disclose their challenges with e-waste management and recycling knowledge.
- Data over-collection, overpopulated coding themes, coding errors, and data interpretation errors.
- Push back to accepting to participate in the study with the assumption that a government agent was conducting the study.

Aside from the study limitations, which are construct validity, internal and external validity, and reliability, I based my validity and reliability on the complication of

getting government agencies to come to terms with e-waste management. Another limitation identified was the theoretical measurement and the validity construct based on the authenticity of the assumptions used in conducting the study. In other to accommodate the above limitations. I ensured that proper labeling or tagging of respondents' responses was done using the NVivo12 before measurement and checking the accuracy of data acquired because validity and reliability are the threats that can invalidate a research work (Gelling et al., 2018; Jackson, 2018).

Recommendations

My recommendations for future studies were based on findings beyond this study's scope. Other recommendations include how government agencies and private nonprofitable organizations could support e-waste best-in-class management and recycling practices.

Recommendation for Future Study

Since most previous and current studies focused on the environmental consequences of e-waste without dealing with the issue of e-waste management and recycling from the cradle to the grave, I recommend that subsequent researchers focus on addressing the unabating e-waste generation and unprofessional and crude recycling method adopted by scrap dealers in Alaba Rago as previously cited by WHO and, (see Bridgens et al. 2019; Deng, Giesy, & Zheng, 2017; Jokela et al., 2006; Szamalek, 2016).

The extension of my study to review the reason behind the e-waste concern was based on the Machiavellian and translation theories of the end justify the means was recommended to underpin the motive and role and behaviors/attitude of the business

owners and the scrap dealers or Aboki in Alaba Rago could be re-examined in a subsequent study in the future.

Scott et al. (2022) asserted that qualitative case study, content, ethnographic and thematic analysis were best for a case study. Therefore, this thematic and content analysis could be replicated in a future inquiry by employing focus group discussion and “one on one” interview to understand further why the scrap dealers' quest for e-waste material is increasing. I desired to extend the study to unravel why the demand for e-waste materials was increasing among the scrap dealers known as Aboki and investigate the effectiveness of the non-governmental e-waste center in Lagos. However, I was constrained to stop studying, having exhausted the scope of the study. It was possible to combine other relevant research methodologies to find an enduring and sustainable solution to the e-waste management and recycling concerns locally and globally.

E-Waste Recommended Professional Practices

E-waste management and recycling concerns are genuine and worth paying attention to and resolving. In Chapter 2, several scholars pointed out the unprofessional practice of disposing of e-waste. Deng et al. (2017) mentioned the crude method deployed by scrap dealers and scavengers interested in extracting precious metal from secondhanded electronics equipment and devices. The limitation of previous studies was the inability to identify credible means of managing and recycling e-waste in Lagos without having to crush and burn electronic equipment to extract components. The limitation of this study was the inability to establish what these scavengers do with the extracted metals.

Therefore, my recommendation for further studies would be that the inquirer should find out the destination of these metals and whether the original equipment manufacturers (OEM) follow the rule of cradle to grave. OEMs need to know what happens to their products at the end of their product shelf life. They should be interested in how their electronic products are managed, recycled, or taken out of circulation. Part of the professional recommendation is that e-waste management agencies in Lagos like LAWMA, LASEPA, NESRA, SON, and FEPA should galvanize and augment the effort of the nonprofitable private organization like "EPRON" to create a national policy that encourages professional management and recycling of electronic equipment with potential e-waste sources across Nigeria.

Therefore, efforts to improve the current e-waste management and recycling practices by unprofessional scrap dealers should be considered further in future studies. Also, the operational standard and capacity of the two privately owned e-waste centers in Lagos should be enhanced and developed to mine precious metals like copper, gold, aluminum, lead, constant, brass, and nickel used in producing electrical, electronic components from e-waste without creating environmental concern, as was the current practice at Alaba Rago and government waste dump sites in Lagos metropolis.

My recommendation is that e-waste dealers should be encouraged to register with the LASEPA, LAWMA, FEPA, NESREA. At the same time, the EPRON a private body that monitors the importation of new, old, and used electronics and should raise awareness on the standard of electrical electronics equipment/devices that business owners import into Lagos, Nigeria.

Second, LASEPA should consolidate the arrangements with the "Global Environment Facility (GEF)." GEF is a federal government agency responsible for coordinating, supervising, and managing e-waste across Nigeria. Unfortunately, the body is not active. Although LAWMA mentioned that GEF selected Lagos as the largest electronic Hub in Africa and proposed to set up 30 E-waste collection centers to manage and recycle e-waste, the scheme was yet to be operational, but this has not happened. So, I recommend further study to interrogate the activities of GEF, EPRON, and LASEPA's efforts to address the overall e-waste management and recycling concerns since this was beyond the scope of this study.

Implications

Implications for Positive Social Change

The significance this qualitative case study was the negative consequence of using relatively used electronics equipment/devices with e-waste management and recycling challenges after these devices stop working, especially electronics imported from Europe without replaceable spares in Nigeria (see Bridgens et al., 2019; Deng et al., 2017; Szamalek, 2016). These authors argued that other challenges associated with used electronics are disposal at the end of their life cycle. Giri & Adhikari (2020) were concerned about how nonbiodegradable e-waste from electrical and electronic equipment/devices was managed and recycled from the cradle to the grave.

The outcome of this research study would lead to a change in purchase and disposal policies by international certifying bodies like IEC, EU, Standard Organization of Nigeria (SON), NESREA, LAWMA, LASEPA, FEBA, GEF, and EPRON that certify

and regulate the quality of electronic and other products in Nigeria. The expected result would translate into a revolutionary social change of improved e-waste management, recycling, and mining of electronic components, among the cost of managing and recycling obsolescence, secondhanded electronic equipment/devices identified in this study and supported in the study by (Olla, & Choudrie, 2014; Jennings et al., 2016).

Therefore, the study's qualitative conceptual framework was based on the situational and developmental theories approach. Using an instrumental case study was based on empirical evidence and conviction. The framework used the ethnography inquiry method of the sources, how e-waste was generated from secondhanded electronic devices, and how electronics users manage and recycle their devices when they go into obsolescence or are disused and disposed off. Although, the study was based on epistemological assumptions using interpretivism to answer the research problem. This research design was most suitable because the knowledge of any phenomenon could be acquired by observation and gathering of facts and philosophical assumptions on inductive reasoning, among other research tools (focus group discussion and interviews) in answering the research question.

This selected study's in-depth analysis of a typical qualitative and case study research methodology suits my study. My research focused on e-waste management and recycling wastes from electrical, electronic device recycling policies and users' awareness, like a case study in Nigeria (see Yaazhmozhi et al., 2020; Andrae et al., 2017; Jennings et al., 2018; Sabbaghi & Behdad, 2018). Additionally, the study required latching onto the experience of the business owners and users of electronic equipment

and the Lagos State Waste Management (LAWMA) in making inquiries into the challenge of e-waste management and recycling.

Implication for Theory

The logical research connections between the framework and theory were based on the nature of my study and research topic. The aim was to help explore why business owners, manufacturers, and people in business use the Machiavellian and transactional/management theory to push forward their business interests without consideration for users. This theory agreed with the concern raised by several authors on the use and recovery of non-degradable materials used in the manufacturing of most electronic equipment/devices. Whether these devices are appropriately managed and sufficiently disposed of using international best practices for e-waste management was the reason for conducting this study. Bridgens et al. (2019) and Deng et al. (2017) agreed with other authors on the negative impact of improper management, recycling, or disposal of electronic waste generated from electronic devices/equipment, yet the problem remained unresolved.

Part of the study's finding was that most of the used electrical, electronic devices ended up as scrap items and sold to an e-waste scavenger who then stripped them to recover precious metal and abandon the nonbiodegradable remnants to the environment. So, because of the monetary gain, e-waste management and recycling are perceived as a business venture for making money in developing countries, especially in Lagos and its environs. For example, the involvement of electronic equipment/devices company representatives in Nigeria like LG and HP would help to advance a plan to address the

recycling of disused electronic devices/equipment, which would add value and give credence to the argument advanced by Speake, & Yangke, (2015) and Szamalek (2016).

Implication for E-Waste Management and Policy

Effective e-waste management and recycling would help eliminate or minimize the potential environmental hazards created by the increase of e-waste generation/disposed off by uncertified e-waste collection vendors without considering the health implication, as corroborated by Alani et al. (2020).

Therefore, the study could be linked to the research interest in Walden University's vision, which supports having a healthy and safe environment by encouraging healthy e-waste management and recycling in society. Invariably, this study also highlighted the challenges faced by low-income earners in Africa who mainly rely on used or secondhand electronic devices as alternatives to new ones. The results and findings of this study would help cascade and inform electronic users, old or new, of the cost of using obsolete electronic devices close to their shelf life with environmental and health implications (Jokela et al., 2006; & Szamalek, 2016).

Bridgens et al. (2019) believe that adopting a multidisciplinary approach to recovering the nondegradable materials used in manufacturing phones and adequately disposing of devices would provide some level of e-waste management. Bridgens et al. (2019) agreed with other authors and scholars on the negative impact of improper management, recycling, or disposal of electronic waste generated from used electrical and electronic devices/equipment.

Meanwhile, I used the thematic, content, and text analysis to conduct this qualitative case study and ethnographic inquiry on the social and economic implications of the unabating e-waste concern emanating from the use of secondhand or UEEED post design, manufacturing, and disposal. I used grounded theory and qualitative purposive design in investigating used electronic equipment and devices in Lagos, Nigeria. Rooney et al. (2016) posited that individual studies should, at minimum, meet the credibility criteria of consistency transparency to make the research method acceptable. In contrast, credibility was used as a yardstick for measuring the internal validity of this study.

Conclusions

The e-waste from secondhand or used electrical, electronic equipment/devices had become biological feedback to the ecosystem hunting man for the extinction of precious metal to satisfy man's taste for technological advancement. This study established that the source of e-waste in Lagos was from new, secondhand, or used secondhanded electronic equipment/devices sold as scrap to business owners or dealers known as Aboki, with a yearly average of 120,000 Tons of generated e-waste. A similar study by (see Babatunde et al., 2020; Ogunseye, 2019; Parajuly et al., 2020; Ohajinwa et al., 2018) authenticated my findings.

This study's findings corroborate Nigeria's lack of regulated e-waste collection & recycling centers, mining plants, enabling legislation and policies as asserted in previous studies by (Prasad et al., 2020; NESREA, 2011; Techcrunch, 2018; Adepojur &Sulayman, 2019; Monsurat et al., 2019). Given the credibly identified gaps in the study, it was evident that the findings, conclusion, and research opinion gave credence to the

assertation by the United Nations Environment Programme (UNEP), Green Peace Movement goal 17, The World Health Organization (WHO), United Nations (UN) Millenium goal 12, 2022; and the assertation by Isimekhai (2017) and Igbo et al. (2018), and supported by Alani et al. (2020) on the growing concern of e-waste generation resulting in environmental challenges in Lagos city. Hence, the essence of conducting the study was to inquire into the reason behind the persistent unabating increase in the demand and use of secondhanded electrical, electronic equipment/devices with known e-waste potential in Lagos, Nigeria, which was a social and environmental concern raised by several researchers and environmental world bodies like UNEP, UN, and WHO.

In summary, new electronic devices/equipment are beneficial and stress-free since they are quickly traded off compared to the used or secondhanded electronic devices/equipment. Therefore, imbibing the concept of effective e-waste management and recycling from the cradle to the grave portend the benefit of extra savings for disposing of e-waste by business owners and the environment while at the same time addressing the negative economic implication for users of secondhanded electrical, electronic equipment/devices among users and business owners.

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Appendix A: Focus Group Observation Note

Type of Focus Group discussion: Single Focus Group

Purpose: This focus group discussion aims to seek data from participants through group discussion on the e-waste management & recycling challenges in Lagos, Nigeria. The study will help further understand why e-waste management is still a growing concern globally and locally.

Participant selection criteria: Must be 18 years and above and a user/owner of electronic devices/equipment with knowledge of e-waste management and recycling experience.

Location: Alaba and Ikeja electronic markets.

Duration: 20 - 35 min

Observer's Name: Amos Kome Onokpise

No of Participants: A group of 4 participants

Research participants (Owners of electronic equipment/devices secondhand or used)

Date (M.D.Y)

Observation Guide

Discussion Question 1:

Observations: • Eye-to-eye contact and facial expressions of participants, • Body language of participants, • Commonly used terminology concerning electronic equipment/devices, and • The mood of participants during the group discussion.	**Duration**	**Notes**
Discussion Question 2:		
Observations: • Eye-to-eye contact and facial expression of participants, • Body language of participants, • Commonly used terminology concerning electronic equipment/devices, and • The mood of participants during the group discussion.	**Duration**	**Notes**

Appendix B: Interview Questions/Guide

Introductory Comments: Introduction of researcher and thank respondents for their participation in this study. Review the signed permission form, explain why the researcher is conducting the interview, and explain that it will take approximately two minutes to complete.

Demographic Questionnaire

a. What is your name?
b. What is your gender?
c. What is your bracket?
d. Where is your Permanent Residence located?
e. What is your education level?
f. What do you do for a living?
g. How long have you been in the business of Electrical Electronic Equipment/Devices?

Part A questions are for UEEED Business-Owners. **[One-on-One Interview]**

1. Can we introduce ourselves?
2. Are you comfortable discussing secondhand electrical, electronic equipment?
3. What type of electrical, electronic devices do you deal on? [TV, Iron, Cell phone, refrigerator, music box, to mention but a few]
4. Did you buy them as new or secondhanded?
5. Tell me about your experience in the business of secondhand electronic equipment?

6. How do you manage or fix defective secondhanded electrical electronic devices when they return for recycling repairs?
7. How often do you receive defective UEEED for repairs?
8. What type of UEEED do you fix most of the time, new or secondhanded?
9. How do you source your spares to fix secondhand electronic equipment?

Follow-up questions:

- Do you think secondhand electronic equipment/devices be banned from being imported into Nigeria?
- How will you manage the e-waste generated from the electronic equipment about recycling policies in your locality?
- What will be your recommendation for business owners of electrical and electronic equipment regarding e-waste management and recycling policies in Lagos?

Part B questions are for users. [Focus Group interview]

- What are your views regarding e-waste management and recycling policies in your locality?
- Discuss how e-waste generated from used electronic devices/equipment be managed or recycled?
- Discuss what you know about recycling policies in your Lagos?

Follow-up questions:

- Do you think importing and using secondhand electronic equipment/devices should be encouraged or banned in Nigeria?

I do not intend to conduct pilot research, and once I obtain the approval of the IRB, I will progress to data collection using the statement method above.

Appendix C: Typical Types of Used Electronic/Devices in Lagos

EXTRACT OF FIELD FINDINGS OF TYPICAL USED ELECTRICAL ELECTRONIC EQUIPMENT/DEVICES

S/N	DESCRIPTION OF UEED	QUANTITY	SOURCES	CLASSIFICATION	LOCATION	DISPOSAL METHOD
1	Home Theater	4	Importation	Domestic E-waste	Computer Village Ikeja	Scavengers