Are we Going to Burn Everything?
Agbogbloshie's Informal E-waste Workers' Perspectives

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Abstract

This study engages with the informal e-waste sector, its financial, environmental and human health impacts as perceived by the e-waste workers. Although recovering resources from e-waste informally is useful to the financial needs of the workers, the rudimentary techniques employed are detrimental to the human-environment system. Surprisingly, not much is known about the perception of informal e-waste workers on their activities and how they triangulate the monetary benefits with the environment and human health consequences. Using the Problem-Centred Interview technique, I explored how informal e-waste workers at Agbogbloshie make meaning of their activities in relation to their financial needs, their duty to protect their lives and the environment. Additionally, their views on eco-friendly ways of processing e-waste, which would not compromise the financial benefits they accrue from their activities, were examined. The study found that informal e-waste workers accord significant importance to the monetary benefits of their activities. Equally, e-waste workers disclosed several health challenges and considered their activities of burning e-waste as polluting the environment. However, the financial rewards derived from processing e-waste informally override concerns for their health and the environment, and consequently influences their views on alternative methods of processing e-waste. The findings augment the e-waste literature and would guide attempts to minimize the adverse effects of processing e-waste informally at Agbogbloshie and elsewhere.

Key words: Agbogbloshie**,** e-waste, informal recycling, e-waste workers, human-environment system.

word count: 20056

Declaration

This thesis is the result of my own research work conducted at the Department of Sociology, Lund University, under the supervision of Dr Christopher S. Swader. I hereby declare that all the sources used in the thesis have been acknowledged.

Dedication

I dedicate this thesis to my father Mallam Rabiu Kassim. May his soul rest in peace.

Acknowledgement

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Introduction

1.1 Research Background

The electronic industry has gone through immense changes since it advent, making consumer electronic equipment accessible to the masses. The downside of this advancement is the short lifespan of equipment, coupled with the challenge of handling electronic waste sustainably. Electronic and electrical waste (referred to in this study as e-waste) are currently considered the fastest growing waste stream around the globe (Lundgren, 2012; Hossain, Al-Hamadani and Rahman, 2015). The increasing amount of e-waste is due, in part, to the rapid desuetude of electrical and electronic devices and the current generation's high demand for modern technology (Lundgren, 2012). The hazardous constituents of these devices, in addition to the huge financial and technological requirements for formal recycling, has resulted in illegal exportation to developing countries for informal processing (Lundgren, 2012; Daum, Stoler and Grant, 2017; Bakhiyi *et al.*, 2018). Processing e-waste informally, despite financial benefits, is detrimental to the human-environment system.

This study explored how informal e-waste recyclers relate the economic gains of their activities to their responsibility to protect their lives and the environment and possible alternatives to reduce the adverse impact without compromising the financial gains. Ehrenfeld's (2008) idea of sustainability in addition to Sen's (2001) Capability Approach served as theoretical underpinning of the study. Ehrenfeld (2008) postulates that the principles of modernity have made money an important aspect of human life. This implies that individuals regardless of the dangers involved in an activity, will nonetheless participate if they are evidence of financial gains from it. On the other hand, Sen (2001) proposed the need to allow people to take part in activities that they have reason to value. Understanding the value informal e-waste recyclers placed on the income generated from their work versus environment and human health is important to any attempt to bring this informal activity to book.

Exported e-waste from developed nations is classified as second-hand electrical and electronic equipment donated to aid bridge the digital gap between the global South and North. However, the majority of the exported equipment has already attained its end-of-life period and therefore does not function as expected (Ahmad Khan, 2016), leading to the creation of a ´digital dump.´ In addition to donations, unscrupulous individuals, in connection with custom officials smuggle e-waste to developing countries using different forms of classifications (Ahmad Khan,

2016; Bakhiyi *et al.*, 2018). The struggle to regulate transborder movements and disposal of e-wastes has become a global interest, which resulted in regulations such as the Basel Convention (1989). However, the economic benefits coupled with challenges in classifying and defining e-waste across nations undermine the ability of such regulations to control e-waste dumping in developing countries (Lundgren, 2012; Hoeltl, Brandtweiner and Müller, 2017).

Description of what constitutes e-waste is one among many issues that have not yet reached consensus. The absence of a universal definition for e-waste, as pointed out by Ahmad Khan (2016) and Lundgren (2012), undermines efforts to control, quantify and map the flow of e-waste around the globe, more specifically in developing countries. Classification of electronics that make up e-waste varies among nations because each country establishes its own list of end-of-life gadgets that fall under the category of e-waste (Ahmad Khan, 2016). That notwithstanding, some open-ended definitions such as the one used by the Organisation for Economic Co-operation and Development (OECD) are widely adopted by e-waste researchers and therefore chosen for this study. OECD considers e-waste as – 'any appliance using an electric power supply that has reached its end-of-life' (Ahmad Khan, 2016, p.249).

Despite the hazardous constituents of e-waste, some people take pleasure in processing it informally. The unfunctional electronics exported to Ghana end up in the hands of scavenger who informally recycle them, mainly through burning for valuable materials, such as copper, to make a living (Yu *et al.*, 2017). This burning process, which mostly take place in Agbogbloshie; a suburb of Ghana's capital, has caused damages to several human-environment system. The activities of e-waste handling start with scavenging. Scavenging, popularly known in Ghana as 'scrap dealing' is an informal self-employed activity that has sustain the livelihood of many urban residents (Oteng-Ababio, Amankwaa and Chama, 2014). The gathered e-waste, after physical attempts by e-waste workers to separate it with bear hands, are burned openly for valuable resources. The accumulated valuable resources, mainly copper, are then sold to cover basic needs of the e-waste workers.

Unexpectedly, the financial benefits derived from engaging with e-waste informally is gradually outstripping the several human-environment dangers that have characterized this activity, such as endangering the aquatic species, human health and environmental contaminations. The business is expanding immensely without any sign of being regulated. Failure to control such an economic activity, though meeting the financial demands of many, undermines campaign on sustainable environment.

1.2 Statement of the Problem

Recovering valuable resources from e-waste is becoming a major industrial sector in most urban societies in developing countries, and Ghana particularly, engaging a fairly large number of people (Daum et al., 2017; Oteng-Ababio et al., 2014; Oteng-Ababio, 2012b; Prakash and Manhart, 2010). The average monthly income of a Ghanaian e-waste worker is around US$ 400.00 (Agyei-Mensah & Oteng-Ababio, 2012). This is considerably higher than Ghana's official daily minimum wage of about US$ 65.10 a month, demonstrating the profitability of an economic activity with a starting capital equal to zero. Whereas the treatment of e-waste to recover valuable resources offers considerably appealing economic benefit, the rudimental nature of the process is accompanied with several risks and has been the source of environmental injustice and inequality in many urban areas of the country.

Studies have exposed significant human and environmental health effects as a result of processing e-waste informally (Lundgren, 2012; Caravanos *et al.*, 2013; Daum, Stoler and Grant, 2017). These negative effects result from the rudimentary methods employed in informal e-waste processing. Physical dismantling and open space burning were found to be the most common methods employed on Agbogbloshie e-waste processing site (Prakash and Manhart, 2010; Agyei-Mensah and Oteng-Ababio, 2012). In addition to several injuries during disassembling of e-waste, smoke from the burning contaminate the air and the toxins released from the burning process have affected the aquatic species in the rivers around the area (Otsuka *et al.*, 2012; Grant *et al.*, 2013). The environmental and human health implications of handling unwanted electronics extend beyond those who are directly involved in the activities, to economically disadvantaged women and children strolling around the area for different purpose.

While much has been done to understand the human-environment effect of the primitive recycling activities at the Agbogbloshie landfill, the narratives of the informal recyclers on the e-waste recycling site has been ignored. Daum, Stoler and Grant, (2017), in an assessment of 40 studies on the landfill, bewailed the non-appearance of informal recycle workers' experience and perceptions in the literature after over a decade of interdisciplinary studies. It is relevant for any attempt to create a sustainable handling of e-waste at Agbogbloshie and Ghana at large, to examine both the views of recyclers regarding their recycling activities on the landfill and feasible ways to resolve the situation. This void in knowledge regarding informal e-waste recycling on the Agbogbloshie e-waste processing site, is the basis for this study.

1.3 Research Objectives and Questions

The general aim of this study is to track how informal e-waste workers perceive their activities of recovering valuable resources from e-waste in relation to the financial, human and environmental impacts. This helps fill in the knowledge gap on the well-researched landfill and ascertain the perspectives and meanings informal recyclers on the site attach to their activities of recovering resources from e-waste. To achieve this, the following specific objectives must be met: -

➢ Collect research data on e-waste workers opinions on the monetary benefits together with environment and human health effects.
➢ Identify viable alternatives if available from e-waste workers, which can help reduce the dangers while maintaining the financial benefit of processing e-waste.

The objectives of the study are converted into the following research questions.

➢ How do informal recyclers perceive their recycling activities in relation, not only to their financial needs, but also to their duty to protect their life and the environment?
➢ How can the adverse impact of informal e-waste treatment be minimized whilst retaining its monetary benefits?

1.4 Significance of the study

> *'Man is the only animal for whom his own existence is a problem which he has to solve and from which he cannot escape.'*
>
> *(Erich Fromm, Man for Himself cited in Ehrenfeld, 2008, p.112)*

The above statement by Fromm suggest that humans in their attempt to survive cause several damages to the environment around them. What is important for him is the fact that these damages, caused by human interaction with the nature, should not go unheeded because their consequences are unavoidable. From this common assumption, it could be resolved that solving the problems envisaged in informal recycling of e-waste is not achievable if researchers and policy makers do not establish how informal e-waste workers perceive their activities. The outcome of the study will enhance our understanding of informal recycling of e-waste and the reason why many people are attached to such economic activities with observable consequences on the environment and human health. In addition, the findings of this study are expected to expand the understanding of researchers, policy makers and international

organizations on how e-waste workers at Agbogbloshie perceive their activities of recovering resources from e-waste relative to their income, the environment and human health.

Informal e-waste processing at Agbogbloshie has gained international attention with many blaming governments for not putting up measure to prevent people from engaging in those activities. Knowledge on how e-waste workers make meaning of their activities will help uncover the mysterious challenges that undermine the assiduous efforts of governments to stop those activities after over a decade of its inception. Correspondingly, the study will offer useful suggestions that will guide actions and policies, geared towards restructuring of the current system of recovering e-waste at Agbogbloshie and potentially elsewhere.

1.5 The Structure of the Study

The study comprises seven chapters. The first chapter is the introduction to the research, where the background of the study is established. Chapter two examines previous knowledge on the topic whilst the conceptual framework that was used to explain the findings of the studies is captured in chapter three. Sustainability and capability approach were the two main concepts that were found useful to help analyse the finding of this study. The methodology chapter of the study discusses the research paradigm and justify the reason for following a qualitative strand for gathering primary data to answer the research questions.

In chapter five, the main elements of sustainability and capability approach were employed to make meaning of the data obtained. The sections of the analysis are headed by themes that emerged from the primary data. Discussions in chapter six revolved around connecting the findings of the studies to the research questions, previous literature and theory. The closing chapter summarized the findings and conclusion of the study. Additionally, the chapter examined the implications of the findings, limitation of the study and recommendation for future research.

Chapter II
Literature Review

Qualitative researchers were previously reluctant to familiarize themselves with what is known about their research interest, to ensure open mindedness in the research process. However, this position is rejected due, in part, to the assumptions that knowledge creation required prior abstract formation, and the need to build informed expectations about the task at hand (Elliott and Timulak, 2005). Base on the latter premises, an extensive literature review was conducted on the economics, environment and human health impact of informal e-waste recycling together with its global trend and management in Ghana. Whereas a sizable amount of literature on the economics, environmental and human health impact of informal recycling exist, little is known about the subjective opinions of the recycle workers on their activities (Daum, Stoler and Grant, 2017) and how they prioritize these three elements of informal processing of e-waste.

2.1 A Brief Assessment of the Global Trend of E-waste

E-waste production is a universal phenomenon with developed countries being the largest contributors. According to Baldé et al. (2015), Africa and Asia generated 1.9 and 16.0 mt[1] of e-waste in 2014 respectively. Correspondingly, Europe and Americas contributed around 11.6 and 11.7 mt in that same year. From this estimation, Africa is the lowest generator of e-waste after Oceania which recorded 0.6 mt (Baldé et al. 2015). This corresponds to earlier estimation by Schluep, Resources and Hagel (2009) that a global trend of 40 mt of e-waste is generated in a year. The main source of e-waste in developing countries, especially Ghana and Nigeria, is from illegal import (Lundgren, 2012). Despite the attempted quantification by scholars on the generation of e-waste, the illegal nature of the trade has left many devices that have reached their end of life, indiscernible to international and national statistics. The globally amassed e-waste constitutes a large fraction of world resources which makes treating e-waste to recover valuables useful to the environment.

Diverse modes of treatment are employed across the world to recover the valuable in e-waste. Whereas treatment of e-waste in developed nations is largely formal, several informal methods are used in developing countries to achieve similar result (Schluep et al. 2009; Lundgren 2012; Baldé, et al. 2015). Additionally, the formal and informal ways of recycling e-waste follow

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[1] Metric ton

three chains, identified by Schluep, Resources and Hagel (2009) as collecting, dismantling and processing. In the formal recycling systems, these three steps are mutually dependent and contribute towards the net yield (Schluep, Resources and Hagel, 2009). Due to the complexity of the components of e-waste, substantial investments in advanced technologies is required to handle the varied and intricate elements of e-waste (Schluep, Resources and Hagel, 2009). This has resulted in shifting responsibilities of handling e-waste to countries with minimum or zero legislation. What is worrying, however, is the fact that the consequences of the rudimentary processing of e-waste in developing nations affects other part of the world. It is, therefore, necessary to establish strict legislation that prevents the transboundary movement of e-waste.

Several legislations exist to control illegal exportation of e-waste from different destinations over the years. Among these legislative initiatives are the Basel Convention (1989), the Bamako Convention (1998), and the European Union Waste Electrical and Electronic Equipment Directive (2003). The Basel Convention is mandated to regulate global transboundary movement of hazardous waste and their disposal. The agreement came into force in 1992 and has remained the only internationally recognized convention regarding e-waste and it administration (Lundgren, 2012). Endorsed by about 170 countries, the Basel Convention additionally, strives to reduce the generation of e-waste and advocate for more environmentally friendly treatment (Schluep, Resources and Hagel, 2009; Lundgren, 2012). At regional levels, the Bamako Convention and the European Union Waste Directive were established in Africa and Europe respectively to control both the regional movement and treatment of e-waste.

2.2 An overview of e-waste and its Management in Ghana

Ghana is among the leading West African countries receiving e-waste from around the world. In addition to import from developed countries, African countries such as Nigeria through their port in Lagos, smuggle their e-waste to Ghana (Grant and Oteng-Ababio, 2012). It was estimated that in 2009 Ghana had received 215,000 mt of electronics and electrical equipment (EEE) with only 30% of the shipments comprising new products and 70% labelled as second-hand EEE (Amoyaw-Osei and Agyekum, 2011). About 15% of the second-hand EEE were unfunctional at the time of arrival (Amoyaw-Osei and Agyekum, 2011). Although Ghana is among the countries that have endorsed the Basel and Bamako Conventions, the country as a whole does not have effective national legislation that will support the enforcement of the international and regional treaties (Oteng-Ababio, 2012a; Daum, Stoler and Grant, 2017).

Whereas quantification of the amount and types of e-waste available in the country is lacking, about half of the second-hand EEE shipped goes directly into informal recycling (Grant and Oteng-Ababio, 2012). Informal processing of e-waste to recover valuables takes charge of obsolete gadget recycling in Ghana and has put the country among the highest e-waste collecting nations. It was estimated that the informal collection accounted for about 80% of e-waste in the country (Amoyaw-Osei and Agyekum, 2011). Despite this contribution, the informal sector is largely unregulated and the rudimentary methods employed by the informal e-waste recyclers is shown to be harmful to the human-environments system (Asante *et al.*, 2012; Huang, Nkrumah and Anim, 2014; Daum, Stoler and Grant, 2017). Attempts to effectively manage e-waste in Ghana will require proper understanding of how those involved make meaning of their activities.

2.3 Monetary Benefit of Informal Processing of E-waste

To Governments and international organizations who has expressed concern about the uncontrolled way of processing e-waste, the monetary impact of informal processing of e-waste may take a back-seat to human and environmental health impacts. However, the accrued and expected monetary benefits of informal processing of e-waste has been the brain behind its proliferation in many urban communities of developing nations. Agyei-Mensah & Oteng-Ababio (2012), in their study about health and environmental perceptions of managing e-waste in Ghana, found that the views of individuals directly involved in e-waste activities is influenced by the economic benefits therein. Their study disclosed an average monthly earning of 'GH¢ 550.83 (US$ 377.28)' for e-waste workers in the capital were Agbogbloshie is located (Agyei-Mensah & Oteng-Ababio 2012, p.513). Such a monthly income, although may differ among e-waste workers, due to their roles, is essential to the life of many people in Ghana's capital.

Akormedi et al. (2013) confirm this with relatively higher returns. In their study, which was intended to examine informal e-waste recycling and working conditions at Agbogbloshie, they found that a daily wage of an e-waste worker at Agbogbloshie ranges between USD$16 and USD$52 (p.282). This puts the monthly earning of an e-waste worker between USD$480 and USD$1560. However, the earnings depend on the activities an individual is involved in, with burners earning the least wage per day (Akormedi et al., 2013). The likelihood of going back home without earning any money according to Akormedi et al. (2013), has informed the decision of most of the workers to seek more stable businesses after raising enough capital

from informal e-waste processing. The two studies above point to the profitability of informal e-waste recycling, which makes it crucial to examine the views of e-waste workers on it.

Many informal recyclers do not intend to stay in the business forever, rather to accumulate capital through savings to start another business. Amankwaa (2013) found enormous savings and investment culture among e-waste workers in Agbogbloshie. Using both questionnaires and in-depth interviews, Amankwaa, extensively explored e-waste workers' saving habits and where they normally keep their earnings. More than half of his respondents involved in savings, could keep not less than USD$10 a week with a recognized or traditional financial intermediaries (Amankwaa, 2013). The study, however, fail to establish what these savings are commonly used for by the workers. Additionally, the fluctuating nature of e-waste workers' earnings, makes such estimations debatable.

Part of wages earned from informal recycling by e-waste workers are sent in remittances to immediate and extended families in the northern part of Ghana. A socio-economic assessment and feasibility study on a sustainable way of managing e-waste by Prakash & Manhart (2010) estimated a total of 20,300 to 33,600 people as indirect beneficiaries of earnings from informal recycling of e-waste in Ghana. Another study by Amankwaa (2014) found that e-waste workers provide significant support to families and dependents out of the money they make from their activities. While both studies by Prakash & Manhart (2010) and Amankwaa (2014) have contributed to the literature by throwing light on the extended benefits of earning from informal processing of e-waste, the usual reason for the support and most identified beneficiaries are still unknown. Notwithstanding the enormous livelihood benefits derived from informal processing of e-waste, the rudimentary means employed have adverse impact on the human-environment systems.

2.4 Human Health Impact of Informal Processing of E-waste

Health risks associated with informal processing of e-waste has been an important aspect of e-waste debates, which has been extensively explored. It is worth mentioning that the basis for many studies including those that point out to the livelihood benefits of e-waste, were to discover the health effect of recycling e-waste informally.

Using the binary logistic regression model, Agyei-Mensah & Oteng-Ababio (2012) found that almost all the e-waste workers were aware of the health risk associated with processing e-waste informally. However, e-waste workers knowledge of the health consequences does not

correspond with experts findings (Agyei-Mensah and Oteng-Ababio, 2012). Opinions about health effects among e-waste workers do not extend beyond accident related injuries. Burns and cuts as a result of dismantling of e-waste, were the apparent human health dangers, in addition to body pain due to longer day of work (Agyei-Mensah and Oteng-Ababio, 2012). Though, Agyei-Mensah & Oteng-Ababio went further to uncover the common diseases recorded by a polyclinic around the e-waste site, additional insight regarding e-waste workers conduct in seeking health care could have add much weight to their findings.

In a broader context, our knowledge regarding the health effect of informal processing of e-waste on the workers, should include understanding patterns of remedial activities they employ to overcome perceived or observable afflictions. Using grounded theory approach, Asampong et al. (2015), confirming the finding by Agyei-Mensah & Oteng-Ababio (2012), further explored health seeking habits of e-waste workers. They found that e-waste workers at Agbogbloshie seek health care from several health providers. Decisions regarding where to seek health medication among e-waste workers were influenced by the extent of injury, readiness and easy contact with health practitioners in addition to the cost and expected benefits involved in seeking health care (Asampong *et al.*, 2015). Admittedly, the amount of money needed to seek health care from established medical facilities, like clinics and hospital, is relatively higher than that of indigenous health practitioners. This eventually makes subscription to a primary health care insurance known as the National Health Insurance Scheme (NHIS) a laudable idea. However, Asampong et al. (2015) in their study found that the majority of the workers are without national health insurance. The study, however, failed to explore the reasons behind low subscription of NHIS.

Other health related studies have claimed more serious and complicated health problem among e-waste workers at Agbogbloshie and elsewhere (Caravanos *et al.*, 2013; Grant *et al.*, 2013; Feldt *et al.*, 2014; Wittsiepe *et al.*, 2015). Caravanos et al. (2013) employed an exploratory cross-sectional strategy to describe health features of e-waste workers at Agbogbloshie. Chemical exposure in urine and blood serum among e-waste workers (exposed group) and non-e-waste workers (control group) were examined. The study found high absorption of heavy metals in the blood sample of e-waste workers. Equally, the exposed population recorded much more elements of 'barium, manganese, selenium and zinc', than the controlled population (Caravanos et al. 2013, p.20). Examining e-waste workers opinions on health assist in understanding how they balance their economic needs with their sense of protecting their lives.

2.5 Environmental Impact of Informal Processing of E-waste

Several procedures such as dismantling and open space burning employed by informal e-waste recyclers at Agbogbloshie to recover valuable resources from e-waste has numerous impacts on the environment. Contamination of water bodies, soil, and air in and around Agbogbloshie are the mostly explored effects of informal processing of e-waste on the environment (Caravanos *et al.*, 2011; Otsuka *et al.*, 2012; Chama, Amankwa and Oteng-Ababio, 2014).

Caravanos et al. (2011) using technical laboratory equipment took air and soil sample of Agbogbloshie to examine the host of chemical contamination on the site. Their study reported a breathing atmosphere that contains elevated concentration of aluminium, copper, iron, and lead. More than half of the 100 soil samples from different parts of the site had lead concentrations ranging from 134 ppm to 18,125 ppm, (Caravanos et al. 2011, p.23). According to Caravanos and his colleagues, these levels are beyond the United States Environmental Protection Agency (USEPA) standard of 400 ppm and 1200 ppm for play and non-play areas respectively. However, it could be argued that comparing the environmental standard of Ghana with that of the United State is a byzantine attempt, since, the values that sum up the assumption of those standards are absence in the former.

Otsuka et al. (2012) and Chama, Amankwa and Oteng-Ababio (2014) expanded the literature regarding environmental contamination at Agbogbloshie by examining chemical elements present at low level on the site in relation to the ideals of Japan and Canada respectively. Chama and his colleagues found that trace metals on the recycle site varies with areas near burning and dumping recording higher rates than other locations. Their findings upheld the assertion that informal processing of e-waste at Agbogbloshie has contributed to the contamination of the Odaw River. An earlier study by Prakash & Manhart (2010) reported dissatisfaction among neighbouring residents regarding how e-waste recycling activities affect the Korle Lagoon and Odaw River. Toxins from e-waste recycling activities has led to the extinction of aquatic species in the lagoon, which has hitherto served as a livelihood strategy for fishers (Prakash and Manhart, 2010). E-waste workers views on water and soil contaminations are unknown.

Agyei-Mensah & Oteng-Ababio (2012) examined e-waste workers knowledge on the environmental impacts of their activities. They found that air pollution was the overriding concern of e-waste workers. E-waste workers considered the smoke and chemicals from burning of e-waste harmful. Although the two researchers found some of their research participants unconcerned about the environmental impact, they were not much sure the source

of this conflicting view. Examining the financial benefits with their perceptions on health and environment, is useful in revealing overlapping interest in informal processing of e-waste. E-waste workers are directing the environmental problems of the area to uncontrolled dumping of household waste and excretion on the site (Agyei-Mensah and Oteng-Ababio, 2012). Such a blame game among inhabitant of the site is not constructive to the environment and will, therefore, be cross-examined with the views of current inhabitant of the site.

In addition to soil, water and air pollution, Akormedi et al. (2013), considered the working environment hazardous for both the e-waste workers and the surrounding populations. E-waste workers after trolling for discarded electronics from residential neighbourhoods, go through a long strenuous fatigue labour to extract valuable resources through burning (Akormedi, Asampong and Fobil, 2013). Akormedi and his colleagues found e-waste workers with limited knowledge of environmental consequences of their activities. However, their discussions and recommendation for a framework that establish a workable financial and social security for e-waste workers, suggest romanticism towards the e-waste workers and their activities. It could be reasoned that such commendation can subdue the continuous efforts by authorities to curtail the employment of informal methods to recover valuables resources from e-waste.

2.6 Summary

In examining the literature, it was clear that informal processing of e-waste has financial, environmental and human health impacts. However, nothing is known about how e-waste workers prioritize these three well-known impacts of e-waste. The reviewed literature has shown that the monetary benefit of e-waste extends beyond the individual workers to their families. Nevertheless, knowledge about the most immediate and extended family beneficiaries of e-waste workers earnings is void. The push factors to the informal e-waste industry are still not clear in the literature. Moreover, workers daily routine and hours of work were not examined in the literature. Although Agbogbloshie e-waste workers perceptions on environment and human health has been explored, it is important to revisit these opinions in order to ascertain how the environment and human health, in comparison with the monetary benefits are assessed by e-waste workers. Equally, Knowledge about the reluctant attitude towards the primary health care scheme by e-waste workers, is yet to be explored. These and other knowledge gap that will unexpectedly arise in the primary data will be what this study is geared towards addressing.

Chapter III
Conceptual Framework

To put the study in perspective, sustainability concept supported by Sen's Capability Approach served as conceptual underpin of the study. The frameworks adopted served both *ontological and hermeneutic tradition* of using concepts (Blaikie, 2009), to identify how their basic features relate to the real world together with the everyday account and activities of informal recyclers. Concepts as noted by Blaikie (2009), are traditionally used in research for five reasons, which includes *ontological* and *hermeneutic* traditions in addition to the *operationalizing*, *sensitizing* and *adaptive* traditions of using concepts (p.113-122). With the ontological tradition, the aim of a concept such as sustainability in a study about the perception of informal recyclers on their activities, will not involve specifying how it can be defined and measured, but on understanding the overlapping interest between what sustainability stands for and the reality out there. Hermeneutic tradition on the other hand, is concern with embedding concepts 'in the everyday language of the social actors under investigation' (Blaikie 2009, p.119). In this tradition, the goal is not to impose the scholarly meaning of sustainability on informal e-waste recyclers, but to understand it from their perspectives and everyday usage. This section will explain the tenets of sustainability and capability approach, their relevance to the study and how the two ideas will be used to explain the findings of the study.

3.1 Sustainability

The concept of sustainability has garnered much attention and can be considered a widely accepted idea. However, the summed aspiration of the concept has not been realized due to several overlapping interests between what the concept calls for and the reality on the ground (Jenkins, 2003; Ehrenfeld, 2008). Sustainability is most often attributed to the Brundtland Report of 1987 (World Commission on Environment and Development (WCED), 1987). However, this study departed from the Brundtland idea of sustainability and sustainable development to explore John Ehrenfeld's ideas of sustainability. Ehrenfeld (2008) notion of sustainability will assist in analysing recyclers perceptions on their activities and the overlapping interests therein. Discussions on sustainability for Ehrenfeld (2008) should go beyond its conception as a property that is 'measured and managed' towards an expression that 'brings forth an image of the world' we expect to see (p.49). Ehrenfeld defined sustainability as "the possibility that human and other life will flourish on the Earth forever" (p. 49). The

remaining discussion will cover the causes of unsustainability and possible ways to achieve sustainability.

3.1.1 Causes of Unsustaianbility

Ehrenfeld (2008) argued that activities geared towards creating a sustainable world contriubute to unsustainability and therefore, the desire to be sustainable should ensue from our beliefs to do the right thing and live in harmony with things around us. He traced the unsustainable charateristics of this generation to the cultural structures of modernity which includes 'reality, rationality, and technology' (p.23). Ehrenfeld (2008) argued that our understanding of what constitutes reality is among many causes of unsustainability. His idea on objective reality as a contributor to unsustainability, points to the need to begin movements regarding sustainability from the conscience of people. Considering the world as an object distinct from us permits authority and 'mastery over nature,' which leads to unsustainable activities (Ehrenfeld 2008, p.24). Additionally, it undermines our ability to reflect and reform our experiences and interactions with nature. This shows that our understanding of nature as an external reality is among many challenges of creating a sustainable world.

Rationality according to Ehrenfeld (2008) is highly connected to our beliefs about reality and what constitute reality. The domineering conception of rationality in the modern culture is one that has to do with economic needs, where people are more concern about meeting their basic needs out of the limited resources available (Ehrenfeld 2008). Such an economic model of rationality put an individual's monetary needs and desire above other issues, which is detrimental to achieving sustainability. Resolving this will require a corporation between the value of natural resources and technological designs (Ehrenfeld 2008). Although technology helps in making life easy, it gradually undermines the capability of nature to sustain life. Technology is critical to achieving sustainability due to, its ability to influence our everyday knowledge and regulate how we live (Ehrenfeld 2008). Ehrenfeld (2008) considered technology not only in the sense of the wide array of gadgets, but a fundamental cognitive orientation of an individual that acknowledge things based on their functions and value. Such discussions on human-technology connection could be extended to understand difficulties in treating absolute technological gadgets sustainably.

Ehrenfeld's (2008) idea of objective reality was used to analyse how e-waste workers perceived the effect of their activities on the natural environment. Rationality on the other hand was employed to understand the trade-off between their health and the need for money. E-waste

workers get in touch with unwanted electronics because of the perceived value it offers them. These values together with alternative suggestions of e-waste workers was used to understand e-waste workers views on whether technology can contribute to efforts geared towards achieving sustainability.

3.1.2 Guiding Principle to Achieving Sustainability

The current sustainability agenda in Ehrenfeld's (2008) view can at its best reduce unsustainability. To move from unsustainability to sustainability, will demand a rekindling of three vital domains of humans turned down by modernity. This include 'our sense of ourselves as human', 'our sense of our place in the natural world', and 'our sense of doing the right thing' (Ehrenfeld, 2008, p. 58). Therefore, maintaining a cultural transformation that enables humans to revive their beliefs and normative behaviours are the elements for creating sustainability. The three domains identified by Ehrenfeld are represented in the borromean-rings below.
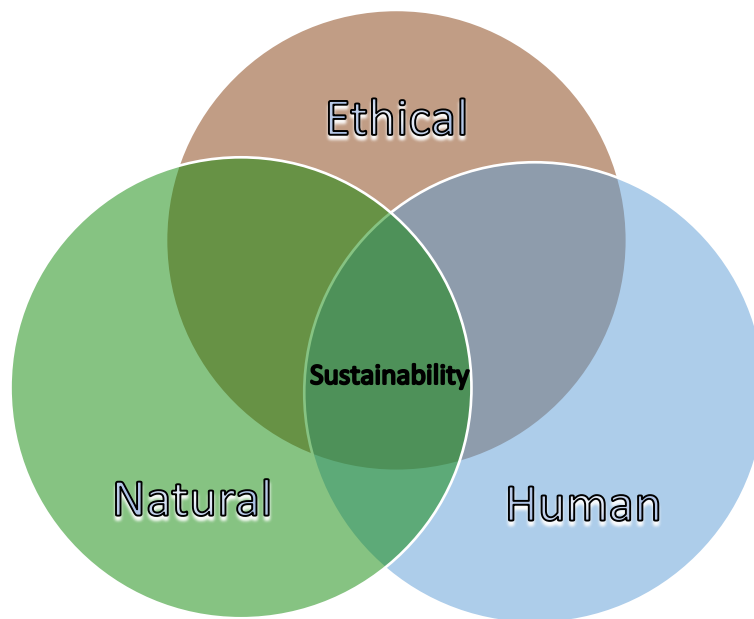
Figure 1: The Tao of Sustainability. Source: Adopted from Ehrenfeld (2008, p.59).

Ehrenfeld considered our sense of doing the right thing the ethical domain. This domain in his assertion is tamed by modern culture of transfer and disperse responsibility. A computer company such as Dell for illustration purposes, produces computers for human use but the responsibility of managing the outdated part or the entire computer has been transferred to

someone living far away from the source of manufacturing. Actions are no more judged base on right or wrong, but rather examined based on the economic benefit associated with that act. The ethical domain was used to analyse how e-waste workers in their quest to meet the demands of urban life are ready to put their lives and that of their neighbours at risk.

The natural world consists of different biological species of which humans are the masters. Attaining sustainability requires identifying our place and relations with the natural world, which Ehrenfeld (2008) termed the natural domain. Failure to establish our place in the natural wold result in considering the environment as a mere object, which can be used to meet our desires regardless of the consequences. The human domain is concerned with redeeming ourselves form the reformatories of the modern cultures. Reawakening our human realm will require a change in design, institutions among others that will incline us towards a thinking that will replace 'need' with 'care' as our new principles of being (Ehrenfeld 2008, p.133). Different overlapping interest between the modern practices of accumulating wealth, power relations among other things undermines effort towards attaining sustainability.

The above disscussed domains serve as conceptual structures that supports our effort towards creating sustainability. Discussions with the e-waste workers was analysed with the guidance of the three domains to understand how the financial demands of e-waste workers has tamed their ethical, natural and human domains.

3.2 Capability Approach

Capability Approach (CA), a normative framework that allows for the assessment of the well-being of individuals (Robeyns, 2005), supported Ehrenfeld's idea of sustainability in analysing the findings of this study. The approach maintains the need for interventions to focus on people's ability and freedom to do what they value (Sen, 2001). The interdisciplinary nature of the Capability Approach has led to a strewed literature from different scholars and disciplines (Robeyns, 2005). The discussion in this thesis will be based on the ideas of the proponent of the approach Amartya Sen. Capability Approach provides a broader philosophical foundation of Sen's basic capability equality (1979) by stressing on the individuals' freedom. Sen (2001) proclaims that analyses of relations between the individual and society should be established in 'the capabilities that a person has, that is, the substantive freedoms he or she enjoys, to lead the kind of life he or she has reason to value' (p.87). This implies that raising the capability of individuals goes a long way to expand their choice, wellbeing and role in economic activities. It could be suggested that e-waste workers are involved in an economic activity with observable

consequences because they are not equipped with skills that would allow them to participate in safer economic activities.

Capability Approach constitute three fundamental concepts namely, functionings, capabilities and agency. Functioning is being or doing what a person values and has reason to value, capability on the other hand refers to a set of accessible functioning that enables a person to achieve what he wants to be or do without constrains (Deneulin and Shahani, 2009). Agency, Deneulin & Shahani (2009) explain is the extent of a person's ability to pursue and realize goals valuable for the person's well-being. Opinions of e-waste workers were analysed in consideration of their functionings, capabilities and Agency. Another key distinction associated with the Capability Approach is that between means such as goods and services against functioning and capabilities, where goods refer to anything that has certain features of value to individuals (Robeyns, 2005). Relating this to the study, it was resolved that an informal e-waste recycler is not interested in e-waste because it is coming from another part of the globe, but because it can assist him meet his basic needs and that of his family. Therefore, the feature of e-waste that enables the functioning of getting a job, which helps in raising income to meet the needs of e-waste workers and their families, is what makes it valuable.

Capability Approach is still struggling to withstand criticism such as establishing a capability list and its individualistic nature. This overriding criticism levelled against Capability Approach is partly due to, the unwillingness of its proponents to outline what counts as capabilities or specific list of capabilities to be considered. The absence of a list of capabilities by Sen makes any capability valuable to be considered (Robeyns, 2005). However, Sen (2004b), considered approving a list of capabilities beyond the scope of academic scholars and suggested that issues regarding which capability is important should be open and guided by the matters at hand. Another reproach that has visited Capability Approach is its emphasis on individual well-being although a person's action is normally part of a collective action (Robeyns, 2005). Capability Approach has assisted in examining the value informal recyclers of e-waste accord to their recycling activities and their positions regarding strategies directed towards restructuring their activities that will not put their means of livelihood at stake. Processing e-waste informally regardless of the effect was necessary in their opinions to enable them to meet their daily needs and that of their families which is relevant to their well-being.

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Chapter IV

Research Methodology and Design

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Research, more specifically academic research, is based on underlying philosophical assumptions, in addition to, a logic of inquiry about what constitute a valid research and the appropriate research approach that suit the development of knowledge about a phenomenon (Blaikie and Priest, 2017; Creswell and Poth, 2017). This chapter explains the philosophical assumption and the research strategy underpinning the study including, data collection and the phases and processes employed to gather data together with analysis procedures. Ethical issues and researchers position were elaborated in this chapter.

4.1 Research Paradigm

The admiration accorded to ontological and epistemological assumptions by Blaikie & Priest (2017) led to the suggestion that, considerations for research paradigms should take precedence over the choice of strategy. Establishing my study within a paradigmatic framework, permitted me to reflect on my commitment to what constitute reality (ontology) and the appropriate way of knowing reality (epistemology) which, in turn, made the entire research process meaningful (Perren and Ram, 2004). The interpretive paradigm was identified appropriate to help put the study in context. Interpretivism is based on a mind-world monism ontology that argues that observation is both theory- and value-laden and therefore, social world inquiry cannot be detached from the activities of making sense of the world (Leitch, Hill and Harrison, 2010; Jackson, 2011). Epistemologically, those who accept this philosophical perspective argue that, knowledge is socially constructed from the meanings individuals attributes to nature and the environment within which they found themselves (Blaikie and Priest, 2017).

Several factors informed the choice of interpretative research paradigm. The main underlining factor, however, was to assist in understanding the world as it is from the subjective view point of informal e-waste recyclers at Agbogbloshie. Equally, it ensured that analysis was pursued within informal e-waste recyclers' frame of reference, rather than, the objective observer of the action. The good side of those premises was the guarantee that the researcher's depiction of informal e-waste recyclers was in line with their perceptions of reality. In practice, situating the study in the interpretivist paradigm, prepared me against field shocks of the multiple constructions of reality that ensued from my interaction with e-waste workers and permitted the discovery of how informal e-waste workers make sense of their activities within their natural settings (Blaikie and Priest, 2017).

4.2 Research Design

This study followed a qualitative research approach of data collection and analysis. This approach allowed for a more open-ended discussions with informal recyclers to ascertain the meanings they make of their activities through individual narratives and lived experiences (O'Reilly 2009; Witzel & Reiter 2013). Informal e-waste recyclers perspectives on informal recycling of e-waste relative to their financial needs, environment and human health risks was extensively explored. Equally, qualitative approach allowed me to engage and reflect on my constructions of informal recycling, whiles listening to the participants' perspective on the phenomenon (Creswell, 2014).

Contrary to the claims by Creswell & Poth (2017) that a researcher needs to identify a particular qualitative design in order to produce a more complex and detail study, this study was not aligned to any defined approach. Creswell and Poth (2017) identify five qualitative approaches to scientific inquiry namely, Narrative, Phenomenology, Grounded theory, Case Study and Ethnography. The study did not follow the Creswell and Poth (2017) thinking of doing qualitative study because such a prearranged idea will take the focus away from identifying an appropriate way of collecting research data that best fit the research question and the empirical object. My study adopted a purely qualitative method and used Problem-Centred Interview technique to collect research data. This allowed e-waste workers to reflect and bring out their views without restrictions. Additionally, it allowed me to incorporate elements of narrative and phenomenology to appropriately report my findings.

4.3 Data Collection

The study combined varieties of procedures to obtain primary data to answer the research questions. The fieldwork was done at Agbogbloshie e-waste processing centre where various activities of recovering valuables from e-waste is done. Before conducting interviews with e-waste workers, a series of events took place that will all be discuss under the heading of data collection in addition to an overview of the study area.

4.3.1 An Overview of the Study Area

The study area is Agbogbloshie;- a suburb in Ghana's capital situated on the banks of the Odaw River and the Korle Lagoon, covering an area of 1.46 km² and an estimated population of about 40,000 people (Ghana Statistical Service, 2013). The indigenous ethnic group is Ga, however, studies on the field reported most of the inhabitant to be migrant from the northern part of

Ghana (Agyei-Mensah and Oteng-Ababio, 2012). Whereas many settlements on the site are formal, it is encircled by informal residential development and activities.

E-waste processing is the internationally recognised informal economic activity at Agbogbloshie. This created the impression that the only economic activities at the study area is e-waste processing. Nevertheless, it is a well-recognized food and hawkers' markets that serves the population of Accra and beyond. Mechanical activities such as fixing and selling spare parts for automobiles is another main activity characterizing the area. The site has over the years grown into a slum with people involved in recycling of diverse types of scraps including discarded electronics. E-waste that finds its way into the site are broken apart to salvage copper and other metallic components that can be sold. Part of the site has been leased to e-waste workers by the National Youth Council (NYC) in 1994 under the leadership of Scrap Dealers' Association of Ghana. Agbogbloshie is currently the hub of informal 'recycling industry' in Ghana with other regional site in other part of the country. Agbogbloshie was favoured for this study over other e-waste processing sites in Ghana, due to its international recognition and the fact that it is the origin of all informal e-waste recycling in Ghana.

4.3.2 Gaining Access to the Research Site and Participants

Before the commencement of the fieldwork, two personnel and I identified to conduct the interviews in the local dialects of the participants met and introduced ourselves to the leadership of the e-waste workers at the study site. We had a brief discussion with the leadership (elders) of the interviewees regarding the nature and purpose of the project. Permission was granted for the study after the leaders established that the project was indeed in fulfilment of my master's program. It was necessary because, others had visited the area and used them for their personal gains on some media platforms, including the international media. The procedures under which the research should be conducted, which includes no taking of photographs, and videos, were made clear. These laid down procedures were upheld throughout the period of data collection.

We took a tour of the site, to familiarize ourselves and spend some time with some of the e-waste workers and explained further to them the nature of the study and the importance of their response with the help of the consent forms before the start of the interviews. We discussed channels through which they collect/acquire and retrieve valuable resources from e-waste. I observed keenly on how the work is done at every stage during the interviews to appreciate the efforts employed to retrieve valuable resources from e-waste.

4.3.3 Research Population and Sampling Technique

The study population was all informal e-waste recyclers at Agbogbloshie. While the sample of the population guided the number, age, sex, and other demographic details of informal e-waste recyclers engaged on the e-waste site, purposive sampling was utilised to gather diverse perspectives, experience and perceived reality of informal e-waste workers on their activities. Purposive sampling enabled me to include research participants who have extensive experience in the informal recycling as well as new comers and why they have decided to venture into the business. The expectations were that, those with extensive experience in the work are conversant with the risk involve and may want to quite whiles the new comers may only be aware of the economic opportunities. The initial plan was to involve e-waste workers below the age of 18 years. However, no one below the age of 18, was found working with e-waste during the fieldwork. In all, twelve (12) people participated in the interview. The study used a fixed purposive sampling which means that participants were recruited before the beginning of the interviews and there was no addition or subtraction afterwards (Bryman, 2016).

4.3.4 Instrument for Data Collection: Problem-Centred Interview (PCI)

Research data for the study was gathered using the problem-centred interview (PCI), an approach developed by Witzel and Reiter in Germany. PCI enabled me to open my interviews with the attempt to collect informal recyclers entire views on the monetary, environment and human health impacts of their activities. This helped me obtained their raw opinions on the phenomenon. The opening question was followed by specific questions arranged under themes. The themes of the interview were based on the monetary benefits informal recyclers derive from their activities, their perception on the human and environmental health risk involve and their suggestions on alternatives. PCI is a face-to-face interview technique appropriate for exploring and evaluating meanings and opinions of individuals on a phenomenon that is less explored (Witzel & Reiter, 2013). The nonappearance of the informal recyclers voice in many studies conducted at Agbogbloshie e-waste processing centre (Daum, Stoler and Grant, 2017) makes PCI the most expedient instrument for gathering research data for this study (Witzel and Reiter, 2013). E-waste workers opinions were accurately obtained without ethical biases.

The interviews were moderated by two trained expert interviewers in the local dialects of e-waste workers. The native language of e-waste workers was Dagbani, making it necessary to seek the help of people who are familiar with both the local language and English to help transcribe the interviews into English. The engaged interviewers had extensive experience in

conducting interviews and have been used severally to conduct interviews on the site. The interviews were recorded with a digital recorder after seeking consent from each of the participants. One of the interviewers guided the interview discussion, whiles the other took field notes and respondents verbal and nonverbal behaviours. Each interview lasted for about 35 minutes. The two interviewers were able to build sufficient rapport with the e-waste workers, which enabled them to delve into more interesting and consistently delicate issues.

4.4 Data Analysis Procedure

The interviews were separately transcribed into English by the two interviewers in addition to the field notes taken during the interviews (see App. II, A, for sample). The reason for doing the transcription separately was to enable me to verify the validity of the transcribed data and identify the differences. Disagreement between the two interviewers were resolved by listening to that section of the interview repetitively until consensus is achieved. Participants of the study were randomly given false names to protect their identities during the analysing of the research data. The transcribed data was imported into Computer Assisted Qualitative Data Analysis Software (CAQDAS) known as NVivo Pro and coded electronically. Coding was precisely done by putting several texts or sentences into nodes. Several nodes were put together to form themes under which all the nodes were discussed in the result and analysis chapter of the study. For example, when considering several sicknesses that envisage e-waste workers as a result of their activities of recovering valuable from e-waste, relevant responses from all the interviewees were coded 'common sickness' (see App. II, B). The theme of 'human health' was identified from this node coding and ideas within this theme were formulated for presentation in the research. The result presentation was balanced with participants' narratives.

4.5 Researcher Positionality

Establishing my position in the study assists in understanding how the research process unfold. Throughout my preliminaries to conduct this study, from writing the research questions to the drafting of the interview protocol and fieldwork, my position as a Ghanaian descending from the northern part, studying issues of informal recycling remains at the frontline. I will discuss these issues together with the assumptions and lessons learnt throughout the research process. The opinions of e-waste workers that people come to the site and use them for their selfish gains required that I position myself as a student whose investigation on the site is mainly for academic purpose. Although I made this clear during my first meeting with the leaders, I repeatedly maintain this position to ensure that participants establish trust with me and provide

me their fair opinion regarding their activities. This expectation informed my decision to present each participant with a Lund University pen to confirm to them my status as a student of the university. My presupposition regarding how important my positionality is to the study was continuously reverse during the entire period of data collection.

I constantly reminded my two interviewers to maintain a neutral position. The interviewers and I are from the Northern part of Ghana and therefore, although we are outsiders, our subjective acquaintance with the northern life together with challenges of meeting the demands of the city will result in having a sense of solidarity with e-waste workers. However, our place in the study met that of the participants without juxtaposition. I have learnt to accept that the study was shaped by my place as a student from northern Ghana. Understanding my positionality in this study assisted me in turning the processes of making sense of a phenomenon to myself and relate scientific claims to the process of knowledge production instead of the mere values and mind of the investigator (Jackson, 2011). I have made a resolution to seek further training to be invariably sensitive in my future encounter with research participants.

4.6 Ethical Consideration

The study was conducted in a way that ensured the right and safety of all participants were not at stake (O'Reilly, 2009). Permission was obtained from the leaders of e-waste workers before the commencement of the fieldwork. My status as a Ghanaian, acquainted with the research site waved the requirement to secure an introductory letter from Sociology Department of Lund University (Creswell and Poth, 2017). The study does not fall under the category classified as sensitive because, all the participants were above the age of eighteen. A consent form providing the details of the project and the rights and responsibilities of participant was orally read in participants own language before the start of each interview (see App. I, B).

Participation in the research was voluntary with the right to quit or terminated the interview at the whims of participants. Participants were informed about where the final work will be available, but their responses cannot be traced in the final work. Problem-Centred Interview (PCI) technique was an appropriate interview approach that respected respondents' capacity and willingness to participate in the study. This approach of conducting interview makes participants the masters of the interaction and therefore, does not disclose sensitive information of respondents since they decided what they would want to bring into the conversations. The consent form, in line with O'Reilly's (2009) way of thinking helped me document participants' involvement and acknowledge their protected rights and anonymity.

Chapter V

Research Results and Analysis

My study examined how informal e-waste recyclers perceived their activities in relation to the financial benefits, their duty to protect their lives and the environment. Possible alternatives that would preserve their health and the environment while maintaining the economics in their activities were also explored. This chapter of the study presents the findings from the Problem-Centred Interviews conducted with e-waste workers at Agbogbloshie. The results are the culminations of e-waste workers' narratives and experiences on processing e-waste informally. Presentation of findings were done by combining the themes used for the interviews with the themes that emerged from the data. Though the themes under which the findings were presented could be considered discrete, there is considerable overlap among them.

Engaging with the research data of the study will be done in consideration with the conceptual framework of the study. Sustainability and Capability Approach were considered explanatory concepts to help understand the findings of the study. As stated under the conceptual framework, Ehrenfeld's (2008) ideas of sustainability were adopted for the study. In his view, sustainability will be attained if we abandon the cultural structures of modernity, which allows our actions to be controlled by our needs and values, and edify our intrinsic human nature. Capability Approach on the other hand, examines individual value based on the internal and external conditions surrounding the individual. Although these two conceptual ideas may be considered distinct, both ideas agree upon the importance of free will.

5.1 Background of Participants

All the twelve participants of the study were male e-waste workers with experience in informal e-waste processing extending from two to eighteen years. The wide range of experience in informal e-waste work among the participants provided space for diverse perspectives. Women were not found directly involved in e-waste activities at Agbogbloshie. However, they were found providing indirect services such as selling food and water to the male e-waste workers on the site. Respondents' ages ranged between 20 to 43 years. Comparing the reported ages with the years in e-waste work revealed that most of the participants began the work at their tender age. It was part of the study plan to include children, but no child was found working with e-waste during the entire period of the fieldwork. Out of the twelve respondents, eight were married with at least a child whereas four were single. Two out of the four single participants disclosed having at least a child with an unmarried partner. This means that almost

all the participants have people alongside themselves to take care of. A general overview of respondents' characteristics is shown in the table below.

Table 1: Participants' Details

Participants' False Names	Age	Hours of work	Level of Education	Marital Status	Number of Children	Years of work	Role in e-waste processing
Adam	27	10	No Education	Married	4	10	Buyer/Dismantler
Basit	43	12	No Education	Married	3	18	Collector/Dismantler
Alhaji	24	10	JHS	Married	1	3	Buyer/Dismantler/
Mukass	33	13	SHS	Single	0	7	Buyer/Collector
Fuad	22	12	JHS	Single	0	2	Burner
Faisal	23	10	No Education	Married	1	10	Buyer
Babanmu	27	13	JHS	Married	1	7	Burner
Anyass	28	9	No Education	Married	6	10	Buyer
Nurudeen	20	9	No Education	Married	1	6	Buyer/Dismantler/Burner
Latif	21	10	No Education	Single	1	5	Burner/Dismantler
Habeer	41	11	No Education	Married	5	12	Buyer/Dismantler
Aafiq	26	11	JHS	Single	2	4	Buyer/Dismantler/Burner

Informal e-waste recycling entails four activities including collecting, dismantling, burning and buying of recovered resources from processed e-waste. Six of the respondents played dual role in e-waste processing, two respondents were involved in three of the activities, whereas the remaining four respondents took part in only one activity each. The activities an individual undertake determines his position and opinion about the work including, the number of hours he spends daily. The minimum working hours a day among the participants was 9 hours and the maximum of 13 hours. It was found that scavengers and burners of e-waste spend more hours at work than those involved in other activities. Five out of the twelve respondents had a formal education with only one person completing Senior High School (SHS) and the remaining four were Junior High School (JHS) graduates. All the respondents originated from the northern part of Ghana and spoke Dagbani as their principal dialect. This implies that all the participants were migrants and will therefore take part in the recycling activities regardless of the dangers to meet the demands of their present locations.

5.2 A typical Working day of Informal Recyclers at Agbogbloshie

The introductory question of the Problem-Centred Interview conducted with informal e-waste workers at Agbogbloshie was expected to give e-waste workers an opportunity to narrate their daily activities, including the benefits, environment and human health consequences. It was found that the daily routine of recovering valuable resources from e-waste by Informal e-waste recyclers at Agbogbloshie varies among individuals and largely depends on the role individuals play in e-waste processing.

Those involved in collecting e-waste were found to begin their day with gathering e-waste from residential areas and beyond. Mukass, a 33-year-old e-waste collector and buyer explains: 'I roam a lot every day in such of this condemn goods (e-waste) you see around us. I leave here (Agbogbloshie) as earlier as possible and travel to other districts outside Accra (sometime) to get these materials from households and abandoned ones. I return later in the evening to stock my goods and then leave to my room which is close by.' This shows that households are the main destination for scavenging e-waste in Ghana. Other reported places were Ghana's port and harbour and second-hand repairers' shops because, this are primary destination of e-waste imported from developed countries.

E-waste buyers and sellers begin their day with contacting their suppliers and customers. Aafiq, a 26 years old e-waste worker, reflected on how he begins his day and asserted 'Work for me starts even before I leave my home to this place. I begin making and receiving calls to make arrangements ahead of the day.' This revealed that the kin competition among informal e-waste traders required that you call your client in advance to secure your portion of the collected or recovered items. Beginning a day from where work stopped the preceding day is something common among e-waste workers daily routine. Alhaji stated this in describing his day 'When I come out here early in the morning, I first check on the materials I bought the previous day to retrieve valuables from them. Then I separate those to be burnt from that of the metals and then sell to the large-scale buyers around here.' This makes it easy for them to complete already started activities before they endeavour to take up another set of activities.

Dismantling and burning were the main processes of recovering valuable resources from e-waste and constitute the core daily activity of most e-waste workers. Dismantlers begin by physically separating different aspect of the e-waste into its distinct parts with their hands. Those that cannot be manually parted are taken up by the burners for burning process. That notwithstanding, some e-waste workers take part in all the activities. Unexpectedly, e-waste

workers were found taking a breathing space between activities to relax and connect to their God through their daily Islamic prayers. Alhaji contributed to this claim with the following comments 'We (me and my boys) normally go for a break at 12 and return immediately after the noon prayers to continue with buying and dismantling.' Additionally, recreational activities were also considered part of their daily routine. Respondents reported taking part in amateur football activities before the day ends. Babanmu, a 27-years young man involved in burning of e-waste, offered '…Later between 5 and 6pm, I join my colleagues to go and play football after that I return here to shower and proceed home to eat and rest.' This revealed that e-waste workers were not attached to their work for the entire day but do have time for other activities beside their work. That notwithstanding, Basit, Mukass, Nurudeen and Habeer did not report any recreational activity. This could be attributed to their age together with the responsibility of taking care of their children at home.

It was expected that e-waste workers without been asked will bring up issues related to environment and human health. However, none of the participants made mention of the daily environmental and human health risk of their work before been quizzed. Such a deathly silence by e-waste workers could support the claim that e-waste workers in their attempts to raise money and take care of the financial needs have lost their sense of caring for the nature and others (Ehrenfeld, 2008). Correspondingly, issues about the amount of money generated in a day from processing e-waste was not included in their initial narratives. The general stillness about the rewards of their work revealed their disinclination to discuss the income they generate from their work and therefore, any reported income from them should be treated with caution.

5.3 Decision to Start Informal Recycling of E-waste

Understanding e-waste workers views on their activities would be incomplete without probing the pushed factors. This theme, however, emerged from participants' response because it was not in the initial interview plan. The decision to take part in e-waste processing varies among e-waste workers at Agbogbloshie. Generally, respondents stated unemployment, colleagues' influence, poverty, school dropout and family background as some of their reasons for working in the informal e-waste recycling business.

Adam, who does not participate in burning, takes on their contenders: 'And when some are here talking about pollution and all that, they forget that there are no jobs for us to do and some of us have no skills to do any other work…We have to survive irrespective of the pollution…' Such a cruel pursuit of means of survival by Adam pointed to the fact that the main reason for

taking part in informal processing of e-waste is the lack of acquired skills to receive employment in the formal sector. On the other hand, there are limited job opportunities for those who have strived to learn skilled jobs. This capability deficiency together with poor strategies to create more jobs for individuals (Sen, 2001), after taking up some time to gain skills, pushed many into informal activities.

The affluent life style of age groups involved in the business of recycling e-waste informally when they return to their various communities in the villages, was another motivational factor that pulled people into e-waste work. Anyass, a young man of 28 years of age with no formal education originating from a typical village, offered: 'I got involved in this work because, my friends will return to the village from the city (Accra) after working in the e-waste business for some time supporting their family in diverse ways and that made me stop following my dad to the farm and joined them here in Agbogbloshie.' It was evident from respondents' characteristics that, they all originated from the northern part of Ghana and occasionally visit their families after a long year of work. The progress seen in them pushed those who are currently in the village to move to Agbogbloshie in search for greener pastures.

Latif and Aafiq were influenced by their colleagues to join the e-waste business after an unsuccessful career. The seasonal nature of farming which is the dominant source of employment to the rural dwellers also contributed to the decision of Adam, Nurudeen and Habeer to move to the city for e-waste work. Almost all the interviewed e-waste workers reported been pushed by the poor financial status of their families. Faisal, a 23-years old married man, claimed 'Family responsibility is one major thing that is keeping me in this work...' Similarly, Adam, a father of 4 children who got married at the age of 18, furthered the claim '…To ease the burden on my family I adhered to calls to come over here to find a job.' Family responsibilities, especially that of parents could push young men in several activities of generating money because children in Ghana are considered insurance to old age and therefore, expected to take charge of their parents' needs including the financial ones.

Nurudeen, the youngest among the respondents with 6 years' experience in e-waste work, reported taking over from his father. He offered 'I have been here with my dad who is no longer working here and has return to the North to do farming. I remember my father use to do this work to take care of us and now that he is no more here, as the first son who has been with him, I accepted the mantle to continue from where he stopped.' This points to the intention of many to nurse their children to take their place when they attain the age of withdrawal.

5.4 The Economics of E-waste Processing

Another theme which appeared in numerous conversion with the participants was the monetary benefit of informal e-waste processing. It was established from participants' responses that money was the principal reason why they were involved in e-waste processing and was accorded significant importance. Informal e-waste recycling has become a source of urban livelihood, financial capital and an opportunity for young people to raise money and take care of their needs and that of their families.

Basit, a 43-year-old man with 18 years' experience in collection and dismantling of e-waste, succinctly revealed '…the monitory benefits of this job are endless.' Similarly, Latif with a lesser experienced compared to Basit expanded on this assertion by giving the exact benefits. He narrated 'It serves as our means of livelihood regardless of how others may see the work.' Working in the informal e-waste processing industry according to the accounts of the e-waste workers has served as a means of securing necessities such as food, water, shelter and clothing for many people. Informal processing of e-waste is considered by many as an established and realized route to ensure their survival in Ghana's capital.

It was obvious that the benefits of processing e-waste informally were enormous, with some workers extending beyond meeting their basic needs. Basit, Mukass, Latif and Habeer reported they have garnered some assets in addition to meeting their daily needs. Surprisingly, Latif, at the age of 21, claimed: 'I have a piece of land back home that I'm putting up a structure on, so that in future when I return home, I will lodge in there with my family.' This is a great achievement among his age groups, since he has no formal education. Land and building were the most reported properties among those who have gone beyond their basic needs. However, Mukass disclosed 'Few years in the business I own a motor bike and I live outside the market being able to pay my rent and take care of my personal needs.' One of the difficulties in Ghana's capital is having a personal means of transport and being able to secure and pay for a descent accommodation. Therefor the ability of Mukass to possess a motorbike and pay for his rent proves his financial success. Others, such as Faisal, reported sleeping at the site in a booth when he stated 'I have my kiosk here in just a stone through from this place. So, I usually don't report to work early…'

Despite the lucrative nature of informal recycling of e-waste, Alhaji and Mukass reported occasional losses and considered that as part of the business. Alhaji, who takes part in 3 of the four activities, bewailed 'I sometimes make losses as well but at least I do gain something little

to cover up for my daily up keep…' However, Fuad, who at the age of 22, has changed no less than two different jobs, considered informal recycling of e-waste more lucrative than his previous jobs despite the occasional difficulties. He offered 'Even though, I am few years in the business and do make some losses on some days. If I compare the money I get with my previous work, it is still better than my previous business.' This shows that e-waste processing is not the only informal activity that e-waste workers have explored in effort to raise money. Additionally, it pointed to the fact that e-waste is often more lucrative than other informal activities and therefore if care is not taken, abrupt movement from unsuccessful informal activities to e-waste recycling will occur.

Informal processing of e-waste is a source of financial capital for many to pursue their desire careers. Mukass, Babanmu and Anyass contributed to this assertion. Mukass, who could not continue his university studies due to financial problems, now spends about 13 hours every day working with e-waste. He revealed 'I am a university drop out. I drop out about 7 years ago because I couldn't raise enough money to pay my fees. So, I came here to work and raise enough money to continue with my studies.' Notwithstanding this good intention, Mukass remained in the job for seven years which requires clarification. He explained 'since I'm securing a lot of benefit from this business, I developed even greater appreciation for the job and that is why I have stayed in up to 7 years.' This means that the intention of most e-waste workers is not to remain in the activity forever.   However, they find it difficult to pull out due to the financial benefits. Babanmu and Anyass stated they were not ready to switch or stop the work any time soon.

Faisal, Nurudeen and Aafiq are amassing the benefit of their investment in other sectors with the money they raise from informal handling of e-waste. Faisal exposed 'In fact, I have been able to buy two tricycles motorbike engaged in transporting goods from one place to the other in this market. I could not have achieved this without this work.' Accumulating money for investment in other activities is mostly accomplished through proper savings of e-waste workers earnings. Aafiq confirms this when he declared 'I have learned to save money which is paramount if anyone wants to invest.' The difficulties of accumulating money among individuals, led to the decisions of many e-waste workers to resort to saving their money with financial institutions. Faisal revealed 'I raise money through savings. Some microfinance operator constantly come here to persuade us to save/invest our monies at the various institution. So, one day I decided to start saving and it has been helping me so far.' It was clear

from Faisal's narratives that this choice was influence by several occasions of wheedling by the financial institutions.

Immediate and extended family members were the major beneficiaries of the money accrued from e-waste work. All participants of the study reported how they support their families in diverse ways. Faisal, a 23-year young man who spend 10 hours at the e-waste processing site every day, disclose how their participation in e-waste work has helped them redeem the favours of their parents and family members 'This work makes our parents and others back in the village appreciate us because we are working hard, and we use the money we get to cater for our families. It makes others respect us when they realise we can make huge investment on our family and in other aspects.' Parents can meet the demands of their communities and actively take part in festive occasions from the remittances of their children working with e-waste.

E-waste workers have been able to establish business activities for their partners and provide their children with the best of education, which they were not lucky to get, from their earnings. Basit, a 43-year-old man who has been in e-waste for 18 years, claimed 'My wife is doing well with her business I helped her set up and my three children are having the best of education. I am capable of solving issues of my extended family without looking back.' Similarly, Babanmu, who is much younger compared to Basit, enumerated the mother, wife and child as the main heirs of his earning. He offered 'My mom and wife are currently the most important people in my life and they are the one's currently benefiting from my earnings. My ability to feed them and provide their needs and pay for my little son's school fees is what is keeping me in this job.' The participants considered their engagement with e-waste financially useful.

5.5 Human Health Impact of Informal Recycling of e-waste

Health related complication is one of the many challenges of processing e-waste informally. Several health-related problems ranging from working conditions, common sickness, most dangerous activities, mode and cost of treating sickness among others were the several categories that emerged from the coded data. The degree of safety or danger envisage in working with e-waste informally varies among e-waste respondents.

Considering the several responses of participants on the dangers of their activities it could be resolved that all the participants considered the working conditions as perilous for human. Fuad, Faisal, Babanmu, Latif and Habeer considered the activities of recovering valuable resources from e-waste as potentially fatal. The voice of Habeer, the second most experienced

e-waste worker with about 12 years in the work, softens almost to a whine in explaining the extent of the threat. He said: 'It is life threatening not only to those inhaling the smoke and feeling the heat during the burning process but including those in dismantling and those doing the offloading of heavy metal especially.' This corresponds to the reflection by Fuad, who is just 2 years old in the e-waste business 'Hmm (sighs), I would say deadly.' Comparatively, it could be argued that both the newcomers and veterans in informal e-waste recycling on the site share similar opinion regarding the dangers in their recycling activities.

Due to the hazardous nature of some of the activities employed to recover valuables, many people shift segments of the process to others more skilled in those activities. Alhaji, who is married with one child and currently involved in buying and dismantling, offered 'It is not something I want to encounter every time because of the heat and smoke associated in the process. So, I usually do more of the dismantling and forward it to someone more experienced to handling the burning. The smoke emanating from the process is highly dangerous and not a good site for one to stand.' Habeer after an advice from a medical practitioner to leave the job decided to engage in those that in his opinion are safer. He revealed: 'The doctor recommended that I quit the job if I want to live longer and that is why I stopped the burning about 6 years ago and rather engaged in dismantling, buying and selling.'

The most common sicknesses that affect e-waste workers were explored. It was found that the health problem of an e-waste worker depends on the activities the person is involved in. Body pains or weakness, coughing, headache and malaria among others were the ailment narrated by most of the participants. Respondents who contributed to this discussion were Adam, Alhaji, Fuad, Babanmu, Anyass and Habeer. Anyass a young man with 6 children complained 'the sicknesses involved in this work are vast. One of them is coughing and this I understand others risk being infected. Others have had fever and it is not good. You visit them at the hospital and you feel like resigning from the work.' On the other hand, Basit and Aafiq ages 43 and 26 years respectively bemoaned their inability to achieve or maintain sexual erection for intercourse and a decrease sexual desires due the work. Basit revealed: 'My problem now is my waist and my wife has been complaining. I am not able to perform like I use to. My strength has deteriorated, because I hardly last long with my wife and that's how this work has affected me, but I must say is worth it.'

Submission by Mukass, Faisal, Nurudeen and Latif conflicts the reported human health complications. They unanimously claimed not encountering any ailment beyond fatigue, which

in their opinion is usual considering the nature of their work. Faisal, who spends 10 hours of work daily, proclaimed '…but, for me I don't even fall sick and this work hasn't given me any sickness yet.' Similarly, Mukass, who works 13 hours daily, maintained 'For the entire years in this business, I have never encountered any form of illness aside body weakness and tiredness which in my view is normal.' This shows that the health experience of e-waste workers varies with some reporting observable defects whiles others remain ignorant regarding the effect of informal recycling of e-waste on their health.

Though all activities employed to recover valuable resources from e-waste are perilous, the risks in some activities are more severe than others. Participants views were explored to ascertain their assessments on different activities and those that are more harmful. Dismantling and burning were considered dangerous. However, offloading which was not identified as one of the activities of e-waste processing before the interviews was considered by participants as the most dangerous activity among all other activities. Alhaji, a Junior High School dropout who is involved in three of the four recorded activities namely buying, dismantling and burning, observed: 'Burning, dismantling and offloading from trucks. You see these three are dangerous. Blast do occur during the burning process of retrieving the valuables, whiles the possibility of getting injured is high when dismantling TV sets…It is risky my brother.'

Confirming the complication in offloading electronic from trucks, Basit shared his experience. He explained 'With my previous experience in offloading, I will rate it as dangerous above all. Over here we don't have the machines to offload those electronics and we resort to doing it manually. If care is not taken during the process, one risk being injured.' Contrary, Fuad, with just 2 years' experience in burning, considered burning the most perilous activity in recovering valuables from e-waste. He disclosed 'With my experience, I will say burning. Some parts of my body have been affected by the heat from the burning that we do. My palms are hard and dark. You can also see some of my fingers are swollen.' From the two-lived experience offered by Basit and Fuad it was realized that e-waste workers have varying experiences regarding the most dangerous activity, which is influenced by the role of individuals in e-waste work.

Protective measures were not completely abandoned by the e-waste workers at Agbogbloshie. E-waste workers used simple materials including their personal clothes and heavy boots to prevent themselves from the dangers that bedevilled their activities. Latif a dismantler and burner contributed to this claim with the following personal experience 'When I am doing the burning, I always have my nose covered with clothes to prevent the smoke from entering my

system that will give me excessive cough and chest pains like you mentioned.' Considerably, it could be reasoned that this effort by Latif has contributed to the reason why he has not recorded any health issues and therefore, considered the work as not having any health effect.

Respondents were asked to relate stories of colleagues who suffered severe injury during their work. Six respondents Adam, Basit, Fuad, Faisal, Babanmu and Latif, reported witnessing severe injuries by colleagues, which in most cases have resulted in the victims giving up informal e-waste recycling. Adam narrated what happened to his closest friend in the business. He narrated: 'One of the guys I was working with a year ago unfortunately used the hammer on himself and it fractured two of his fingers…, he has stopped working here and now engaged in the dispatch riding business popularly known as "Okada".' On the other hand, Alhaji, Mukass and Anyass accounted stories of people they were told have underwent severe injuries on the job. Habeer and Aafiq did not respond to the question whiles Nurudeen after 6 years in the e-waste work maintained 'honestly, I don't know of any. But sometimes people do get injured and they even travel to the North to seek further treatment locally.' Despite this witnessed and reported injuries, e-waste workers were not ready to give up their work.

Respondents were found to use different health care providers at various stages to cure diverse injuries that arise during the informal treatment of e-waste. The most reported source of treatment were pharmacies, clinics, hospitals and sometime self-treatment. Considering the individual narratives of e-waste workers regarding their source of treating ailment and years of working with e-waste, it was resolved that e-waste workers decision to seek professional medication depends on how long they have worked in the business. Fuad and Alhaji with less than 5 years' experience in the work each, resorted to very basic way of treatment. This was what Alhaji offered: 'On some occasions, I use the traditional treatment. especially, with the body weakness and headache which I suspect sometime could result to a fever.' On the other hand, Adam and Habeer with 10 and 12 years of experience in e-waste work respectively indicated they seek health treatment from pharmacies.

However, the decision on which method of treatment to adopt depends on the perceived and severity of the injury or sickness. Some e-waste workers will resort to self-treatment if in their view the sickness is minor. It was apparent that another most important determinant of source of medications was the cost involved in seeking health care. Fuad, who has not accrued much from the business after 2 years of participation, explains why he resort to self-treatment. He disclosed 'When one gets sick like malaria or something, the person spends a lot of money at

the hospitals or clinics and that is the reason why I normally buy pain killer from the pharmacy.' This implies that medical cost discourages most e-waste workers from seeking professional medical treatments. The primary health care generally known as National Health Insurance Scheme (NHIS) was meant to resolve this problem. However, Habeer bemoaned his experience after subscribing to the scheme. He orated 'I will use myself as an example because, I was admitted to the hospital for almost a month. And during that period, I spent a lot of money paying medical bills because the National Health Insurance (NHIS) card doesn't cover.' This revealed why many e-waste workers are reluctant to subscribe to the scheme.

5.6 Environmental Health Impact of Informal Recycling

Respondents' opinions on the effect of their activities on the environment were explored. Indeed, all the research participants confirm their activities are harmful to the environment. However, air pollution resulting from the burning was the only environmental effect identified by e-waste workers. Fuad, a burner with 2 years in e-waste work who spend 12 hours of work daily, observed: 'As for air pollution in relation to the burning that we do, definitely not right but where else can we burn these items? It's not good but we don't also have an option.' It was conclusive that Fuad and Babanmu considered the burning as the only available option for their survival and wished people could live to accept that.

Similarly, the submission by Faisal and Latif suggested that burning is a component of their activities, which is for a right course. Faisal postulated; 'The pollution I may say is part of the work because, you cannot set on fire and not see smoke. That is impossible…' Latif expanded this and referred to activities farmers employ to prepare their lands for cultivation. He recalled: 'When I used to go to the farm with my dad, there are times were the farms has to be burnt to make the lands fertile for planting, that is also air pollution but in the right direction. So, we are not polluting the air for nothing.' This suggests that an economic activity such as informal recycling of e-waste, will not be considered damaging if those involved in such an activity have something equally harmful to refer to.

Water pollution is another reported effect of informal recycling of e-waste. However, this claim was rejected by e-waste workers. None of the participants accepted the fact that their activities have damaged local water bodies. Aafiq who has been working on the site for 7 years made this clear when he submitted: 'Honestly this work doesn't affect any water body.' He continued his submission by rejecting the availability of water bodies 'We don't even have any here except the Korle Lagoon and the sea at Korle-Gonor. And if you are talking about the Odwa

drains, that is no water body. It is a drainage system that connects with other drains in the city through this place into the Korle Lagoon. So, our activity doesn't affect any water body.'

Correspondingly, Habeer thinks the lagoon is nowhere near their activities. He revealed 'the lagoon is not closer to us and so I wouldn't say our work affect the water bodies.' He made it clear that they are rather affect by the unattended drainage around them. Faisal, an e-waster buyer, detected that municipal authorities would have confronted them if it is true their activities affect local water bodies. He assumed '…I also think if there is anything like that, the authorities would have ensured that we don't operate here again.' This suggest that officials in charge of controlling the spread of this informal activity are not enlightening e-waste workers on the dangers of their activities. Regarding the issue of blocked drainage, Submission by Adam revealed that some of the e-waste workers are contributors to that effect. He stated 'Some time ago, some of our people when they sell their recovered valuable resources from e-waste, they usually dump the unwanted materials into the drainage system...' He, however, quickly transferred the blame by adding that 'But I don't see how that affect anything because already, the gutters are filled with dirty water...' This point to the fact that e-waste workers may try to occasionally, cover their unfriendly activities and that of their colleagues by shifting the blames onto others.

Respondents opinions about the effect of their activities on other informal workers and residents on the site varied. Only Adam, Anyass and Aafiq considered their work harmful to people who are not directly involved in their activities. Among the 3 respondents who admitted their work has effect on their neighbours and passers-by, only Aafiq showed some remorse for them whiles Adam and Anyass shared a mere perception. Aafiq bemoaned: 'We are making money from this work to feed ourselves and our families whiles others (our neighbours) and other passers-by are affected by the smoke (polluted air) which may cause them some sickness.'

Respondents did not envisage the effects of informal processing of e-waste on the soil. However, Adam, Basit, Alhaji, Mukass, Babanmu and Anyass reported sanitation issues whiles Faisal, Latif and Aafiq stated oil from mechanical works as some of the activities by other people that are detrimental to the soil and sometimes makes movement in and around the market difficult. Regarding the sanitation problem, Alhaji explained by proposing 'If you look behind the shade in front of us, you see the heap of refuse dumped there by some unknown persons… at a point, it became worse and people who stayed around were exposed to mosquito bites and the sticking smell that comes out of the refuse is unpleasant for the inhabitants over

here.' Mukass briefly helped in understanding the course when he censured 'There is nobody doing the checks neither is a refuse disposal container available for the people to drop in their trash.' With reference to mechanical oil, Faisal disclosed what goes on. He queried 'You know there are a lot of informal professions here and one of those is mechanical works. What happen is they splash dirty oil (unwanted oil) from the engines on the floor, which changes parts of the workshop and it surroundings black.' However, he was not sure how the unmanaged oil affects the soil and those walking on it although he believes the oil is not chemical free. It was concluded that e-waste workers perceive air pollution as the only effect of their activities on the environment whilst they considered events of other informal workers as harmful to the soil.

5.7 Respondents Views on Money Against Environment and Human Health

It was evident that environment and human health impact of informal processing of e-waste were not anywhere near the monetary value e-waste workers attached to their work. Regardless of the several dangers and effects of their activities, almost all the e-waste workers settled on the need to make money. Faisal, a father of one child, disclose this when he stated 'Money you know is very important to us and we need it to solve our problems. But what do you get from this dirty water in the drains?' He proposed a description for their work when he said: 'The definition of our work in other terms is polluting the air for money.' Equally, Habeer a father of five children comparatively reasoned 'The risk involved in this work is high, but the money is equally important, and I think it is worth it.' Acknowledging the risks without intending to quit the work demonstrate how the need to make money has supersedes e-waste workers concern for their lives and the environment.

Based on significance participant accorded the monetary benefit of their work, it was relevant to understand how it is prioritized relative to environment and human health effects. It was revealed that more than half of participants considered money their upmost. Human health and on one occasion all three were accorded equal ranking. Fuad, Faisal, Babanmu, Anyass, Nurudeen, Latif and Aafiq stated money as their topmost priority. The views of Aafiq will represent this group. Aafiq established '…money is what I would consider first and as for the pollution, if you ask anybody working here, the person will tell you it is not something we consider when money has to be made.' Alhaji and Mukass specified money and health while Habeer stated only health. None of the participants mention environment, nonetheless Basit stated all the three are important although Adam did not take part in the ranking. Considering the significant participants attached to the financial gains of informal processing of e-waste, it

could be argued that financial difficulties and to a more larger extent luck of means of livelihood undermine efforts to create a sustainable world. In accordance with Ehrenfeld's assertion, e-waste workers demonstrated a rational behaviour that made them self-interested individuals who were much concern about meeting their financial demands. Those who found it difficult to categorically mentioned money considered all or two of the three important but still maintain the need to raise money to meet the demands of urban life.

5.8 Alternatives to the current method of processing e-waste at Agbogbloshie

Participants' opinions about alternative methods of processing e-waste were examined. A deep ambivalence was found in participants' estimation of alternative ways of processing e-waste. On one occasion participants indicated they will accept alternatives whiles on other occasions they revealed the possibility of opposing alternatives. Adam, Basit, Alhaji, Fuad, Faisal, Babanmu and Nurudeen actively took part in the discussion about alternatives whereas Mukass, Latif, Habeer and Aafiq were silent. To appreciate the irregularities in participants' suggestions of alternatives, the account of Nurudeen will be examine in detail.

Nurudeen, the youngest among the participants with 6 years' experience in the work, admitted that the current informal way of processing e-waste is unsafe and harmful to their health. He acknowledged: 'I can only say it is very dangerous to our health, considering the processes involved in every aspect. The burning is not healthy, the offloading is very risky, and the dismantling can result to serious injuries. It is a difficult job.' He added when he was further asked if it is the best way 'No, because, this certainly cannot be the way when people are getting injured and damaging parts of their body every day. I believe there are better and efficient methods just that, we have not explored those options yet.' At this point his recommendations for alternatives were explored. He suggested 'machines you know, that would load and offload our goods here. Also, the burning aspect which you people consider to be polluting the air…but we cannot afford it now.' With such constructive suggestions from Nurudeen I explored his opinion on how introducing machines will affect his work. Below was what he said:

'I think it will affect my work positively such that I would not invest much energy in doing the dismantling and I would not be experiencing all this body weakness and tiredness all the time.' It is obvious from the above submissions that Nurudeen was in support of alternatives such as machines for offloading and burning of e-waste. Since Nurudeen has no formal education and training to use these machines it was imagined that following what he suggested will require an establishment to take those responsibilities. I further explored how he will react to a call to

submit his collected e-waste to this establishment. His response on that reverted all his proposals for alternative. He argued 'That will not be an innovative idea at all. I will consider it another way of putting us out of business. There is no going to be any profit for us compared to when we dismantle and sell it to them...So, for me, I will vehemently oppose and resist that move, and I know my other colleagues will equally do same.' The mismatch found in the narrative of Nurudeen, which was evident in the response of other participants, revealed that the position of the informal workers should be considered during alternative initiatives.

Suggestions on alternatives by the e-waste workers revolved around the possible ways of containing the smoke during burning. Faisal suggested '…If there is a mechanism whereby the burning could be done in something like the locally built ovens for bread baking such that, the entire smoke will be maintained in there.' This sustains the assertion that air in their views is the most affected by their activities. Basit the veteran among the participants has a different view all together. He claimed: 'There are no other ways apart from the methods we are using. Sometime ago, a company was established to assist us in retrieving the valuables, but our people later resisted the service of the company because they weren't getting value for money.' For Basit, informal e-waste processing retrieves more valuables from e-waste than formal methods of using machines. On the other hand, Mukass is of the view that alternative suggestions could result in losing their jobs. He orated 'It will affect my work by putting me out of business. I would not be employed because, I do not have the skills to operate those machines or the innovation.' From this and the previous account it could be reasoned that alternatives to informal recycling should include expanding the capabilities of e-waste workers to enable them take active role in the new methods of processing e-waste.

5.9 Summary of Analysis

Six themes in addition to the respondents' backgrounds were identified from the interviews with e-waste workers. The analysis revealed that informal e-waste processing is still left for men. The daily activities of e-waste workers were influenced by their roles in processing e-waste informally. Several reasons were found to account for individuals' participations in the activities with financial background and family pressure being the main determinants. The monetary benefits derived from the informal handling of e-waste, in the views of the workers, surpass the environment and human health effects. Almost all the participants were not ready to trade the money accrued from their activities with anything. The benefits accrued from recycling e-waste informally has led to conflicting alternative ideas from e-waste workers.

Chapter VI
Discussion of Research Results

I was interested in discovering how e-waste workers at Agbogbloshie perceive their activities in relation to the monetary benefits, environment and human health. Knowing this offers a relative insight for researchers, as well as policy makers and non-governmental organizations concerned about the e-waste problem in Ghana. My aim was to conduct a study with findings that augment the body of knowledge on an internationally recognized e-waste site by incorporating the voices of e-waste workers, which has been previously neglected. Twelve (12) e-waste workers on the site were interviewed with the help of Problem-Centred Interview technique. Their responses were coded and put into categories with the help of a qualitative software known as NVivo Pro from which seven (7) themes emerged for analysis. This section of the study intertwines the findings with the research questions, previous literature and theory.

6.1 Connecting Results to Research Questions.

Environment and human health together with the financial impacts are key components of informal e-waste processing debates. Investigating how informal e-waste workers make meaning of their activities in relation to these three components and possible ways to merge the overlapping interest therein, is at the core of this study. The views of e-waste workers, regarding money, the environment and the human health impact of their activities and possible alternatives to reduce the adverse consequences whilst maintaining the benefits were explored. This was guided by two research questions answered in an interview with e-waste workers at their workplace. This section of the chapter relates my findings with my research questions.

6.1.1 How do informal e-waste recyclers perceive their recycling activities in relation not only to their financial needs, but also to their duty to protect their life and the environment?

This question was set to ascertain the views of informal e-waste recyclers on their activities in relation to their monetary benefits, environment and human health. The findings discussed represent how e-waste workers make meaning of their activities.

The findings of this study suggest that monetary benefits accrued from informal recycling of e-waste, is what pushes and retains people in that business. This was reinforced by numerous narrations from e-waste workers regarding how they were able to meet their basic needs and cover the needs of their families and children as well. The possibility of starting informal

recycling of e-waste without any substantial amount of money has made it a source of raising financial capital to start a new business or career, which require more funding. The endless financial uplift embedded in this activity has left e-waste workers with a dim notion of the adverse implications of informal recycling of e-waste on human and environmental health. Almost all respondents considered money as crucial with more than half of them stating money as their topmost priority when compared with environment and human health.

It was obvious that e-waste workers do not pay much attention to their health, although they admitted noticing several health complications due to working with e-waste. They disclosed chest pains, headache and body weaknesses as various health problems they experience. Sexual and reproductive health problems were also found in the accounts of some e-waste workers. Fatigues and tiredness that comes with the job were best considered normal by e-waste workers. Burning, dismantling and offloading of electronic from trucks were considered the most common injury induced activities. Some e-waste workers have resorted to safer activities in the process due to medical advice. Remedies for ailment among e-waste workers was determined by the perceived severity of the sickness and the cost involved in treatment. This shows that e-waste workers were aware of the human health problems of processing e-waste informally, but relentlessly ranked it the second thing to consider after money.

The only environmental consequences recognized by e-waste workers was air pollution. They were oblivious of the effect of their activities on water bodies and soil. That notwithstanding, several activities at Agbogbloshie by different segments of the population were pointed out as main contributing factors to soil contamination. From the analysis of the interviews with e-waste workers it was revealed that environmental health implications were at best considered normal and at worst unimportant. Only one person during the prioritization considered environment together with health and money as important. This shows that majority of e-waste workers do not perceive protecting the environment as part of their duties.

6.1.2 How can the adverse impact of informal e-waste treatment be minimized whiles retaining the monetary benefit?

With this question, I intended to gather suggestions from e-waste workers on alternatives that will help eliminate the adverse impact of informal e-waste recycling without compromising the financial gains.

Keeping to the views of e-waste workers that air pollution was the only recognized environmental effect, many recommendations from them revolved around ways to curb the

smoke produced during the burning process. Respondents made it clear that their way of processing e-waste is not the best, but that it is the only option they have available. They suggested establishing an enclosed place stocked with extra modern machines that can contain the smoke during the burning process. This useful suggestion from e-waste workers was reversed when they disclose their unreadiness to submit their gathered e-waste to the establishment for processing. Presenting their collected e-waste to such a company will in their views not fetch them more money compared to when they use their rudimentary means.

Equally, many considered the possibility of being put out of business since they may not have the skills to be recruited by the company. With reference to previous experience, e-waste workers disclosed that machines cannot retrieve as many resources as the rudimentary methods of processing e-waste. To this end, most of them claimed that bringing in machines will not work. Offloading of e-waste from trucks was identified as one of the dangerous activities on the site and therefore few participants suggested getting a machine that could help them with the offloading of e-waste and other metals from trucks. The uncertainties envisaged in the suggestions by e-waste workers points to the fact that alternative means of processing e-waste should endeavour to expand their capabilities in order to retain their positions in the business.

6.2 Connection to Previous Literature

In chapter two of this study, I reviewed literature on informal recycling of e-waste to assist position the study within the framework of existing publications. Studies discussed in the review will now serve us the lens for vetting my findings.

My findings resonate and expand the assertion by Agyei-Mensah & Oteng-Ababio (2012) that financial benefits of informal e-waste recycling influences e-waste workers observation on health risks to environmental effects. Environment and human health were not at the frontline of e-waste workers. My findings, however, contradicts the claim by Agyei-Mensah & Oteng-Ababio (2012) that some of the e-waste workers are ignorant about the health dangers of their activities. I found all of them aware of the health implications. Additionally, my study challenges the assertion by Agyei-Mensah & Oteng-Ababio (2012) that e-waste workers knowledge on health issues is mainly on accident related injuries. My findings revealed that e-waste workers are aware of other health issues such as sexual weaknes and breathing problems.

The findings of the study were in line with Asampong et al. (2015) conclusion that the cost of seeking health treatment from reputable health centres together with percieved severity of

ailment result in many e-waste workers using self or traditional methods of treatment. However, my findings revealed that such attitude is mostly among the new comers in the e-waste work. Additionally, my study complements the claim by Asampong et al. (2015) in discovering that e-waste workers remained adamant about subscribing to the primary health care scheme in Ghana known as National Health Insurance Scheme (NHIS), because the scheme does not cover all forms of sicknesses. The unreadiness of some e-waste workers to visit hospitals during their sick period made them consider contributions to the health care as a waste of resources.

Capital accumulation through savings was found to be higher among e-waste workers in Ghana (Akormedi et al., 2013; Amankwaa, 2013). The findings of my study expanded this claim by pointing out that the accumulated money from those savings are invested in other informal sectors and careers. Prakash & Manhart (2010) and Amankwaa (2013) established that the money generated through informal processing of e-waste is used to support people who are not directly involved in the activity. The two studies, however, could not ascertain those who receive the supports and the reasons for the support. My study in addition to maintaining those claims found that financial needs of families were in most cases the main reason why people were involved in e-waste work. Parents, wives and children were the most common beneficiaries before siblings. The investment in children is mostly in relation to their education whereas wives in most cases are supported by their husband working in e-waste to start their own informal trade. Parents on the other hand received remittances from their children to meet their basic needs and take part in communal activities and religious festivities.

The findings confirm what Agyei-Mensah & Oteng-Ababio (2012) found in their study when they examined e-waste workers perceptions on environment. However, my study extends this further by exploring other activities that Agyei-Mensah & Oteng-Ababio (2012) found e-waste workers reffering to as 'damaging the environemnt'. The site is not left to only e-waste workers and therefore, acitivities such as spattering of engine oil on the soil by mechanics and uncontrolled dumping of refuse are cosnidered more dangrous to the environment. Similarly, E-waste workers' perceptions on the effects of their activities on soil does not correspond to the findings by Caravanos et al. (2013) and Chama et al. (2014) that the traced metal elements in the soil at the site, due to informal e-waste processing, exceeds international standards. Claims by Prakash & Manhart (2010), Otsuka et al. (2012) and Chama et al. (2014) that activities of e-waste workers affect the water bodies in and around Agbogbloshie are challenged by my findings.

6.3 Connection to Theory

Sustainability and Capability Approach were the explanatory framework of the study. Whereas the findings of the study support Ehrenfeld's and Sen's idea of sustainability and Capability approach respectively, aspects of the findings debunked the assertion by Ehrenfeld. This section of the discussion chapter will connect the findings with these frameworks and identify where it maintains or disprove the assertions of the concepts.

Ehrenfeld (2008) reasoned that the modern cultural structure has made the rational to make more money to meet our needs more relevant than the need to protect our lives and the environment. Environment for example is considered an external entity and therefore, Individuals sudden wish for money to achieve certain daily needs is favoured over land, air and water contamination. The findings of my study upheld this claim because, e-waste workers revealed that money is more important to them than the environment and their health. Their ability to meet their needs and that of their families is what gives them a sense of belonging to their communities and therefore will do anything to achieve that. However, findings of the study debunked Ehrenfeld's suggestions that edifying our human uniqueness and sense of doing the right thing tamed by modern cultures will help us overcome these challenges. This is because, the need for money did not tam e-waste workers inherent nature to care for the environment and others but overrides them. Thus, e-waste workers are aware of their need to protect their lives and the environment but are not ready to allow that needs to endanger their sources of income. Therefore, enlightening people on the need to protect their lives and the environment will be hardly successful, as far as their financial needs remain unattended to.

The findings of my studies upheld the assertion by Sen (2001) that policies should be geared towards empowering the capabilities of individuals to allow them to do what in their views will contribute to their well-being. It was evidence from the findings that alternative ways of processing e-waste that will undermine the ability of the current e-waste workers to participate in e-waste processing will not be successful. E-waste workers are not ready to lose their position in the broader chain of e-waste recycling and therefore the best policy will be the one that expands their capabilities and help them take part in a more sustainable ways of processing e-waste. The findings of my study upheld the assertion by Sen that enlisting a set of capabilities in not necessary and should be left to the situations at hand. This is because, most of the e-waste workers do not have basic education and therefore, having an established list of capabilities that requires for example, formal education would not be useful to them.

Chapter VII
Summary, Conclusion and Recommendations

Knowledge on the perception of informal e-waste recyclers regarding the effect of their activities on the human-environment systems is still limited. As a young researcher with much interest in how processing desuetude technological gadgets informally undermines the quest to create a sustainable world, I was compelled by the absence of informal e-waste recyclers voice in the literature to conduct this study. I explored how informal e-waste workers make sense of their activities in relation to the monetary benefits, environment and human health effects using qualitative research approach. Additionally, the views of informal e-waste workers on how to reduce the adverse effect of their activities whilst maintaining the financial benefit were explored. 12 e-waste workers at Agbogbloshie were interviewed using Problem-Centred Interview technique to obtain primary research data for analysis. The theoretical background of the research were the concept of sustainability and Capability Approach. The discoveries coupled with the discussions outlined the perception of informal recyclers on their activities and possible alternatives they think will help reduce the negative effect of processing e-waste informally. In this chapter, I present a summary of the findings and conclusion, the usefulness of the findings in practice, limitations, and rationalize the direction of future research.

7.1 Summary of Findings and Conclusion

The themes that emerged from the research data gathered to ascertain how e-waste workers perceive their informal recycling activities and possible alternatives were as follows;

- ➢ A typical working day of an e-waste worker
- ➢ Decision to take part in informal processing of e-waste
- ➢ The economics of informal processing of e-waste
- ➢ The health impact of informal processing of e-waste
- ➢ The environmental impact of informal processing of e-waste
- ➢ Money against environment and human health impacts
- ➢ Alternative ways of processing e-waste

The daily routine of e-waste processing was determined by the role an individual play in e-waste processing. The reported roles among e-waste workers were Buying, collecting, dismantling, and burning of e-waste. The sources of e-waste were mainly residential areas, electronics repairers' shops and Ghana's port in Accra. The reason to engage in e-waste processing extended from unemployment, poverty, family burden and school dropout, among

others. The financial benefits of processing e-waste informally were the main reasoned people got involved in the activity. E-waste workers were able to meet their financial needs with the money they accrue from their work. Other beneficiaries of the earnings were parents, wives, children and siblings. The relevance e-waste workers accord to the money they generate from their activities overrule the environment and human health impacts. Regardless of the witnessed and reported casualties on the site, health effects of informal e-waste recycling were second to money. Offloading of electronics from trucks on the site was considered the most dangerous activity together with dismantling and burning. Injuries and sickness recorded are cuts, headache, body weakness, sexual and reproductive problems, among others. Cost of treating ailments undermines the ability of e-waste workers to seek professional medical care.

Air pollution was the only perceived environmental impact of informal processing of e-waste by the workers. This was because it was easy to make sense of smoke coming out of the burning process. E-waste workers were unhappy about the smoke, but at the same time not ready to give up the work. Water and soil contamination as a result of informal processing of e-waste were unnoticed among e-waste workers. They strongly dismissed assertions that their activities have effects on the soil and water bodies in and around Agbogbloshie. Correspondingly, e-waste workers pointed to poor sanitation and splashing of automobiles' oil on the soil by other informal workers as hazardous to the soil. Monetary benefits of informal recycling of e-waste among the workers is second to none. The importance e-waste workers attach to money has led to conflicting alternative suggestions. On one level e-waste workers were ready for alternative ways of processing e-waste on another level, they disclosed their intentions to oppose alternatives because they will lose their positions in e-waste processing.

In conclusion, my study using qualitative approached with conceptual guidance of sustainability concept and capability approach provides insight on how e-waste workers make meaning of their activities in relation to the monetary benefit, environment and human health. We have understood how e-waste workers balance the monetary impact of their activities with environment and human health effects. Also, it is now clear which of the three issues is most recognized and considered by e-waste workers. The study added to the literature that the economic burdens of individuals influence their views on their responsibility to protect their lives and the environment. Therefore, activities geared towards sustainability and enriching individuals' capabilities should not disregard their economic needs and background.

7.2 Implications of Findings for Practice

My study presented the views of informal e-waste workers at Agbogbloshie-a suburb of Ghana's capital. Their narrations developed a foundation of knowledge surrounding how e-waste workers make meaning of their activities relative to the financial, environment and human health impact. It is from the rich analysis of e-waste workers perception that I established my recommendations for practice.

The findings of the study will serve as guidance to understand the motives behind irresistible attitude of informal e-waste workers to give up their activities. Additionally, it was clear from the finding of the study that maintaining the financial gains of e-waste workers is crucial to the effectiveness of any successful alternatives on the site. This is because the financial burden of workers will not allow them to think otherwise and therefore any designed alternatives of processing e-waste should take the economic demand of the e-waste workers into account. Additionally, expanding the skills of e-waste workers will enable them take part in other economic activities and help prevent the spread of informal way of processing e-waste to other part of the city.

Additionally, the findings of the study have revealed the formed perceptions of e-waste workers on their activities which is useful in understanding how to handle their plight. These established views of e-waste workers cannot be erased overnight and will require continues cohesion between environmental taskforces and the e-waste workers. Constant education and seminars with e-waste workers and their leaders on the site will be relevant to taming such a strong perception among e-waste workers. Voluntary health checks at the site can also help get e-waste workers informed about their health status. It was revealed that e-waste processing is not the only informal activity on the site and therefore to get the cooperation of informal e-waste workers other activities on the site that are equally harmful should be addressed.

7.3 Limitations of the Study

Although the research process is considered successful with interesting findings, the research strategy is characterized with several challenges. The most obvious of these challenges is the issue of sampling. Due to the nature of informal processing of e-waste, most of the e-waste workers do not always stay at the site. Therefore, only those found on site during the three weeks of data collection were sampled for the interviews. An additional three weeks on the site could have helped resolve this challenge, but the researcher is limited by time and, also, not

financially capable of hosting the two interviewers for another three weeks. Moreover, the interviews were done at the workplace of participants and therefore other participants were able to listen to the response of their colleagues which may have influence their response as well. This however, did not affect the overall finding of the study since observable disagreement were found in their responses.

Another limitation of the study has to do with the conceptual framework. The ideas of Ehrenfeld and Sen regarding sustainability and Capability Approach respectively were the only concepts considered for analysing the result of the study. In relation to sustainability, most of the discussions by other scholars has nothing to do with the world views of people and therefore could not be added to Ehrenferecild's notion of sustainability. Capability Approach (CA) on the other hand was mainly on the account of Sen because Nussbaum, a significant contributor to our understanding of CA, is mainly concerned with producing a normative theory of justice. Although exploring the findings of the study with the views of two individuals without considering the broader notions of those concepts can be perceived as a limitation and therefore, recoded under the limitation of the study, it was done to suit the purpose of the study.

7.4 Recommendation for Future Research

My study contributes to the understanding of how e-waste workers prioritize the monetary benefit of informal recycling of e-waste with the environment and human health impact. The findings are best understood in the context of the twelve e-waste workers interviewed for the study. Transferability to other places should be done with consideration to the settings and situations at hand. The findings of my study offer a footing from which future research could be conducted. I therefore suggest the following four areas for future research.

➢ An ethnographic study on the monetary impact that includes diverse e-waste workers over an extended period.

➢ Theorize how our understanding of an economically damaging activity can assist in building a solution sustainable for the environment and those partaking in the activity

➢ Examining the main buyers and destination of the recovered valuable resources from the processed e-waste.

➢ Investigating the interactivity between e-waste workers and the environmental taskforce of Ghana.

References

Agyei-Mensah, S. and Oteng-Ababio, M. (2012) 'Perceptions of health and environmental impacts of e-waste management in Ghana', *International Journal of Environmental Health Research*, 22(6), pp. 500–517.

Ahmad Khan, S. (2016) 'E-products, E-waste and the Basel convention: Regulatory challenges and impossibilities of international environmental law', *Review of European, Comparative and International Environmental Law*, 25(2), pp. 248–260.

Akormedi, M., Asampong, E. and Fobil, J. N. (2013) 'Working conditions and environmental exposures among electronic waste workers in Ghana', *International Journal of Occupational and Environmental Health*, 19(4), pp. 278–286.

Amankwaa, E. F. (2013) 'Livelihoods in risk: Exploring health and environmental implications of e-waste recycling as a livelihood strategy in Ghana', *Journal of Modern African Studies*, 51(4), pp. 551–575.

Amankwaa, E. F. (2014) 'E-waste Livelihoods , Environment and Health Risks : Unpacking the Connections in Ghana', *West African Journal of Applied Ecolog,* 22(2), pp. 1–15.

Amoyaw-Osei, Y. and Agyekum, O. O. (2011) 'Ghana e-waste country assessment', *SBC e-waste Africa Project*.

Asampong, E., Dwuma-Badu, K., Stephens, J., Srigboh, R., Neitzel, R., Basu, N. and Fobil, J. N. (2015) 'Health seeking behaviours among electronic waste workers in Ghana Environmental health', *BMC Public Health*, 15(1).

Asante, K. A., Agusa, T., Biney, C. A., Agyekum, W. A., Bello, M., Otsuka, M., Itai, T., Takahashi, S. and Tanabe, S. (2012) 'Multi-trace element levels and arsenic speciation in urine of e-waste recycling workers from Agbogbloshie, Accra in Ghana', *Science of the Total Environment*, 424, pp. 63–73.

Bakhiyi, B., Gravel, S., Ceballos, D., Flynn, M. A. and Zayed, J. (2018) 'Has the question of e-waste opened a Pandora's box? An overview of unpredictable issues and challenges', *Environment International*. Elsevier, pp. 173–192.

Baldé, C.P., Wang, F., Kuehr, R., Huisman (2015) *The global e-waste monitor – 2014.* Available at: https://i.unu.edu/media/unu.edu/news/52624/UNU-1stGlobal-E-Waste-Monitor-2014-small.pdf, [Accessed March 8, 2018].

Blaikie, N. (2009) *Designing Social Research: The Logic of Anticipation*. 2nd edn, *Designing social research: The logic of anticipation*. 2nd ed. Cambridge, UK: Polity Press.

Blaikie, N. and Priest, J. (2017) *Social Research : paradigms in Action*. Cambridge : Polity Press.

Bryman, A. 2016, *Social research methods*. 5th ed. Oxford : Oxford University Press.

Caravanos, J., Clark, E., Fuller, R. and Lambertson, C. (2011) 'Assessing Worker and Environmental Chemical Exposure Risks at an e-Waste Recycling and Disposal Site in Accra , Ghana', *Journal of health Pollution*, 1(1), pp. 16–25. doi: 10.5696/jhp.v1i1.22.

Caravanos, J., Clarke, E. E., Osei, C. S. and Amoyaw-Osei, Y. (2013) 'Exploratory health assessment of chemical exposures at e-waste recycling and scrapyard facility in Ghana', *Journal of Health and Pollution*, 3(4), pp. 11–22.

Chama, M., Amankwa, E. and Oteng-Ababio, M. (2014) 'Trace metal levels of the Odaw river sediments at the Agbogbloshie e-waste recycling site', *Journal of Science and Technology (Ghana)*, 34(1), p. 1-8.

Creswell, J.W. 2014, *Research design : qualitative, quantitative, and mixed methods approaches*. 4th ed, international student edition. Los Angeles, Calif. : Sage Publications.

Creswell, J. W. and Poth, C. N. (2017) *Qualitative inquiry & research design : choosing among five approaches*. 4th ed. Los Angeles : Sage Publications.

Daum, K., Stoler, J. and Grant, R. (2017) 'Toward a More Sustainable Trajectory for E-Waste Policy: A Review of a Decade of E-Waste Research in Accra, Ghana', *International Journal of Environmental Research and Public Health*, 14(2), p. 135.

Deneulin, S. and Shahani, L. (eds) (2009) *An Introduction to the Human Development and Capability Approach: Freedom and Agency*. London: Earthscan.

Ehrenfeld, J. (2008) *Sustainability by design : a subversive strategy for transforming our consumer culture*. New Haven : Yale University Press.

Elliott, R. and Timulak, L. (2005) 'Descriptive and interpretive approaches to qualitative research', *A Handbook of Research Methods for Clinical and Health Psychology*, pp. 147–157.

Feldt, T., Fobil, J. N., Wittsiepe, J., Wilhelm, M., Till, H., Zoufaly, A., Burchard, G. and Göen, T. (2014) 'High levels of PAH-metabolites in urine of e-waste recycling workers from

Agbogbloshie, Ghana', *Science of the Total Environment*, 466–467, pp. 369–376.

Ghana Statistical Service (2013) *2010 Population & Housing Census*. National Analytical Report.

Grant, K., Goldizen, F. C., Sly, P. D., Brune, M. N., Neira, M., van den Berg, M. and Norman, R. E. (2013) 'Health consequences of exposure to e-waste: A systematic review', *The Lancet Global Health*. Grant et al. Open Access article distributed under the terms of CC BY-NC-ND, 1(6), pp.350–361.

Grant, R. and Oteng-Ababio, M. (2012) 'Mapping the Invisible and Real "African" Economy: Urban E-Waste Circuitry', *Urban Geography*, 33(1), pp. 1–21.

Hoeltl, A., Brandtweiner, R. and Müller, R. (2017) 'Approach to solving the E-waste problem - Case study Ghana', *International Journal of Sustainable Development and Planning*, 12(6), pp. 1050–1060.

Hossain, M. S., Al-Hamadani, S. M. Z. F. and Rahman, M. T. (2015) 'E-waste: A Challenge for Sustainable Development', *Journal of Health and Pollution*, 5(9), pp. 3–11.

Huang, J., Nkrumah, P. N. and Anim, D. O. (2014) 'Reviews of Environmental Contamination and Toxicology', 229(February), pp. 18–34.

Jackson, P. T. (2011) *The Conduct of Inquiry in International Relations: Philosophy of science and its implications for the study of world politics*. Routledge.

Jenkins, W. (2003) 'Sustainability theory', *Encyclopedia of Sustainability*, pp. 380–384.

Leitch, C. M., Hill, F. M. and Harrison, R. T. (2010) 'The philosophy and practice of interpretivist research in entrepreneurship: Quality, validation, and trust', *Organizational Research Methods*, 13(1), pp. 67–84.

Lundgren, K. (2012) *The global impact of e-waste: Addressing the challenge*, *International Labour Office, Programme on Safety and Health at Work and the Environment (SafeWork), Sectoral Activities Department (SECTOR)*. Geneva.

O'Reilly, K. (2009) *Key Concepts in Ethnography*, *Key Concepts in Ethnography*. London: Sage.

Oteng-Ababio, M. (2012) Electronic Waste Management in Ghana - Issues and Practices. In: Curkovic, S., ed., *Sustainable Development - Authoritative and Leading Edge Content for*

Environmental Management., 1st ed. Rijeka, Croatia: InTech.

Oteng-Ababio, M. (2012b) 'When necessity begets ingenuity: E-waste scavenging as a livelihood strategy in accra, Ghana', *African Studies Quarterly*, 13(1–2), pp. 1–21.

Oteng-Ababio, M., Amankwaa, E. F. and Chama, M. A. (2014) 'The local contours of scavenging for e-waste and higher-valued constituent parts in Accra, Ghana', *Habitat International*, 43, pp. 163–171.

Otsuka, M., Itai, T., Asante, K. A., Muto, M. and Tanabe, S. (2012) 'Trace Element Contamination around the E-waste Recycling Site at Agbogbloshie, Accra City, Ghana ', *Interdisciplinary Studies on Environmental Chemistry—Environmental Pollution and Ecotoxicology*, pp. 161–167.

Perren, L. and Ram, M. (2004) 'Case study method in small business and entrepreneurial research: Mapping boundaries and perspectives', *International Small Business Journal*, 22(1), pp. 83–101.

Prakash, S. and Manhart, A. (2010) 'Socio-economic assessment and feasibility study on sustainable e-waste management in Ghana', *Öko-Institut e.V. - Institute of Applied Ecology*, 49(0), pp. 1–118.

Robeyns, I. (2005) 'The Capability Approach: a theoretical survey', *Journal of Human Development*, 6(1), pp. 93–117.

Schluep, M., Hagelüken, C., Kuehr, R., Magalini, F., Maurer, C., Meskers, C., Thiébaud, Müller, E. and Wang, F. (2009).. Recycling – from e-waste to resources. Sustainable innovation & technology transfer industrial sector studies. Final report, United Nations Environment Programme (UNEP), StEP – Solving the e-Waste Problem, Paris / France and Bonn / Germany.

Sen, A. (1979) 'Equality of what?', Tanner lectures on human values, 1, pp. 195–220.

Sen, A. (2001) *Development as Freedom*, *Oxford Press*. Oxford; New York: Oxford University Press.

Sen, A. (2004b) 'Dialogue capabilities, lists, and public reason: Continuing the conversation', *Feminist Economics*, 10(3), pp. 77–80.

Wittsiepe, J., Fobil, J. N., Till, H., Burchard, G. D., Wilhelm, M. and Feldt, T. (2015) 'Levels of polychlorinated dibenzo-p-dioxins, dibenzofurans (PCDD/Fs) and biphenyls (PCBs) in

blood of informal e-waste recycling workers from Agbogbloshie, Ghana, and controls', *Environment International*. Elsevier Ltd, 79, pp. 65–73.

Witzel, A. and Reiter, H. (2013) *The Problem-Centred Interview: Principles and Practice*. London: Sage Publications.

World Commission on Environment and Development (WCED) (1987) *Our Common Future*. Oxford University Press. New York, NY, USA.

Yu, E. A., Akormedi, M., Asampong, E., Meyer, C. G. and Fobil, J. N. (2017) 'Informal processing of electronic waste at Agbogbloshie, Ghana: workers' knowledge about associated health hazards and alternative livelihoods', *Global Health Promotion*, 24(4), pp. 90–98.

Appendices

Appendix I

Interview Guide and Consent Form

A. Interview Guide

Lund University

Department of Sociology, Faculty of Social Science

Problem-centred Interview Guide for interaction with informal recyclers on Agbogbloshie e-waste processing centre

Researcher's Background

I am Mubarik Kassim Rabiu a Ghanaian student at Lund University in Sweden, Studying master's in development studies. I am conducting a research on informal recycling of e-waste in partial fulfilment of my program. Your cooperation in the interview is highly appreciated and your answers will be kept in secret if you deem that necessary and be used only for the research purpose.

Respondent Background

- Respondent's Pseudonym (False Name) …………………………….
- Gender: …………....
- Age: ………………
- Marital Status……………….
- Number of Children………………………….
- Number of years in e-waste recycling……………….
- Role in e-waste processing………………………….
- Regular hours of work……………………………...
- Highest level of formal education…………………………….
- Place of origin ……………………………………….

Introductory Question (Opening Question)

I have read and heard a lot about informal recycling of e-waste, but I believe that the people involved in this work have special lived experience and opinion that I am interested in exploring with this dialog.

- You have played the role of (electronic waste collector, dismantler, burner, or buyer of recovered resources from processed e-waste) for … years. Please can you explain to me one of your typical working days?

Respondent's opinion about monetary impact of informal recycling

- Why are you involve in this work (electronic waste collection, dismantling, burning, or buying of recovered resources from processed e-waste)?
  - ➢ So, will you say is your choice or you were pushed by your financial condition?
  - ➢ What is your opinion on the monetary benefit of electronic waste work?
- What major financial changes do you perceive in your lifestyle and that of your colleagues in that work?
  - ➢ How will you describe your financial status in comparison with that of those who are not in informal recycling?
  - ➢ What are the major monetary benefits that are keeping you in this work?
  - ➢ What in your opinion will happen in terms of your financial needs when you are asked or decide to stop this work?
- In your opinion, do you think the money is worth the coughing and sickness that comes with the work?
- How do you view the money you get in comparison to the water and air pollution?

Respondent's opinion about the health impact of informal recycling.

- Tell me about the common sickness you encounter due to your work? i.e. coughing, chest pains, reproductive problems etc.
- What is your opinion about the sickness and diseases involved in the work?
  - ➢ Do you consider your work as life threatening?
  - ➢ Which of the activities result in high injury i.e. burning, dismantling etc.?
  - ➢ Tell me what you do when you are sick. Where do you get medicine?

- Tell me a story about a friend in this work who has been on sick leave or had a sustainable injury due to the work?

Respondent's opinion about the environmental impact of informal recycling

- How do you feel about the burning and smoke that comes out of it, when you want to recover say copper from an electronic device?
- Tell me a story about your relationship with the neighbouring houses and offices?
- What is your opinion about how your work has affected the water bodies in the area?
  - ➢ Have you observed that during raining, chemicals from your work can be washed into the local water bodies?
  - ➢ What other activities apart from your work (e-waste recycling) do you think affect the soil and water around Agbogbloshie?
- How do you perceive the NGOs and officials who come around to talk to you about potential damages to the water, soil and air pollution?

Respondent's opinion on alternative ways of treating e-waste

- What are your views on the current method of recovering valuable resources from e-waste?
  - ➢ Do you consider it the best way to recover valuable resources from e-waste?
  - ➢ What other ways will you suggest?
  - ➢ How in your opinion will that affect your work?
- How will you react when you are asked to stop burning and rather present the e-waste you have collected from residential areas to a formal recycling industry?
- Between the money you get, the coughing and injuries and the damage to water bodies, soil and air pollution which one will you consider before switching to these new ways?

Thank You!

B. Consent Form

Study Background

You or your children are invited to take part in a study regarding e-waste recycling on Agbogbloshie e-waste processing centre. You were selected to participate in the study because you are involved in the informal recycling of e-waste at Agbogbloshie. Those involve in other activities at Agbogbloshie that is not related to e-waste cannot participate in this study. The study is in partial fulfilment of my master's degree in Development Studies. The result will therefore be presented to Lund University and may ultimately be published as an article in a Journal. The title of the study is stated below;

- Are we Going to Burn Everything? Agbogbloshie E-waste Workers' Perspective

We know many people have come here to conduct studies about your work but most of them did not consider your opinion and subjective views about e-waste recycling which this study is intended to do. We want to give you an opportunity to talk about yourself and what is important to you regarding your work. we are doing this interview for a colleague who cannot speak Dagbani, so it is important that you tell us everything in a way that will help him understand your work and your views on it. The interview is confidential and anonymous; that means that we do not need to know your name. We will just ask you to choose an assumed name that will be used instead of your name. So, you are free to say everything you want, and no one will know you are the one who said it. There are no right or wrong answers; we are interested in everything that is interesting to you.

If you agree to take part in the study, you will be asked some questions which audio will be recorded and later transcribed for the study purpose only. The recording will enable us to fully concentrate on what you are say during our conversation. The duration of the interview is between 30 minutes to an hour. There are no foreseeable risks and participants of the study will be presented with a token of appreciation from Sweden. Your cooperation in the interview is highly appreciated and your answers will be kept in secret if you deem that necessary and be used only for the research purpose. However, the decision to participate in this study is completely yours. You may refuse to take part in the study at any time without affecting your relationship with us. You have the right to ask questions about this research study and to have those questions answered by us before, during or after the research.

CONSENT

I have understood the provided information above. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's Pseudonym (False Name) _____

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

Sample Transcriptions and Coding

A. Sample Transcription

Problem-centred Interview Guide for interaction with informal recyclers on Agbogbloshie e-waste processing centre

Researcher's Background

I am Mubarik Kassim Rabiu a Ghanaian student at Lund University in Sweden, Studying master's in development studies. I am conducting a research on informal recycling of e-waste in partial fulfilment of my program. Your cooperation in the interview is highly appreciated and your answers will be kept in secret if you deem that necessary and be used only for the research purpose.

Respondent Background

- Respondent's Pseudonym (False Name): Basit
- Gender: Male
- Age: 43
- Marital Status: Married (two wives)
- Number of Children: 3
- Number of years in e-waste recycling: 18years
- Role in e-waste processing: Dismantling
- Regular hours of work: 12hrs
- Highest level of formal education: Nil
- Place of origin: Savulegu (Northern Region)

Introduction

I have read and heard a lot about informal recycling of e-waste, but I believe that the people involved in this work have special lived experience and opinion that I am interested in exploring with this dialog.

- You have played the role of (electronic waste collector, dismantler, burner, or buyer of recovered resources from processed e-waste). Please can you explain to me one of your typical working days?

Ans: I have boys who worked under me and I do send them to go out and buy the materials whiles I buy from others. So, I am always sited here and when I have enough I begin dismantling together with my boys. If we retrieve copper among the materials, I ask that they take those once to the burners to retrieve the valuables.

We normally go for a break at 12 and return immediately after the noon prayers to continue with buying and dismantling. I also engage in buying of heavy metals that I gather for onward sale together with the e-waste you see around here. They are all my properties and at the right time, it will be transporter to either those big men near the sinkkins company here at Agbogbloshie or Tema yard.

So, my day is always filled with different activities and you are even lucky to have me here answering your questions.

Respondent's opinion about monetary impact of informal recycling

- Why are you involve in dismantling and buying of e-waste?

Ans: I was a farmer in the North and I left the job somewhere in the year 2000 and joined this business and I haven't regretted. Business was booming then as compared to now. You ask the monetary benefits and I say the monetary benefits of this job are endless. I have built my own house in the North with monies I made in this business.

My wife is now a trader up North after I'd supported her with money to start the business and she's also doing well.

- So, will you say is your choice or you were pushed by your financial condition?

Ans: Most people came here because of the civil war between Dagombas and Konkonbas in the early 90s. Due to unrest, they all flee here but for me, I came to this market when everything

had settled. However, I am telling you on authority that, every single person you see engaged in this business of their weak financial situations including myself.

- What is your opinion on the monetary benefit of electronic waste work?

Ans: My answer is I have built my own house; my wife is doing well with her business I helped her step up and my three children are having the best of education. I can solve issues of my extended family without looking back. God has really blessed me after years of challenging work. I always give praise and thanks to the Almighty for His continues blessings and guidance.

- What major financial changes do you perceive in your lifestyle and that of your colleagues in that work?

Ans: I have always been a down to earth person. I don't rub shoulders with anybody. I respect people no matter their age groups and you can attest to the fact that I was having some discussion with some of the young once here when you guys approached.

However, our financial status is not the same, but we respect each other irrespective of our financial status.

➢ How will you describe your financial status in comparison with that of those who are not in informal recycling?

Ans: I am very content with what I've achieved so far in this business. And those who are not in the informal recycling sector, I would say they have an advantage over us because they don't go through the kind of stress we go through.

But it doesn't really matter because, our fingers are not the same isn't it, so it doesn't matter too much to me, that's what they chose to engage in.

➢ What are the major monetary benefits that are keeping you in this work?

Ans: The smiles that I am putting on the faces of my family especially my kids. I am always fulfilled when they asked for something and am able to provide. Over here in Agbogbloshie, others look up to me to fund their education and sometimes travel needs to go and see their family during emergencies.

➢ What in your opinion will happen in terms of your financial needs when you are asked or decide to stop this work?

Ans: For me I have no worries. I intend very soon to return home with my second wife and invest heavily in commercial farming. I am a retired farmer and I will return back to it as many are adopting the modern farming techniques.

Moreover, the government intends to implement the One-Village-One-Dam policy and that will help many farmers to do all year-round farming. So, I don't think I would have any monetary issues if I am asked or decide to stop this work.

- In your opinion, do you think the money worth the coughing and sickness that comes with the work?

Ans: I have gathered enough experience in this work and have trained all my boys a safer way of retrieving the valuables. For the burning aspect, I provide them safety tools to cover themselves at the site. Therefore, they are not exposed to the smoke and the heat involved in the process. So, we are not that much exposed to some of this sickness and coughing.

- How do you view the money you get in comparison to the water and air pollution?

Ans: For the smoke from the burning we do, I wish we had a more better way to contain it such that it doesn't affect our neighbours or passers-by including those who come to buy food stuffs in the market. For the water here is just dirty water from the city and we don't have any use for it.

Respondent's opinion about the health impact of informal recycling.

- Tell me about the common sickness you encounter due to your work? i.e. coughing, chest pains, reproductive problems etc.

Ans: My problem now is my waist and my wife has been complaining. I am not able to perform like I use to. My strength has deteriorated because I hardly last long with my wife and that's how this work has affected me, and I must say it worth it.

- What is your opinion about the sickness and diseases involved in the work?

Ans; For almost two decades in this business, I have never been admitted for any form of illness aside body weakness and tiredness which in my view is normal.

➢ Do you consider your work as life threatening?

Ans: I nearly lost one of my leg in my early year in this work. I remember at that time we were helping a colleague offload some e-waste and one fell on my leg. It was God who saved me, or I would have been crippled. It is indeed life threatening.

➢ Which of the activities result in high injury i.e. burning, dismantling etc.?

Ans: With my previous experience with offloading, I will rate it above all. Over here we don't have the machines to offload those e-waste and metals, we therefore resort to doing it manually. These metals are heavy and if care is not taken during the process, one risk being injured.

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> ➢ Tell me what you do when you are sick. Where do you get medicine?

Ans: I rest for a while and the business is not on break. My boys are always in charge till I return. Like I told you, I don't usually fall sick only body pain and tiredness will make me rest for a couple of days.

- Tell me a story about a friend in this work who has been on sick leave or had a sustainable injury due to the work?

Ans: This colleague of mine was here with us and he was doing well for himself until the unfortunate day when an explosion occurs during burning and affected his leg. During that period, I nearly quit the work because I couldn't stand the news. It was very heart breaking for all of us here.

Respondent's opinion about the environmental impact of informal recycling

- How do you feel about the burning and smoke that comes out of it, when you want to recover say copper from an electronic device?

Ans: On my part we always provide extreme protection, but it is still not a good place to be when the burning is going on. Even from a far, one is capable of contracting cough which is very dangerous. For me honestly during my early days before now, I don't feel comfortable.

- Tell me a story about your relationship with the neighbouring houses and offices?

Ans: No response

- What is your opinion about how your work has affected the water bodies in the area?

Ans: well I will say the improper sanitary conditions around us. Then again, I will lay the blame at the door step of the leadership here. We should have been able to organise ourselves from time to time to clean up the place, but we don't while others have also turn this palace into a refuse dump.

> ➢ Have you observed that during raining, chemicals from your work can be washed into the local water bodies?

Ans: For the big drains over here, I think it is the responsibility of the assembly to make sure the drains are desalted so that the waste from the city would move freely into the lagoon. So, when they do that, even when the rains wash the particles into the drain it would washed away into the lagoon.

> ➢ What other activities apart from your work (e-waste recycling) do you think affect the soil and water around Agbogbloshie?

Ans: The engine oil spillage on the floor is another issue. It makes the place unpleasant and slippery. Sometimes we do fall into it and that is not good for our health as well.

Other observation is that, some of our colleague's throw some of the unwanted electronic waste to the drains make it difficult for the waste water to run freely into the lagoon.

- How do you perceive the NGOs and officials who come around to talk to you about potential damages to the water, soil and air pollution?

Ans: Yes, they do but when they come I usually allow my guys to take turns in their meetings because usually it is time consuming while we have work to do.

Respondent's opinion on alternative ways of treating e-waste

- What are your views on the current method of recovering valuable resources from e-waste?

Ans: there is no other way apart from the method we are using. Machines were brought here to help us, but it wasn't useful at all.

➢ Do you consider it the best way to recover valuable resources from e-waste?

Ans: I'm yet to be convinced there is a better way. If there is, it will be welcome only if that would generate the same output or even better than we currently do.

➢ What other ways will you suggest?

Ans: That we could get at least two standby machines for offloading and the other to suppress the smoke during the burning process.

➢ How in your opinion will that affect your work?

Ans; It wouldn't affect my work negatively but rather an improvement in the work.

- How will you react when you are asked to stop burning and rather present the e-waste you have collected from residential areas to a formal recycling industry?

Ans: That will be difficult because they wouldn't pay as compared to the amount they would pay if the valuables were retrieved before it is sold to them. Aside that, they would incur more cost to retrieve the valuable that wouldn't be done properly if they use the machines.

- Between the money you get, the coughing and injuries and the damage to water bodies, soil and air pollution which one will you consider before switching to these new ways?

Ans: All are important especially the money and health. But we also have to survive. But if there are other ways to contain the smoke or government will consider establishing an

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ultramodern e-waste factory, were all of us here could move there to continue with our business, it would have been very much appreciated.

Thank you!

B. Coding and Themes Book from Nvivo

Name	Description	Sources	References
Alternative ways of processing e-waste	This theme captured respondent's opinions on alternative methods that can be used to process e-waste. Suggested alternatives, readiness to accept and work with alternatives and consequences are captured here.	11	39
Cannot stop the work		2	3
Employment from industry		1	1
Machines were not effective		2	2
Machines for offload electronics and Manage smoke		5	6
No alternatives		4	6
Put me out of job		7	9
Resist alternative suggestions		2	2
Start a new job		3	4
Will accept alternative work		7	9
Daily routine	These them pulled the daily activities of e-waste workers, the challenges and how they overcome them.	12	34
Break time		6	6
Burning		4	5
Check on business partners		3	4

Name	Description	Sources	References
Continue yesterday's work		2	2
Engage in buying and selling		1	1
Engage in dismantling		5	5
Perform Salat		2	2
Recreational activities		4	4
Strolling for e-waste		4	4
Decisions to start e-waste work	Reasons for participating in e-waste narrated by participant are put under this theme.	11	39
Colleague influence		4	4
Farming is seasonal		1	1
Lack of employment		3	3
Family burden		9	12
School drop out		1	1
Unemployment		5	7
Unrest in the North		1	1
Economic benefit	The monetary benefits of informal processing of e-waste are captured under this theme.	12	69

Name	Description	Sources	References
Means of Livelihood		8	15
Money is important		11	11
Raise Capital		3	3
Savings		3	4
Assist me support my family		12	26
Environmental health	The effects of informally processing of e-waste on soil, air and water pollutions are categorized under this theme.	12	45
Air Pollution		5	6
Bad sanitation practice		6	8
Blocking drainage		1	2
No water body		11	22
Oil from Mechanical workers		3	4
Human health	Respondents opinions on health effect of processing e-waste informally together with common ailments, means of treatment are captured here.	12	89
Common sickness		11	19
Cost of treating sickness		4	5
Mode of treating sickness		9	14

Name	Description	Sources	References
Most dangerous activities		12	15
Never been sick		3	4
Other harmful activities		2	2
Reported or witnessed injuries		10	11
Safe activities		2	2
The work is hazardous		9	12
Wear protection		3	4
Other Issues	Issues that are not directly related to study but add up to our understanding of e-waste workers opinions are captured here.	11	31
Relations with other informal workers		5	7
Local and international officials		9	9
People fear coming here		2	2
Previous job		6	6