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Managing ICT Waste: The Case of Delta State University Abraka, Nigeria

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Introduction

Abstract

Introduction

Information and communication technology (ICT) are modern tools and equipments that are used for the processing, storing, disseminating and utilization of information. Information and communication technology include computers, monitors, modern, keyboard, mice, scanner and printers etc. According to Aina (2004), information and communication technology is concerned with the technology used in handling, acquiring, processing, storing and disseminating information.

Information and communication technology has benefited educational institutions in several ways. Haag, Cummings and Dawkins, (2000) summarize the benefit in the following three (3) areas; the area of information processing task (such as online registration of courses, payment of school fees and checking of results), as an enabler of innovation and it has collapsed the wasting of time and space in academic programmes. Besides, other organizations like banks, hotels, phone companies, fuel stations etc. has also benefited from ICTs. Information and communication technology has made the information processing task in educational institutions particularly Delta State University, Abraka very easy, for example the task of computing and printing payroll checks during payment of staff salaries. It has also facilitated online course registration, payment of school fees

etc. through the University portal accessible to students 24/7.

Educational institutions and other organizations acquire different categories of ICTs like computers, radios, televisions sets CD-ROM, computer terminals, telephone lines and modem, cellular phones and fax machines. Obafemi Awolowo University (OAU) is rated as having the best ICT system in the Nigeria with its own VSAT access to the Internet and campus-wide intranet. With over 1000 computers distributed in 15 computer laboratories across the campus, the university has embarked on the progressive application of ICT to all its functions and services such as academic, research and administrative (Agyeman 2007). The National Open University of Nigeria (NOUN), established in 2002, has created across the country several study centres in the form of computer laboratories or cybercafés equipped with computers in a Local Area Network (LAN) connected through a Wide Area Network (WAN) to deliver distance learning courses to all study centres (Agyeman 2007). NOUN ICT applications presently cover: management of student records, learner management system, communication and delivery of the human resource and finance courses (Agyeman 2007).

As ICTs goes faulty and or obsolete they constitute waste. Thus, the ever growing dependence on electronic products has paved the way for an emerging environmental concern called "Electronic Waste". The problem of electronic waste seems to have emerged only recently, it has been building up since the first computer or electronic product was manufactured. According to PPCC (2006), "Electronic waste is an unwanted electronic or electrical appliance that have been discarded by their original users such as old and outdated computers, laptops, televisions, cellular phones, Mp3 players, telecommunications equipments, keyboards, mouse, photocopiers, typewriters etc". Majority of the electronic waste contain materials that could be recovered and reused for new product development. Electronic equipment contains hazardous materials, which can affect human health and environment if not properly managed (PPCC, 2006).

Since the establishment of the Delta State University in 1992, there have been series of electronic waste generated within and around the school premises that has directly and indirectly caused damages to the environment and human health. For example, a lot of abandoned computers can be found in the school cyber café and offices. In addition, abandoned megaphones, photocopiers, manual typewriters, keyboards, mice, telephones etc are found in lecture rooms, the university library, and university hostels causing negative health and environmental consequences. Viewed against this background, this study becomes necessary as it would focus on the way forward for the university in the management of information and communication technology waste. The following research questions were put forward to guide the study:

i. What are the types of ICT waste generated in Delta State University, Abraka?

ii. What is the level of ICT waste generated in Delta State University, Abraka?

iii. What are the measures put in place for ICT waste disposal in Delta State University, Abraka?

iv. What are the environmental consequences of ICT waste in Delta State University, Abraka?

v. What are the problems militating against proper disposal of ICT waste in Delta State University, Abraka?

Scope and Delimitation of the Study

The study was done in Delta State University main campus Abraka. It is limited to all categories of ICT waste disposal methods, the level of the waste generated, its environmental consequences, the measures put in place and the problems militating against ICT waste.

Review of Related Literature

Haag, Cummings & Dawkins (2000), categorized information and communication technology waste as keyboard, mice, screen, printers, modems etc. Wikipedia (2010), categorized ICT waste into computers, entertainment device, electronic, mobile phones and other items such as televisions, scanners etc discarded by their original owners. Information and communication technology also include devices which are destined for reuse, resale, salvage, recycling or disposal. They represent working and reparable items but which are dumped or disposed or discarded by the buyer rather than recycled.

Wooddell (2008) categorized ICT waste as high-tech trash that includes cast-off Televisions, Computer, Monitors, Printers, Scanners, Keyboard, Mice, CPU, Fax Machine, Pocket Computers (PDA) walkie-talkies, baby monitors, certain kinds of watches and cell phones. In other words, anything digital that is no longer being used.

It is really hard to know the real level of ICT waste generated in Nigeria. However, some environmental groups such as Basel Action Network (BAN) and Greenpeace (2009) have done a lot of investigations which indicate that large quantities of highly polluting hazardous waste electronic electrical equipment (WEEE) are illegally pouring into Nigeria. They pointed out that the inappropriate management of end-of-life WEEE in Nigeria is becoming a new environmental challenge for the twenty-first century.

In 2005, more than 1,000 units of used television sets on average arrive every day in Nigeria. And these figures apply only to television sets and not the total amount of electronic waste (computers, printers, scanners, photocopiers, monitors, typewriters, mouse, keyboard etc) (EEA, 2009). In Nigeria, an estimated 500 containers of second-hand computer related electronic equipment of various states of condition and age enter the country each month. Most of it ends up in Lagos-the computer village, Ikeja. On average, each contain about 800 computers and monitors which amounts to about 400,000 arriving each month or 5 million units a year (Puckett and Fogel 2005; Osibanjo & Nnorom 2007).

Before 2001, Nigeria had one of the lowest telephone penetrations in the world 0.35% compared to the highest mobile phone penetration in the world. But since the digital telecommunication system was introduced in Nigeria in 2001, the teledensity increased from 0.7% in 2001, to 24.2% by the end of 2006, Osibanjo & Nnorom (2007). This means that Nigeria is faced with a big problem with the huge amount of imported ICT waste. Unfortunately, the government is doing little or nothing to avert the problem.

ICT scrap is managed through various management alternatives such as product reuse, conventional disposal in landfills, incineration and recycling. According to PPCC (2006) Land filling is one of the most widely used methods for disposal of ICT waste. PPCC (2006), landfilling does not appear to be an environmentally sound treatment method for substances which are volatile and not biologically degradable, persistent or with unknown behaviour in a landfill site.

Incineration is another very common way of disposing ICT waste (PPCC 2006). According to Wikipedia (2010), incineration is a waste treatment technology that involves the combustion of organic materials or substances.

Recycling is a process designed to collect, process, remanufacture and reuse materials instead of throwing them away (Walsh 2004). Commonly recycled ICT waste include, monitors and cathode ray tubes, laptops, modems, keyboard, telephone board, hard drives, floppy drives, compact discs, mobile fax machine printers, CPU memory chips, connecting wires and cables (PPCC, 2006). Recycling helps conserve raw materials and energy that manufacturers would other

wise use to make new products. Recycling keeps materials out of landfill space, Walsh (2004).

Reuse method according to PPCC (2006), implies that ICT waste goes for slight modification or may be used as such. This method also reduces the volume of ICT waste generation. The United State Electronic Management Agency (2010) noted that reusing ICT waste is usually preferable to any waste management option and that reuse extends the lives of valuable products and keeps them out of the waste management system for a longer time. PPCC (2006) supported this view stating that large company should purchase the used equipment back from the customers and ensure proper treatment and disposal of ICT waste by authorized processes.

In order to ensure sound environmental management and protection and in line with its statutory responsibility, the Federal Ministry of Environment, Housing and Urban Development organized a National Workshop on ICT Waste in December 14th 2007 at Abuja with the theme: National sensitization/stakeholders workshop on ICT Waste Management plan for Nigeria.

Osibanjo (2007) stated categorically that the health hazard and environmental damage ICT wastes pose to man is enormous because of the hazardous and toxic materials they contain. Nigeria has had more than a fair share of the danger that is associated with ICT waste.

Uncontrolled burning, disassembly and disposal can cause a variety of environmental problems such as ground water contamination, atmospheric pollution or even water pollution (Wikipedia 2010). Dumping of information and communication technology waste in any environment occupies space, disorganizes the environment and has negative health consequences such as leaching toxins into the soil, air and ground water which later entire the crops, animals and human body systems causing physical injury, skin disorder, interference with regulatory hormones and pollution. Medical experts have warned that exposure to these substances can cause damage to blood and nervous systems, DNA, Immune systems; kidney and can lead to respiratory and skin disorders and lung cancer and can interfere with regulatory hormones and brain development. Information and communication technology waste contain heavy metals, such as lead, zinc, chromium cadmium mercury and with element in trace amounts, germanium gallium, barium, nickel etc. (Osuagwu & Ikerionwu 2010). According to Greenpeace (2010), there is an increase in information and communication technology waste and this increase is disturbing especially when coupled with the fact that waste management processes and regulation have not caught up to the digital age. Outdated waste disposal methods are still employed through out much of the world. This leads to polluted water, contaminated soil, and air pollution from the burning of plastics and high cancer rate in the people who work and live around the recycling dump sites. However, the disposal and recycling of computer waste in the institution has become a serious problem since the methods of disposal are very rudimentary and pose grave environmental and health hazards.

There are several problems militating against proper storage and disposal of ICT waste as it is evidenced by some environmental group such as the Basel Action Network (BAN) & Greenspace (2009), who indicated that the Nigerian government seems not to keep any type of record or statistics on imported ICT waste even though Nigeria has a National import ban for hazardous waste. This could be seen as neglect, lack of knowledge about ICT waste, lack of resources and weak administrative bodies. Puckett, Jim & Cathy Fogel (2005) posited that "National law does not specify anything on electronic waste". The National law (Decree 42) on hazardous waste states a complete ban. But at this moment, ICT waste does not come in as electronic waste; they come in as cell phones, and technologies. Olowgboye (2009) opined that the there is no official import permit for ICT waste but unfortunately a hug number of unserviceable used electronic and electrical appliances are being imported into the country regularly in form of dumping without government raising an eyebrow. From what is going on, it may seen like the

Nigerian government either does not care about the import or do not mind if or they are too slow in reacting to the problems.

According to Uwah (2005) ignorance about the danger of these information and communication technology waste to human health and poverty, technological backwardness are fundamental factors that is militating against proper disposal of ICT waste. However great or part of the society (Rural and Urban) are unaware that much of the diseases they suffer come from these ICT waste. Most people who could not afford brand new electronic equipment end-up in second hand. This trend which has remained unabated has continued to be a challenge to the regulatory agencies (Imohiosen 2007).

Imohiosen (2007) revealed that product enter Nigeria market without proper regulations thereby making the country a dumping ground for all sort of electronic devices. According to Puckett, Jim and Cathy Fogel (2005), 25-75% of the second hand goods cannot be used and that there exist no ICT waste management collection or regulatory programme in Nigeria. This means that very significant amount of ICTs really have no where to go other than where all waste goes to that is, the waste dumps. These dump sites often occur as wayside dumps along the roads, where people and domestic animals pass by everyday.

Research Method

Survey method is used for the study and the respondent population consists of staff working with ICT equipments in the various Departments in the University, from which a sample of 67 staff was randomly drawn from the various Departments. The questionnaire was used to collect data which were analyzed using simple percentages and frequency counts.

Results and Discussion

Research question 1: What are the types of ICT waste generated in Delta State University, Abraka?

The result of the analysis is as presented in table 1.

Table 1 Types of ICT waste generated

Variables	Responses	Percentage (%)
Computer	46	75.4%
Keyboard	49	80.3%
Mouse	42	68.8%
Photocopier	23	34.7%
Typewriter	44	72.1%
Scanner	15	24.6%
Printer	33	54.1%
Ups	24	39.3%

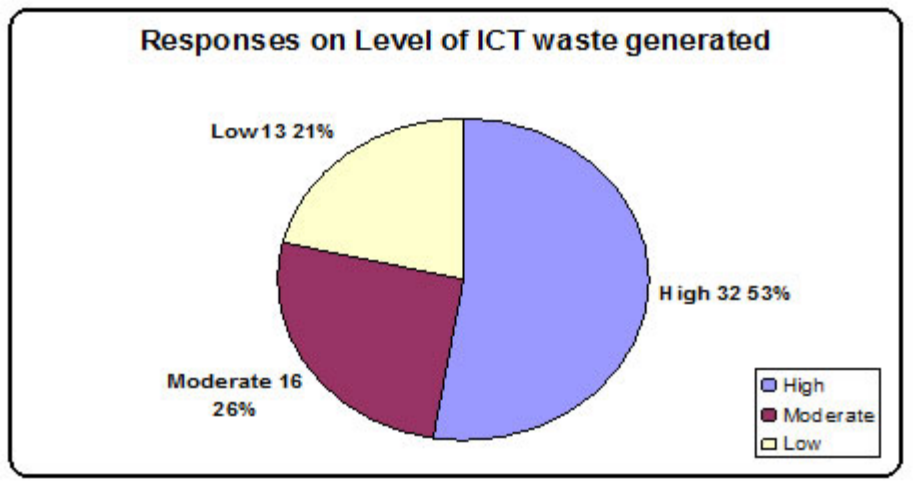
Monitor	30	49.1%
Modem	11	18.3%

From table 1, it could be seen that 49 (80.3%) respondents indicated keyboard, 46 (72.1%) indicated computer, 44 (72.1%) indicated typewriter, 42 (68.8%) indicated mouse, while 33(54%) indicated printers as ICT waste. Based on the analysis, it could be concluded that keyboard, computers, typewriters, mouse and printers constitute ICT waste in Delta State University, Abraka. This finding corroborates Puckett, Jim & Cathy 2005; Osibanjo & Nnorom 2007 who estimated that over 400,000 computers, monitors and other electronic equipment of various states of condition and age entered the country (Nigeria) each year. Also, Basel Action Network (BAN) and Greenpeace (2009) found that large quantities of highly polluting hazardous waste electronic electrical equipment (WEEE) are illegally pouring into Nigeria.

Research question 2: What is the level of ICT waste generated in Delta State University, Abraka?

The result of the analysis is as presented in figure 1.

Figure 1: Rate of ICT waste generation



From figure 1 response from respondents indicated a high i.e. 32 (53%) rate of ICT waste generation in Delta State University Abraka. This finding is in line with Basel (2009), (EEA, 2009) and Puckett, Jim and Cathy Fogel (2005) who found that there is an increased in flow of fairly used or rather faulty electronics into Nigeria. This will in no small measure result in an ICT waste generated in Nigeria. These electronics have relatively short life span because they were purchased as second hand items. Furthermore, Olowgboye (2009) observed that though there is no official import permit for information and communication technology waste in Nigeria, the country has become a dumping ground for used and unserviceable electronics and electrical appliances.

Research Question 3: What are the measures put in place for ICT waste disposal in Delta State University, Abraka?

The result of the analysis is as presented in table 2.

Table 2: Measures put in place for proper disposal of ICT waste

Variables	Yes	No

We have standard guide	11 (18.3%)	50 (81.9%)
We have collection program	12 (19.7%)	49 (80.3%)
We have platform to sensitize and educate staff	15 (24.5%)	46 (75.4%)

Table 2 shows that majority of the respondents asserted that there is virtually no clearly defined standard or measure put in place to guide on ICT waste disposal, This finding agrees with Puckett, Jim and Cathy Fogel (2005) who posited that there exist no ICT waste management collection or regulatory programme in Nigeria.

Research Question 4: What are the Health environmental consequences of ICT waste in Delta State University, Abraka?

The result of the analysis is as presented in table 3.

Table 3: Health and environmental consequence of ICT waste

Health/Environmental Consequences of ICT Waste	Responses	Percentage (%)
Physical injury	34	55.7%
Skin disorder	5	8.3%
Occupy space	36	59.1%
Disorganize office	35	57.3%
Interference with regulatory hormones	5	8.3%
Leaching toxins into air, soil and water	22	36.6%

From table 3 above it was observed that majority of the respondents i.e. 36 (59.1%) indicated that ICT waste occupies space, 35 (57.3%) indicated that it disorganizes office while 34 (55.7%) indicated that it causes physical injury. This result corroborates Osuagwu and Ikerionwu (2010) who found that dumping of ICT waste in any environment occupy space, disorganizes the environment and has negative health consequences.

Research Question 5: What are the problems militating against proper disposal of ICT waste in Delta State University, Abraka?

The result of the analysis is as presented in table 4.

Table 4: Problems militating against proper disposal of ICT waste

Variable	Responses	Percentage (%)
Neglect	26	42.6%
No awareness	48	78.6%
Lack of finance	23	34.7%

No policy	30	49.1%

From table 4 it was observed that majority of the respondents i.e. 48 (78.6%) indicated lack ICT waste awareness and 30 (49.1%) and lack of policy, 26 (42.6%) as the major problems militating against proper disposal of ICT waste in Delta State University Abraka. This confirm Basel Action Network and Greenpeace (2009) who found that neglect, lack of knowledge about ICT waste level coupled with weak administrative bodies are problems to disposal of ICT waste in developing countries. More so Uwah (2005) asserted that ignorance about the danger of these ICT waste to human health, poverty and technological backwardness are fundamental factors militating against proper disposal of ICT waste.

Conclusion

This paper was able to establish that there is inadequate management of information and communication technology waste in Nigeria, Nigeria Universities and Delta State University, Abraka in particular. And that this may be as a result of lack of awareness and policy on ICT waste management and some other contributory factors. The paper also revealed that Nigeria has fast become a dump site for e-waste from all over the world thereby exposing the environment and citizenry to grave health and environmental degradation. And as such the Government should sit up and tackled this problem squarely.

Recommendations

Based on the research findings, the following recommendations were made:

1. The university should draw up a policy on ICT waste management.

2. Government should make proper legislation to guide against indiscriminate influx of ICT waste into the country. If possible, place an outright ban on the importation of used electronics.

3. A detailed environmental pollution assessment should be done to determine the level of environmental pollution and degradation caused by years of reckless dumping of e-waste in Nigeria.

4. Government should build recycling plants and waste collection facilities to cater for the collection and recycling of ICT wastes.

5. A nationwide enlightenment campaign should be done to educate the populace on the dangers associated with ICT waste.

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