

A Web Base E-Waste Management and Data Security System

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Abstract

With the introduction and expansion of ICT, there has been an increase in e-waste and the safety of information in e-waste. An empirical study was conducted in Benin City using a well-designed questionnaire distributed among university college students in higher education, telecommunication providers, civil servants, computer dealers, computer technicians, and e-waste collectors to suggest a framework for e-waste management and an information security tool. An average of four hundred respondents have been surveyed. The data were analyzed using SPSS, and the findings show that the human eye is inadequate for e-waste management and information security tools. The findings also revealed a well-known horrible way of thinking closer to the safety of statistics in damaged systems, owing primarily to a lack of information and the inconveniences associated with it. To address this, a framework and a functional online net website have been improved, which are based on reputation and sensitization of e-waste management and information security. This tool has been suggested as a proper e-waste management and information security tool.

Keywords: e-waste management, data security, policy and regulations, environmental threat, EEE, WEE, Basel Convention

Acknowledgments: Thanks to all parties who have supported the implementation of this research. I hope this research can be useful.

For citation:

Perfectson, O., G. (2023). A Web Base E-Waste Management and Data Security System. *Radinka Journal of Science and Systematic Literature Review*, 1(1), 49-55. <https://doi.org/10.56778/jdlde.v1i12.113>.

Introduction

In the digital age, it has become imperative for both individuals and companies to store data on electronic devices like computers, smartphones, and a variety of other gadgets while also wishing for this data to stay private. (BAN 2005) Older electronic equipment will inevitably need to be disposed of when newer technologies advance since they are deemed obsolete and can

sometimes be exported to be fixed, refurbished, or repurposed, which is mainly thought of as a sure way to extend their lifespan (Amachree, 2013). Global reports on the rise in improper waste management have been made public by plastic pollution. With a growing global population and rising per capita consumption brought on by economic expansion, waste output is also rising. A total of 25 Mt worth of selected raw materials were found in e-waste in 2019, with a value of USD 57 billion. Global e-waste may expand quickly during and after COVID-19, driven by demands for electronics owing to remote working and homeschooling (Probst et al...2020), in addition to previously expected increases in e-waste and notwithstanding the pandemic's economic impact. To prevent security breaches like identity theft, credit card fraud, and other computer crimes, the research suggested several suggestions to individuals and corporations on how to properly dispose of their computers. (Thomas et al. 2022). This research aims to proffer some solutions to individuals and organizations on how to effectively dispose of their computers in order not to suffer such security breaches as identity theft, credit card fraud, and other computer crimes using Benin City as a case study.

Methodology

This study focused on discarded computers imported into Benin City which end up mostly at electronic waste dumpsites. These computer hard drives were obtained discretely from selected university repair shops and e-waste collection centers. The study also conducted a survey to access what options users will primarily consider before disposing of their used computers. Thus, the study was conducted in two stages. The first stage was an experimental procedure using a commercial data recovery tool Recuva Data Recovery 1.53.0.1087 to attempt to retrieve residual data from the hard drives of disposed computers. 50 computer hard drives were obtained from within Benin City. The drives were numbered so that information retrieved can be linked to the particular drive. The process simply involved mounting the drives obtained on a primary computer using the traditional master and slave technique i. e. the master hard disk which is the original hard disk in the system and the drive on which data was to be recovered was the slave some information was obtained from the hard drives and classified as secret financial information, confidential and uncategorized.

Design Of Study

The study adopted the cross-sectional research design which allows the research to be carried out in a natural setting without the control and manipulation of the variables. The design analyses data collected from a population or a representative subset at a specific point in time. The advantage of this design is that it allows statistical inferences to a broader population so that results can be extrapolated. Civil Servants, Students, Technicians, Waste Collectors, and Others in Benin City form the population of the study. The total population of Benin City as of 2021 was 1,782,000.

Data Collection and Analysis

Data collection was done through the administration of a structured questionnaire to people from the selected sections. The questionnaires were screened for completeness by the researcher, for analysis. Descriptive statistics, simple percentages, mean and standard deviation were utilized to depict or evaluate the knowledge, attitude, and practices of the respondents to e-waste data security.

Results

Analysis of results

IBM SPSS software was used to analyze the results of the survey. Table. 3 below shows the data view of the results in SPSS, where the data was entered after coding and table.4 shows the variable view of the analysis in SPSS where the data are defined and edited.

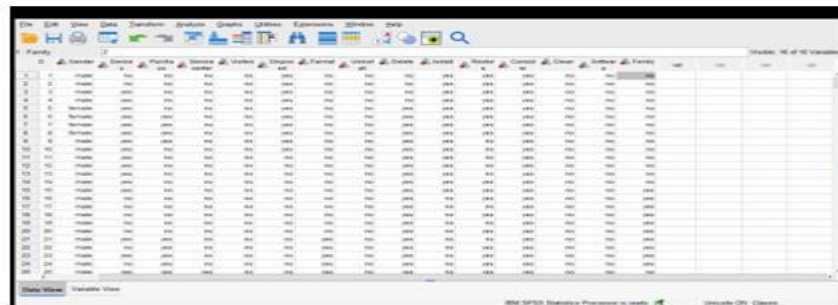


Table 1. Data view of the SPSS analysis

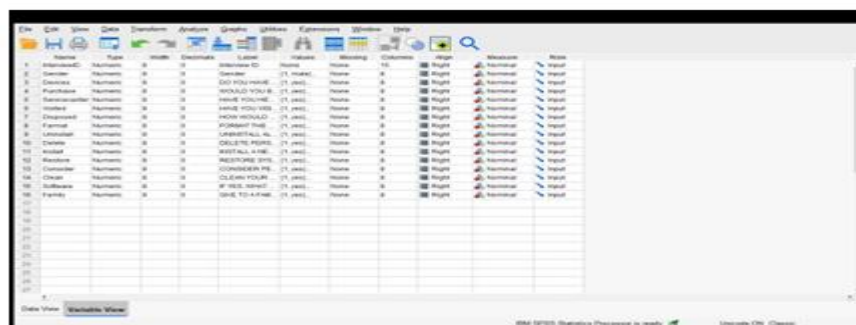


Table 2. Variable view of the SPSS analysis

		Frequenc y	Percent	Valid Percent	Cumulative Percent
Valid	yes	192	47.8	48.0	48.0
	no	208	51.7	52.0	100.0
	Total	400	99.5	100.0	
Missing	System	2	.5		
Total		402	100.0		

Table 3. Did you format your hard drive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	157	39.1	39.3	39.3
	No	243	60.4	60.8	100.0
	Total	400	99.5	100.0	
Missing	System	2	.5		
Total		402	100.0		

Table 4. Do you uninstall all programs

Results of some of the analysis that was carried out using IBM SPSS, we could observe from Table 5 above that 192 persons which represent 47.8% only formatted their hard drives during the survey and 208 persons also represent 51.7% did not format their hard drives and in table 6, 157 persons which represent 39.1% of the total population under study uninstall all the programs on their hard drives and 243 which represents 60.4% do not which shows that most people did not format their systems before disposing of them which eventually exposed them to potential criminals who may use the information on those systems for malicious purpose.

Discussion

Software Development Tools

The Software And Tools Used For The Development of This Model Are Html, CSS, Javascript Php Xaamp Server, and IBM Spss. Mysql Database and Recurva Software Program Documentation. In the developed system, a web portal was created which acts as an intermediate for the user who gives away their e-waste products and the recycling agencies. Fig.4.1 is the login page where a user will type in his or her username and password to log in to access the portal. Fig.4.2 is the signup page where the user will register his or her details to be documented at the server (mySQL server) so that they can log in to the portal. Fig.4.3 is the Home page of the web model developed that describes the website. Here the user can navigate to other pages in the portal such as the About page, registration page, and registration page where the users or customers will register their products by filling out the form and submitting it.



Figure 1. The Login Page

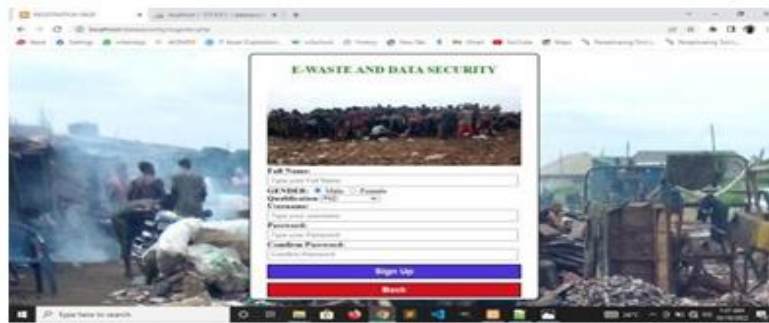


Figure 2. The signup Page



Figure 3. Home page



Figure 4. Product Registration Page

Conclusion

Most people or establishment disposes of their computers when it has outlasted their usefulness. The task however is that many of these computers would be discarded without cleansing them of information and this information can be easily recovered. In this study, it is however concluded that indeed data is being disposed of without due regard to security as the results revealed that about 32% of drives examined were correctly erased. It is quite apparent that most users are unaware of the fact that some data remains on their drives even after deleting them and this data can be recovered from these drives using data recovery software. With the current outburst in cybercrimes, identity theft, and other related fraud due care must be taken when disposing of used electronics such as computers. This study has shown that indeed using a simple 'off the shelf' or commercial data recovery tool, it is possible to recover some information

from computer hard drives disposed to Benin City. This research may be useful to persons who would want to try to recover personal files which have been unintentionally deleted from their computers.

Author Contributions

Conceptualization; methodology; validation; formal analysis; investigation; resources; data curation; writing-original draft preparation; writing-review and editing; visualization; supervision; project administration; funding acquisition; Oise Godfrey Perfection.

Funding

This research was independently funded by researchers.

Conflicts of Interest

No Conflicts of interest.

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