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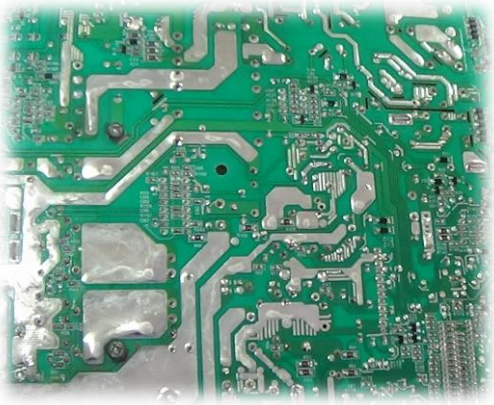
E-WASTE PROJECT – FINAL DRAFT REPORT



SWAZILAND E-WASTE MANAGEMENT PILOT PROJECT

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Thank you all.

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Glossary of terms: as used in context in this report the following terms shall mean as defined:

Collectors	Formal or non-formal bodies that collect e- waste. This may involve procuring bonded computers from government a and parastatals, collecting old computers from private sector organisation etc.
Consumers	An organisation or individual that uses electrical and electronic equipment and then discards it as waste after the equipment has reached its end-of-life and/or is rendered unusable, malfunctioning etc. Note that the end-of- life for a consumer is the functional use of the equipment by that consumer, and may feed into the second-hand market directly or through refurbisher(s).
Distributors/ Retailers	Include all bodies selling equipment to the end-consumer, including donated computers
End-of-life	Refers to the end of the useful life of equipment in a particular environment. The equipment may then be passed onto the second-hand market. Note that this is distinct from lifespan which describes the total functional life of the equipment.
Importers	Importers of branded and non-branded electrical and electronic equipment.
Recyclers	Businesses and individuals that do one or more of the following; collection, dismantling, separating fractions, and recovering material (e.g. plastic, copper, gold etc.) from e-waste after the lifespan of the equipment.

SUMMARY

The rate of e-waste generation in Swaziland has always been unknown, however it can now be estimated with a 'reliable' degree of confidence following an inventory undertaken by the Ministry of Tourism and Environmental Affairs through Swaziland Environment Authority, the national environmental agency, herewith also referred to as the Authority. This exercise has helped the Authority to better understand the present situation and is now in a better position to determine further measures needed to ensure environmentally sound management of e-waste in Swaziland.

In general, the assessment has unveiled that there is a lack of reliable data on the generation, collection, import and export of e-wastes, and management schemes for handling it.

It can be asserted that e-waste is mostly generated in areas with **access** to electric power. It is a known fact that the all these pilot areas are within the urban areas, however a majority of individual (household) respondents reside in rural areas and/or were able to give information including that of their rural settlement.

The ownership of electrical and electronic equipment has been found to cut across all income levels. However, the number and range of multiple electrical and electronic equipment units owned is higher in the high income segment.

Possession of IT equipment such as computer has been found to generally increase with the size of entities for the obvious reason of running the businesses effectively and efficiently, whereas refrigerators and televisions are found to be relatively higher in star hotels and restaurants due to the type of services provided, the number of customers served and the number of hotel rooms they have.

Government offices and NGOs, ownership of equipment such as computers and refrigerators is high. In academic and research institutions, the number of computers is relatively high. Government ministries and departments, banks, corporate businesses and NGOs are the dominant consumers of electrical and electronic equipment hence it is drawing to conclusion that they are currently the most important source of e-waste in the country, however the rapid penetration of electrical and electronic equipment in the general society will soon alter this picture to a more heterogeneous e-waste situation, particularly with regard to mobile phones, computers and their accessories.

Registered import volumes, stocks and penetration as well as estimates for annual e-waste generation for computers, mobile phones, television sets and refrigerators and their accessories is still being processed.

Electrical and electronic products are sold mostly via small shops distributed all over the urban areas. There is a significant flow of electrical and electronic equipment and gadgets to informal repair shops. The repairing process is done manually using common hand tools such as screw drivers, voltmeter and soldering tools to mention but some by first conducting tests to identify the problem with the equipment through removing the casing to expose the internal components that need to be repaired or changed. Should the item not be repairable it is usually abandoned by the owner and the repairer keeps it as a source of spare parts for other equipment otherwise it is discarded with municipal wastes. Generally there is lack of willingness to pay for collectors to take away non-functional electrical and electronic equipment. Most users of electrical and electronic equipment and generators e-waste do not care about whether or not collectors give a guarantee of safe disposal save for international corporates, NGOs and the high income segment of society.

OBJECTIVES OF THE E-WASTE FLOW ASSESSMENT/STUDY IN SWAZILAND

The general objective of the project is to assess the e-waste management landscape in Swaziland. Specific expected project output/outcomes for the projects are:

a) Produce a baseline study on the current state of e-waste in Swaziland
b) Map the strengths and weaknesses of the current situation in handling e-waste
   Meetings and discussions
c) Develop and enlarge the network of relevant stakeholders/key players in the existing 'e-waste flows', including the repair/reuse and recycling industry, the Electrical Electronic Equipment (EEE)supply sector, as well as government regulators/administration; and
d) Develop a roadmap for the way forward as well as recommendations for sound management of waste, e-waste in particular, advocacy efforts
e) Create awareness of the roadmap through workshop facilitation and media reports as necessary

Project goals/outputs achieved: Respondents were identified from various segments of the society considered as e-waste stream sources; and these comprise of households, business entities, academic and research institutions, wholesalers and retailers, government offices and non-governmental organizations (NGOs), and maintenance/repair shops. A set of four questionnaires was being used wherein all the e-waste stream sources were catagorised;

- recyclers and refurbishers,
- corporate and institutional consumers,
- importers, exporters and producers
- private/household consumers

The data collected data was being checked for completeness before being analysed. The Analysis was done using MS Excel. The data was collected in the six participating municipalitie:

MUNICIPALITY	Households	Collectors /recyclers	Corporate	Retailers	TOTAL
Mbabane	17	4	34	10	65
Manzini	1	1	11	5	18
Ezulwini	1	-	12	1	14
Piggs Peak	-	-	19	4	23
TOTAL	**19**	**5**	**76**	**20**	**120**

Six municipalities participated in the project implementation and a total of twelve technicians and inspectors were trained on environmentally sound management of waste, e-waste in particular, principles and best practices with particular focus on dismantling of IT equipment, management of waste from lighting equipment through recycling of spent fluorescent lamps and lights.

A partnership was formed between a local e-waste collector and a Microsoft approved computer Refurbishing Company in the regions (South Africa) wherein three computer technicians were trained on refurbishing computing equipment on functionality testing of received computing equipment, data cleaning, to 'mix and matching' of components using environmentally sound management methods.

A leading local newspaper has developed interest in the management of e-waste and has started reproducing 'stories' on e-waste and participate in all the meetings. During the month of July, two stories on e-waste have been in the newspaper (see extracts of the articles below)

Page 2 Times of Swaziland Friday, July 6, 2017

Times of Swaziland – Thursday, July 6, 2017

Local councils to crack the whip on E-Waste

BY THEMBINKOSI MAVIMBELA

MIDRAND – Some local municipal councils are taking a leaf from South African companies with the hope of cracking the whip on E-Waste.

E-Waste is unused battery or electricity powered material that is hazardous and includes computers, washing machines, remote controls, cellphones, and fluorescent lights to mention a few.

The six municipalities that are currently in Midrand, South Africa are Manzini, Matsapha, Mbabane, Pigg's Peak, Ezulwini and Ngwenya. The delegation from Swaziland also comprises officials from the Swaziland Environment Authority (SEA) and Contrawaste, a local company that specialises in E-Waste.

In a visit to Reclite, a recycling and recovery company in South Africa on Monday, Patricia, a manager at the company, stated that a lot of E-Waste was often disposed recklessly leading to dire consequences for communities.

She said E-Waste often had mercury, a substance she said was hazardous and caused serious health risks such as miscarriages, effects to the kidney, and brain damage.

"Mercury does not affect people instantly, but has undesirable long term effects," she said.

Patricia narrated that if not controlled, mercury could evaporate and be inhaled by human beings. She went on to say that some people disposed E-Waste in landfills not knowing that they are risking the lives of thousands of other people.

She explained that if the mercury from the electronic gadgets would be spilt onto the ground, it might be sucked by the ground and be washed into nearby rivers.

"Children play in rivers while others drink from those rivers and this may lead to them getting infections that will affect them in the long run," Patricia pointed out.

Yesterday, the Swazi delegation visited Africa waste, another E-Waste recycler where they were taught how to properly dismantle computers and which parts to avoid breaking.

Nadia, the manager at the company stated that some E-Waste like CRT monitors were hazardous once the screens were

Some of the participants of the workshop in Midrand, South Africa.

Page 2 Times of Swaziland Friday, July 6, 2017

Six municipalities in fight against hazardous waste

MBABANE – Bad habits will fall.

The first step to wiping clean the country's towns of hazardous waste has been initiated as six municipal councils gathered at the Swaziland Environmental Authority (SEA) to design a plan to combat bad disposal of the waste.

The six municipal councils were Ezulwini, Manzini, Matsapha, Mbabane, Ngwenya, and Pigg's Peak. Also at the meeting were representatives from SEA, Contrawaste, Ministries of Health and Labour and Social Security as well as one for the Swaziland Standards Authority (SWASA).

Recycling

Currently hazardous waste is not accepted by some recycling centres but is directly disposed at landfills. International standards dictate that waste such as old television screens, computer monitors; computer hard drives, fluorescent lights, printers, and light bulbs should be properly dismantled and recycled to avoid deadly consequences.

The existing practice of disposing such waste at landfills was described by SEA Environmental Engineer Mduduzi Dlamini as bad practice that needed to be changed. Dlamini said the way the waste was disposed put people's lives in danger and exposed them to terminal infections. He said that there was a need to find a long lasting solution and to have local authorities involved.

"We will start with a cleanup of all lights that no longer work but improperly stored then advance to collecting other waste later," Dlamini said.

There will be specially designed containers placed at different points by each of the municipalities where the public can dispose the waste. SEA is yet to deliberate on whether it will buy the containers for the municipalities or let each municipal council buy them and the Authority pays for the waste disposal with the money it would have used to purchase them.

Dlamini was of the view that the drop off points had to be guarded at all times as people might loot disposed items and rip out the metal and copper. Because of the unavailability of disposal points, he pointed out that people had the tendency of leaving their old electronic gadgets with technicians after realising that it would be expensive to fix them.

"They then buy new electronic supplies and leave the technicians to worry about disposing their old ones," Dlamini noted.

Emphasised

Contrawaste Director Nigel Sparkes emphasised that there had to be security to manage drop off points. This would ensure that people do not end up using the specialised disposal containers to throw away other waste.

The Pigg's Peak Municipal Council Environmental Health Officer Bongekile Dlamini revealed that they had already identified mini drop off points in their town. They will be in the townships, town, deport, and schools and the council has already began sensitising schools about responsible hazardous waste disposal.

"We will then collect the waste from the mini drop off points, place it at our deport where it will be collected by Contrawaste for disposal," Bongekile said.

Environmental Health Officer at the Municipal Council of Mbabane Samukelisiwe Nxumalo said there was a need to include buy back centres to help in the collection of the waste. She added that the centres were ideal because they were already in existence and people were used to utilising them for waste disposal.

"We cannot have many drop off points because they need to be managed and that comes at a cost," Nxumalo said.

It was said that there was a need to also involve companies in hazardous waste management.

Brenda Dlamini (L) and Samukelisiwe Nxumalo (R) following proceedings during the meeting.

Swaziland Environmental Authority's Environmental Engineer Mduduzi Dlamini stressing a point.

Govt equally responsible for the disposal of hazardous waste

MBABANE – What about government waste?

This was a question raised by the Environmental Health Officer at the Municipal Council of Mbabane Samukelisiwe Nxumalo who pointed out that there was a need for the Swaziland Environmental Authority (SEA) to deliberate with government on the issue.

Nxumalo was of the view that government was equally responsible for the disposal of hazardous waste and officials had to be on board with regard to the issue.

"Collaboration is important in the success and sustainability of the project," Nxumalo said.

The Municipal Council of Pigg's Peak Environmental Health Officer Bongekile Dlamini supported Nxumalo by saying that SEA had to implement a bottom up approach in engaging the government on the issue of waste management.

Dlamini raised concern that the government had its own policies regulating how

Four stakeholder meetings have been held thus far between the months of June and July 2017 wherein the first two were planning meetings and the last two were progress reporting meetings. Environmental risk associated with e-waste management was ranked in order of priority using risk factors such as those with component containing listed chemicals either in Stockholm Convention such as brominated flame retardants polybrominated diphenyl ethers and any other international treaty such as the Minimata Convention

on Mercury for mercury containing e-waste (lighting equipment) whose health effects ranked a priority to attend to immediately.

Participants during one of the stakeholder meeting/workshop

The on-the-job training on recycling of e-waste indicated that it involves the breaking down of all sorts of electronic devices without use of a hummer and fire because these electronic devices contain components that can be reused and/or recycled such as circuit boards and components containing some of the dangerous chemicals like mercury such as switches. Within these different parts are a wide range of toxic chemicals such as brominated flame retardants to keep the equipment, computers in particular, from catching on fire, mercury phosphor in the lamps that light up the screen and many other rare toxic materials.

Some of the Participants listening to the presentations

A job well done (environmentally sound management) dismantled industrial printing and copier machine

Step-by-step demonstration

Dismantled small office printing machine

E-waste Collection: There is only one 'formal' e-waste collection system identified thus far wherein an authorised Sumsung brand agent for mobile phones, in Swaziland, maintains a service where

damaged phones can be handed in for repair or exchange. This does includes all other electronics such as laptops and tablets that are insured as same is a repair agent for the insurance companies.

The assessment has thus far unveiled that there is some moderate volumes of e-waste collected and managed by scrap metal collectors and recyclers otherwise there is no other e-waste collection system developed Swaziland. Scrap metal collectors do not specifically focus on e-waste but on any type of metal-containing waste. Generally e-waste volumes from private households are still moderate and there is a common consumer behaviour of not giving away obsolete devices because they are considered to be still having value and scrap metal collectors and recyclers pay for waste they receive thus the general public are made to believe they can make money out of all the e-waste including non-value waste streams. It is envisaged that once devices such as computers, mobile phones and TVs are not regarded as luxury goods any more, the willingness to store obsolete devices will also decrease.

SCOPE OF STUDY

Geographical scope: The geographical boundary for this assessment and data collection with a field study was initially to be the Mababane-Manzini corridor and its environs, however for representative and wider coverage Piggs Peak Town has been added. This was based on the premise that Mababane-Manzini corridor is the heaviest consumer of ICT products and Piggs Peak Town is the only municipality outside this corridor with a functional waste management system including an approved landfill; consequently these areas have more challenges related to e-waste management. The data collection and subsequent analysis will be used to extrapolate the national e-waste situation and challenges.

Product scope: The assessment was limited the product scope to lighting equipment and IT equipment; specifically personal computers (or desktop PCs), laptops (notebooks), cathode ray tube (CRT) and flat panel monitors, printers, and related computer accessories. The assessment may extend to large household and industrial electrical and electronic equipment.

Assessment design and methodology

The project is being implemented through explorative/formulative assessment that looks to establish the state of the computer acquisition, use and disposal market in Swaziland. An assessment methodology framework was customized from a generic framework and describes the various stakeholders, the indicators for which data needed to be collected and the possible sources of data. The assessments collects both quantitative and qualitative data to establish the flow of e-waste and subsequent disposal.

Data collection methods and assessment tools: Data is being collected through document reviews of policies and laws which so far none have been found specifically focused on e-waste, interviews with stakeholders, as well as observations by data collectors. The primary data is being collected/obtained through administration of questionnaires to the respondents. Additionally interviews are being conducted with key persons in policy, regulatory and operational areas of the e-waste scene. These tools/ questionnaires are annexed.

Four sets of questionnaires with interview guide were adopted and customized to the Swaziland situation and are being administered. The questionnaires have specific sections relating to each stakeholder: importers, distributors, consumers, collectors/recyclers, and disposers. A sample of 150 interviewees is targeted for face-to-face interviews with representation from all the identified sectors. The sampling is purposive to address the non-homogonous nature of the population. Other

informers are households with access or located near dumpsites and international organisations (institutioanal) generating e-waste. The other target group for interview is policy-makers and regulatory agencies.

Further source of primary data is observation during site visits to a retailers and second-hand market, scrap dealers, repairs shops and dump sites. These are conducted to qualitatively map activities in the area, working conditions, and the source and state of old computers and other related e-waste, and the type of customers and their specific interests.

Key sources for secondary data being explored include government documents and similar research conducted in other countries in the region.

Target population and design of the field assessment: The e-waste handlers in Swaziland comprises stakeholders ranging from electrical and electronic equipment importers and retailers, consumers, repair shops/refurbishers, recyclers and final waste disposers. A working list is being developed for the assessment since the trading license regime does not disaggregate ICTs from general trade. This means that no definitive list of stakeholders is available from the Ministry responsible for Trade and Commerce. The list is to be developed through the data collectors' experience in the ICT market, interviews with key players in computer repair sector, importers, and those buying second-hand electrical and electronic equipment such as computers from government or corporate entities. The yellow pages and national directory are also being consulted. The field assessment targets 150 respondents from the 9 categories of stakeholders who are purposively sampled.

The 150-targeted respondents are categorised as follows:

Category		Target
Stakeholders	Retailers (includes Importers, suppliers and distributors)	40
	Consumers/end-user	10
	E-waste collectors /recyclers	10
	E-waste refurbishes/distributers of refurbished computers	5
	Government Ministries	18
	Corporate (including Institutions Public Sector Companies and Private Sector Companies	40
Households		20
Policy makers		4
International bodies		3
Total		**150**

Rationale

International context of e-waste management:

The fast growth of the information communication and technology sector globally is driven primarily by national initiatives to enhance competitiveness in the global information society. This has lowered the cost of electrical and electronic related equipment in many instances, and in many countries. In addition, the move towards information society initiatives such as e-government and e-education calls for the increased acquisition and use of computers, as well as programmes to increase computer penetration.

Against the high growth, is the high rate of obsolescence of such electrical and electronic equipment related to technological change, meaning that there is a need to dispose of large quantities of such equipment as computers. The United Nations Environment Program (UNEP) estimates that up to 50-millions tons of e-waste is generated annually worldwide.

As an equipment reaches its end-of-life, disposal challenges arise. While operational appliances do not pose a danger to the user, poorly disposed e-waste can result in severe health and environmental

hazards due to highly toxic substances, such as lead and mercury. It is therefore important to arrange for safe disposal of the computers and their components, which includes the right health and safety measures.

Most e-waste recycling in developing and countries with economies in transition is done informally and there is little regulation in place to safeguard the health of those who dismantle the electronic equipment. Additionally, many developing countries have been caught up in a web of global e-waste dumping disguised as donations and low cost affordable electrical and electronic equipment. This usually goes unnoticed due to the lack of legislation that governs the importation of non-functional, non-reusable and obsolete electronics into the various countries.

Responding to safety and health concerns, countries have taken a number of measures. Many European countries banned e-waste from landfills in the 1990s due to the fear that toxic substances will leach and contaminate underground water. In this regard, countries in Europe and Asia have developed a policy framework for e-waste.

The key thrust is for the manufacturers, importers, retailers and distributors as well as the consumers to take responsibility for the end-of-life disposal. In some systems, a fee/tax/levy is chargeable at the point of sale to cover the costs of disposal.

Some countries under the Organisation for Economic Co-operation and Development (OECD) have established recycling systems which ensure safe disposal and high collection rates partly financed by an Advance Recycling Fee (ARF) added to the sale price of new appliances, permitting consumers to return end-of-life equipment free of cost. Consumers have to return end-of-life equipment to retail outlets or collection points, from where e-waste is sent to specialised recyclers.

E-waste management also provides opportunities wherein the equipment is dismantled into various parts, some of which are valuable. For instance, circuit boards contain valuable metals, including gold that can be reclaimed and the shredded e-waste fractions are sold to recyclers.

According to the Swiss Association for Information & Communications and Organisational Technology (SWICO), up to 80% of the weight of a PC/server is metal and up to 53% of CRT monitors is glass, as illustrated in table below. These materials can provide a downstream market for recycled material.

Electrical and Electronic Equipment		**% of weight**						
	Average weight (kg)	Metals	Plastics	Metal-plastics	Cable	Glass	PCBs	Pollutants
CRT monitors	15.87	8	36	2	-	54		
LCD monitors	5.72	45	21	-	-	28	6	
PC/servers	13.39	80	6	1	3	-	9	1
Laptops	3.51	40	40	13	1	4	11	
Printers	11.70	61	60	5	1	1	3	
Large-scale copiers	90.96	68	68	9	3	2	5	

Source: SWICO Activity Report, 2007 (www.swicorecycling.ch)

Relevant International convention(s): There are two key international conventions regulating waste management; the Basel and Bamako Conventions. These Conventions emphasize that signatories ensure that the generation of hazardous wastes, and other wastes within a country, is reduced to a minimum, taking into account social, technological and economic aspects.
Where a country exporting the hazardous waste does not have the technical capacity, necessary facilities, or suitable disposal facilities to dispose of the waste in question in an environmentally sound and efficient manner, steps must be taken to minimize pollution and its health consequences as far as possible. This also applies to raw material exported for recycling or fraction recovery.

NATIONAL CONTEXT OF E-WASTE MANAGEMENT

Policy and legislative framework: Swaziland is a party to the Basel and signed the Bamako Convention and participated in Rio de Janeiro in 1992 where it supported the provisions of Agenda 21 amongst other declarations and statements of principle, such as the Rio Declaration on Environment and Development. Agenda 21 is a global plan of action supported by the United Nations which calls for the improvement of environmental information for decision-making.
At policy level, the Ministry responsible for environmental management, the Swaziland Environment Authority (SEA) under the Ministry of Tourisms and Environmental Affairs (MTEA) has a developed a National Waste Management Strategy (2018-2022)which is still in draft form. One of the key functions of the SEA is the full implementation of the Environmental Management Act, 2002 (EMA, 2002). EMA defines hazardous waste, pollutants and pollution. The strategic plan also emphasises the principle of polluter pays. To achieve this objective, the Ministry's role is to create an enabling environment through policy, legal and regulatory reforms for environmental and natural resources management. From the strategic plan, it is worth pointing out that the Authority has taken an all-inclusive approach on waste management issues to address all aspects of waste management. The wide scope necessitates that legislation on waste is defined in broad terms. Going forward it would be necessary to develop regulations that focus on specific aspects of waste (e.g. e-waste).
To realise its mandate, the Ministry's core functions are:

a) Formulation, analysis, and review of policy on environment
b) Monitoring and coordinating multilateral environmental agreements and formulating environmental laws and Regulations.

The Ministry derives its waste management policy framework from EMA, which requires each individual to safeguard and enhance the environment.
The Swaziland Environment Authority (SEA), created under EMA, is the regulatory agency in the implementation of all policies and regulations relating to the environment. Swaziland through SEA produced her first State of the Environment (SoE) report in 2001 and the second in 2014 and continues to report on a regular basis to the government through theline ministry MTEA. The Swaziland SoE is in line with the reporting standard accepted worldwide as a tool for measuring environmental progress towards sustainable development.
SEA's role as an agency of government is to provide leadership in pollution prevention and control and well as waste management guidelines. It acts as the principal instrument of Government in the implementation of all policies relating to the environment. In the Swaziland National Waste Management Strategy and its Action Plan (2018-2022), key objectives include universal compliance and enforcement of environmental regulations (waste in particular), facilitating the development of sector specific plans and guidelines and standards as well as the prosecution of offenders failing to meet the provisions of the EMA and all its regulations. SEA therefore works with the entire spectrum of stakeholders on matters of waste management and is therefore also expected to formulate and regulate policy that governs recyclers, downstream vendors and collectors in the e-waste sector.

The Waste Regulations 2000 and the Environmental Management Act 2002, and the Swaziland National Waste Management Strategy all in general stipulate that for any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed of such waste in the manner provided for under the law. This means that a person whose activities generates waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose of such waste in a designated waste disposal facility and that any person, whose activities generate waste, should segregate such waste by separating hazardous waste from non-hazardous waste and dispose of such wastes.

It is clear from the law that individuals and organisations whose activities generate e-waste have an obligation to dispose end-of-life equipment in a manner that takes into account its hazardous components. The law requires e-waste collectors and final disposers to register with SEA, through the waste licensing process and dispose of the waste at designated facilities.

Licences are required for the following operations:

a) Waste transportation (Special Waste Carrier License;
b) Waste disposal sites (General Waste Management License);
c) Waste treatment plants (Special Waste Management License);
d) Cross-border transportation of waste (Transboundary Permit).

The Act establishing the Swaziland Environment Authority (SEA) empowers SEA to issue orders and to apply in a court of law compelling any individual or organisation to immediately stop the generation, handling, transportation, storage, or disposal of any waste where such activity presents an imminent and substantial danger to public health, the environment or natural resources (EMA, 2002.

In addition the Urban Government Act, 1968 defines local government national policies, the Local Authorities also implements waste management policies, while the Ministry of Health (MoH) is concerned with health issues.

The Public Health Act, 1968, the Environmental Management Act, 2002 and the Waste Regulations, 2000, bestow authority on the municipalities to deal with waste. In discharging this mandate the local authorities have to take cognisance of the Public Health Act, 1968. Under these laws, it is the duty of every local authority to take all lawful, necessary and reasonably practical measures in maintaining its localities in a clean and sanitary condition and to manage waste in their respective jurisdictions.

Social aspects: Key results from the Integrated Labour Force Survey (ILFS) 2013/14 indicate that the official unemployment rate stood at 28.1% for both sexes, 24.4% for males and 32.2% for females. The rural unemployment rate was 15 percentage points higher than the urban rate and the unemployment rate for youth stood at 51.6%. It is evident that the majority of the unemployed especially the youth and women are absorbed in the informal sector. Commonly referred to as 'Bakamdodi', the sector covers all small-scale activities that are normally semi-organised, unregulated, use low and simple technologies, and employ few persons. This includes informal businesses working in the fields of waste collection. Due to the sector's lack of proper legislation, it is prone to exploitation and poor working environments. The Mbabane Manzini through Matsapha corridor leads in informal sector job creation because of the concentration of industries and the readily availability of reusable waste streams emanating from the industries and the government offices and departments.

The prevailing employment policies and their legal framework are contained in various policy documents and Acts of Parliament and foremost enshrined in the Constitution. The Constitution of Swaziland provides for the protection of the fundamental rights and freedom of individuals.

Child labour in Swaziland, which is defined for purposes of this report as work undertaken by children aged 5-17 years, which may prevent them from attending school, and which is exploitative, hazardous, or inappropriate for their age.
Most working vulnerable groups which are the woman, children and unemployed man do so to augment their family harvests and to some extents social income. Some of these vulnerable groups find 'employment' in the informal sector as scavenging at dumpsites for recyclables such as plastics and metals, which they deliver to recyclers. They also are engaged in dismantling of e-waste at the collectors' premises.
Country Specific Economic and Development Indicators: In the education sector e-learning programmes have gained popularity among schools and a number of institutions of higher learning are requiring typed assignments and at times submissions of such assignments electronically and many individuals are taking course offered online elsewhere. In order to accommodate more students in the e-learning programmes, the institutions have boosted the number of computers, in addition to other infrastructural requirements. There is a drive by the trainees, trainers/instructors to own computers to enable them to access learning resources at their convenience.
The prevailing favourable economic conditions have facilitated the rapid acquisition and disposal of computers by institutions and private individuals. At the same time, demographics also impact on the country's projected e-waste volumes. The national population stands at 1.2 million (CSO 2007), while the population growth rate is estimated at 1.6%. The median age is 20.5 years (CSO, 2007). The youthful population is more prepared to use computers as a working tool and therefore the rate of acquisition of computers is on the increase as the youth enter the employment market. It has been found that there has been substantial growth in national electronic communication and phone access, especially in the mobile telephone segment in the recent years. There was a rapid exponential grown in the national telephone access that was experienced in the year 2012/2013 as a result of the introduction of the fixed phone lines and the cell phones that were introduced by the national telecommunication company Swaziland Post and Telecommunications whose operation licence was later withdrawn and the services was abandoned and resulted in thousands of receivers and cell phones rendered obsolete and contributing to the ever increasing e-waste stream.
As of January 2014, there were 805,000 subscribers on the cellular networks in Swaziland according to World Factbook, U.S. Central Intelligence Agency and according to MTN Swaziland there were 879375 by end 2014 showing an annual increase of 74375 subscribers and by end of 2016 there were 969854 subscribers. Since there is no manufacture and the price is not controlled, the cost of handsets and the demand for service are both high and this situation encourages the mass importation of 'grey' and second-hand handsets, which are comparatively cheaper but have a shorter lifespan and typically because either their battery or system unit soon dies out.
The increase in the number of cyber-cafés/internet-cafes and mobile phone outlets in Swaziland, in general, has been observed, which is evidence of the rapid growth in the communications sector. These cyber-cafés operate with five or more computers, most of which are second-hand (refurbished) therefore have a short life.

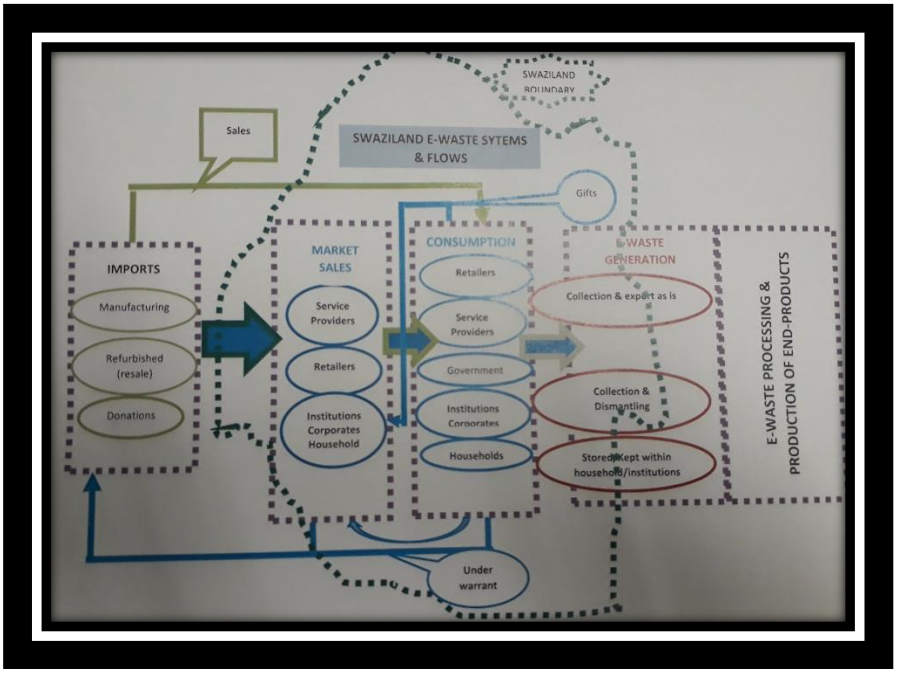
E-waste mass flows

Preliminary findings of the assessment of flows indicate that the consumer obtains the electrical and/or electronic equipment either from an importer, authorised distributor, general trader or a

manufacturer who supplies directly to the market or through a retailer. The preliminary findings indicate, so far, that after the end-of-life of these equipments, the disposal process is not clear. In established e-waste frameworks for international corporates ISO compliant corporates a formal or informal collection system exists to collect the equipment. These equipments are fed into the second-hand market through auction sales and/or as donations. The second-hand market seeks to extend the life cycle of the equipment by reselling it as is with very few requiring repairing (further attendance to) before selling. The assessment has found that there is no refurbishing activities of either computing equipment and/or any accessories taking place. The Repairing involves changing parts to make the equipment operational. Once repaired, the equipment is sold to a consumer as a second-hand and the process is repeated. When the equipment is deemed to be beyond repair, it is dismantled by use of hammer to recover the copper containing component material. Some recyclers of ferrous and nonferrous materials are aware of the valuables from electrical and electronic equipment especially the cables.

The study, so far has found that either the whole equipment is discarded or is used for something else or just piled up or indiscriminately discarded or abandoned with the repair shops or disposed as any other waste to the disposal facility.

In Swaziland there are no manufactures of any IT and lighting equipment. The study has so far found authorised distributor for Hewlett-Packard and Samsung amongst the many brands in the markert such as, Acer, Dell, Toshiba and Lenovo readily available in many outlets without any manufacture warranty. Many different brands of lighting equipment are in trade without any manufacture warranty.



The Market Flows of Electrical and Electronic Equipment in Swaziland and Waste from Electrical and Electronic Equipment within and out of Swaziland

E-WASTE GOVERNANCE STRUCTURE

A brief of the various ministries and parastatals responsible and how they relate to e-waste management is given below.

Ministry of Tourism and Environmental Affairs (MTEA): Designs policies that govern environmental issues. The ministry through its parastatal, the Swaziland Environment Authority,has adopted a more participatory approach to waste management that is evidenced in the draft Swaziland National Waste Management Strategy and its Action Plan. It gives guidelines to the local authorities on ways and means of dealing with waste.

Ministry of Health (MoH): formulates policies that govern health care waste management and any other calamity that has the potential to affect the health of humans and according to the Public Health, waste is a nuisance which when not handled properly leads to diseases.

Ministry of Information Technology and Communications (MITC): The mandate of this ministry is to formulate policy on ICT in broad terms. Under the ministry, is an autonomous body the Swaziland Communication Commission, which is a regulator in the communications sector.

Ministry of Commerce Trade and Industry (MCTI) and the Swaziland Standards Authority: The Swaziland Standards Authority is an autonomous body under this ministry which develops standards that are used in the pre-export/import verification of conformity programme with the aim being to minimise the risk to Swaziland of unsafe and substandard goods from entering Swaziland through the execution of conformity assessment activities in the country of export. SWASA is expected to do pre-shipment inspection of second- hand goods including computers to ensure that they are usable.

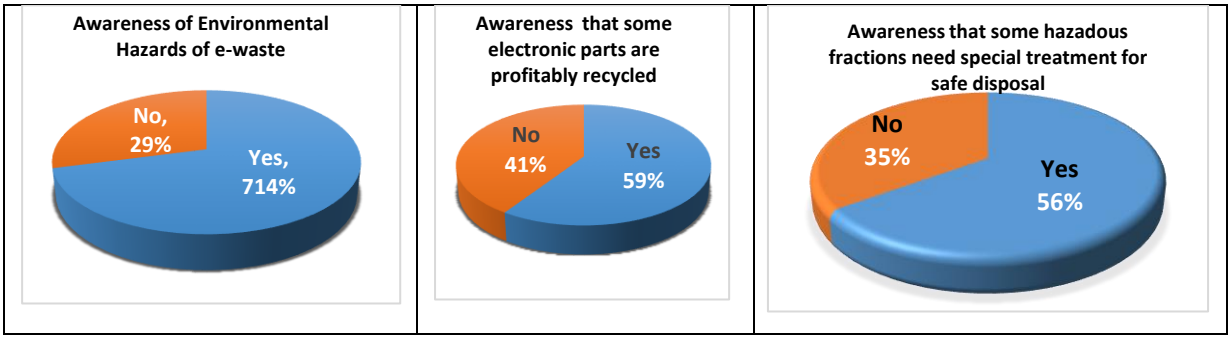
Swaziland Revenue Authority: This body is charged with the task of revenue collection. It also collects statistics of goods, including electrical and electronic goods, which are imported into the country.

Local Authorities: Under the Environmental Management Act, 2002, the Waste Regulations, 200, the Public Health Act, 1698 and Local Government Act, 1968, it is within the mandate of local authorities to deal with environmental management duties that include cleaning, solid waste management and maintenance of waste management infrastructure but because e-waste is a recent phenomenon, it is not clearly defined in the activities of the municipalities.

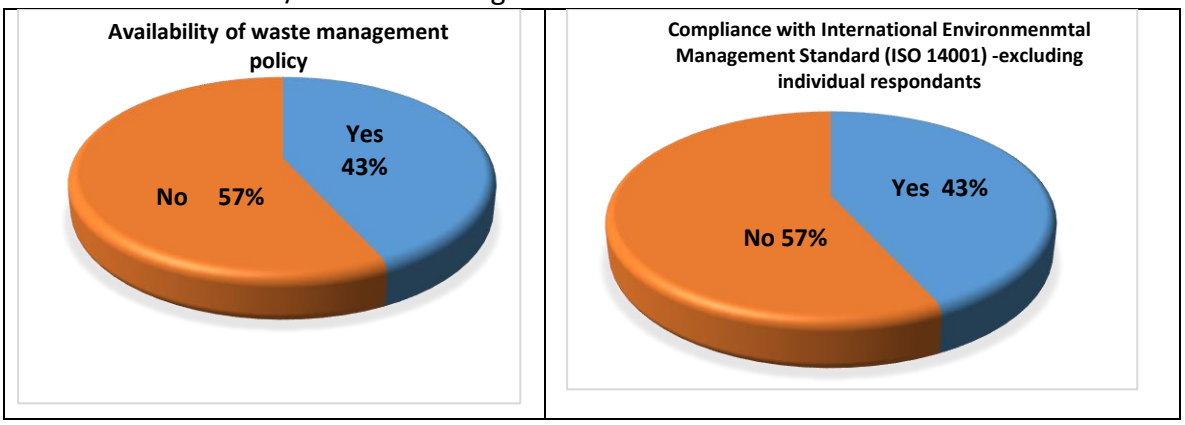
STAKEHOLDER ANALYSIS

Stakeholders in the value chain were interviewed, and the results are presented in this section.

Assessment of the levels of Awareness: The level of awareness of the environmental hazards of e-waste was found to be high amongst the all the respondents with 71% aware and only 31% not aware while there was an almost equal level of awareness on that some electronic parts can be profitably recycled with 59% aware and the remainder 41% unaware.

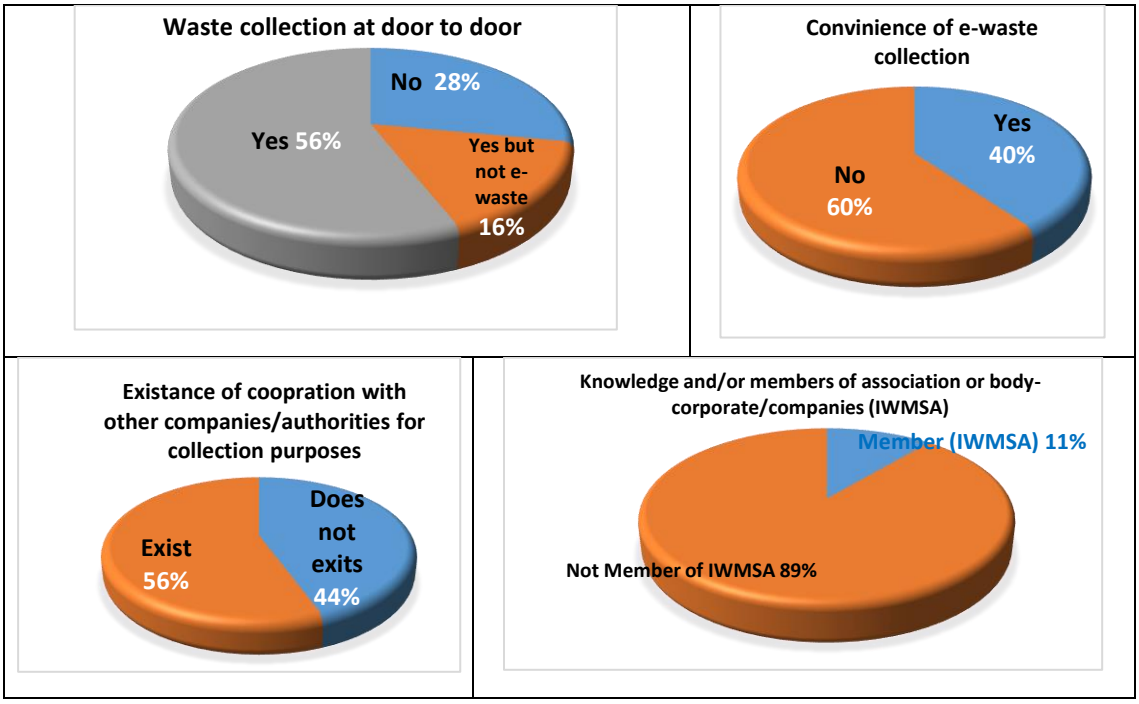


Only 43% of respondents (institutions, organizations and companies) have a policy/policies related to environmental and/or waste management.

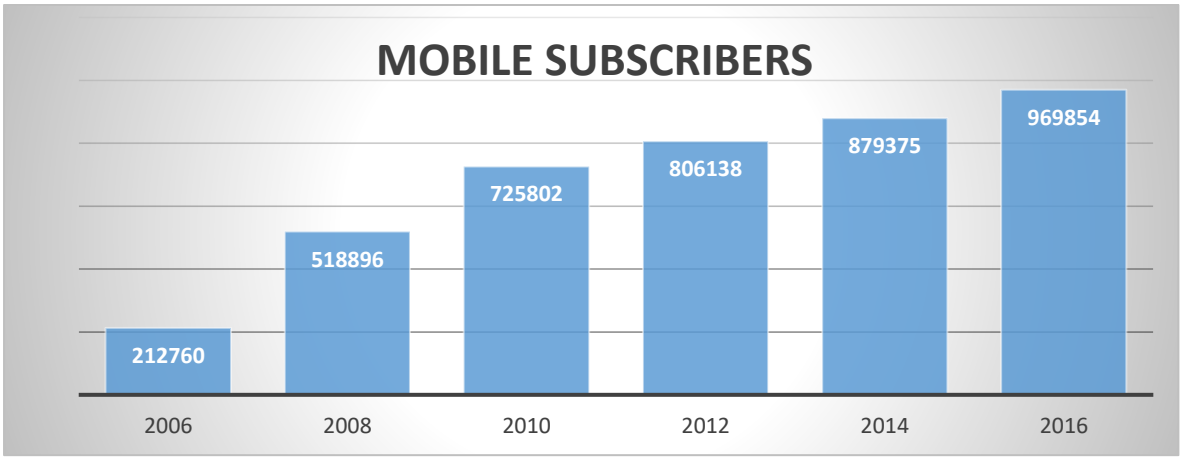


56% of private/household respondents have access to door to do all general/household waste collection, 28% do not have that access and 16% have access but e-waste collection excluded. Only 40% of those with access to door to door waste collection including those with access but excluding e-waste are conveniently serviced. 56% of respondants with access to the waste collection indicated that there exist a collaboration with other companies/authorities for collection purposes with the remainder 44% indicating that there is no collaboration.

Only 11% of respondents (corporate and waste recyclers) have knowledge and/or are members of a waste management association, the newly formed Institute of Waste Management of Southern Africa Swaziland Chapter (IWMSA-SD) in particular.

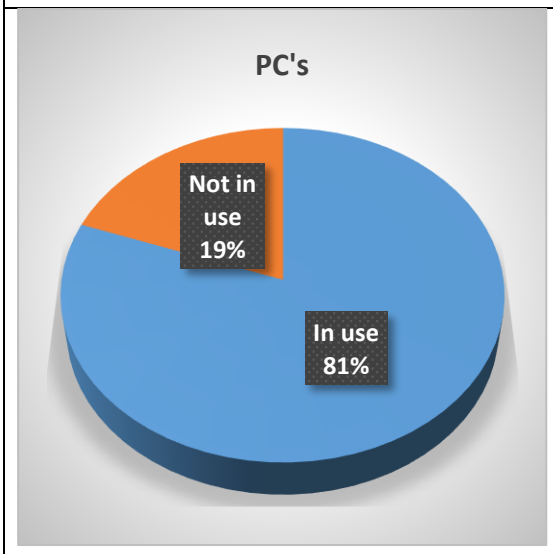


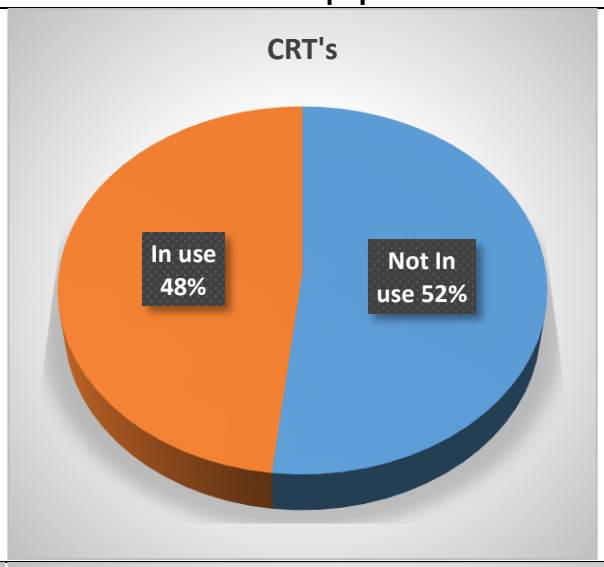
Between 2006 and 2016 there was a 456% (212760-969854) increase in mobile subscribers.

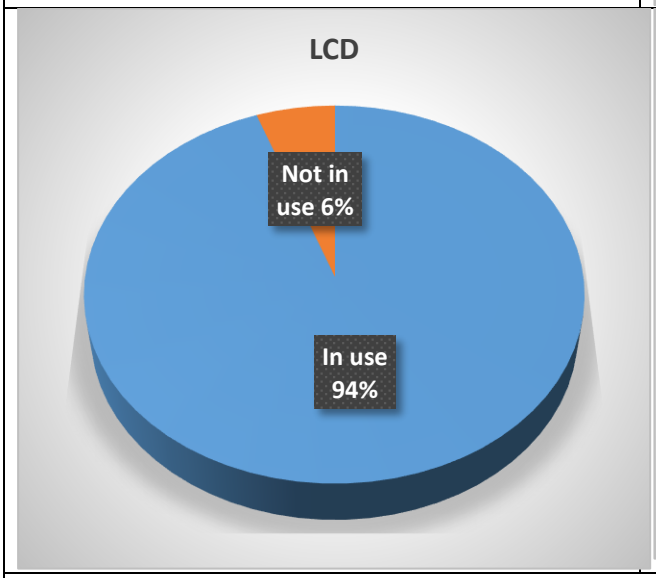


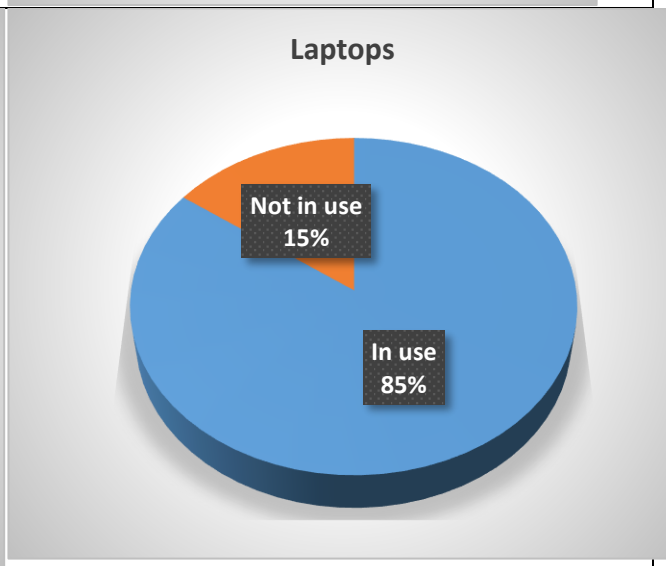
Stakeholders in the IT equipment supply value chain were interviewed, and the results are presented below.
Alternatively in percentages, the in-use and not in-use analysis of each tracer equipment is further demonstrated below as follows;

Information & Communication Electrical and Electronic Equipment

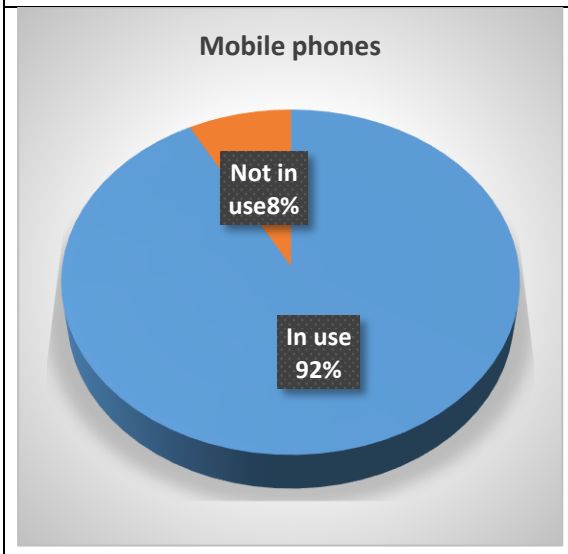


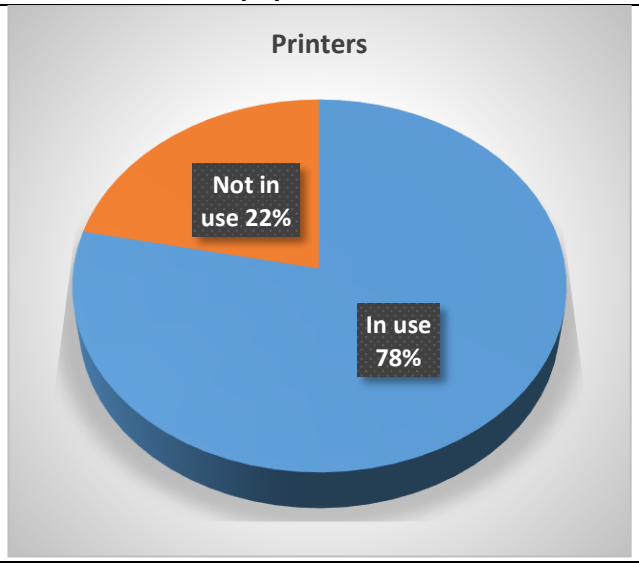


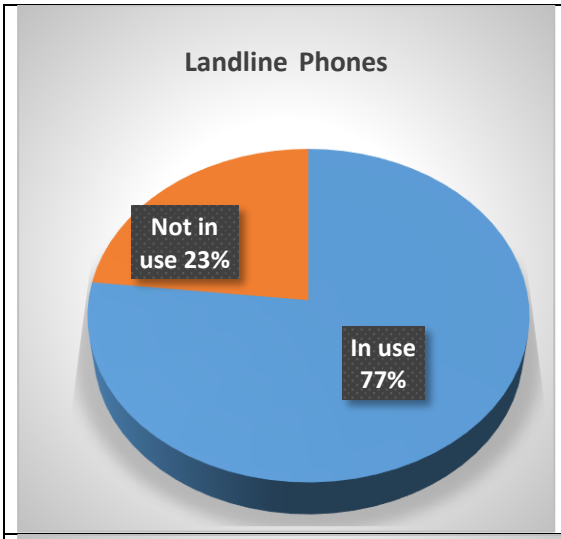


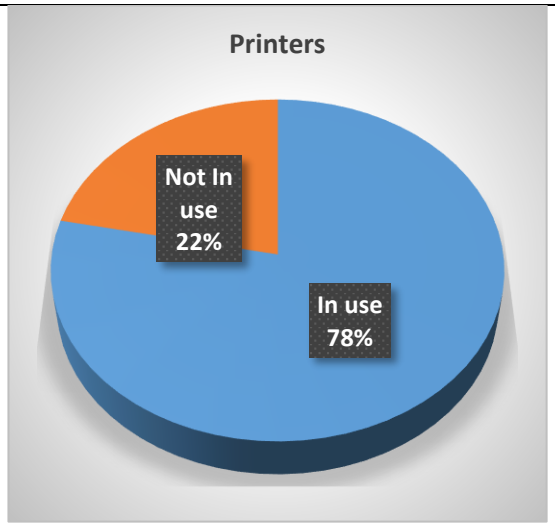


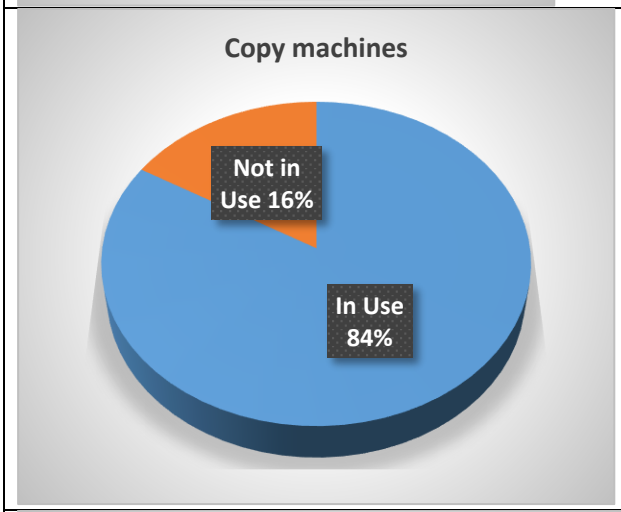
Telecommunication Electrical & Electronic Equipment

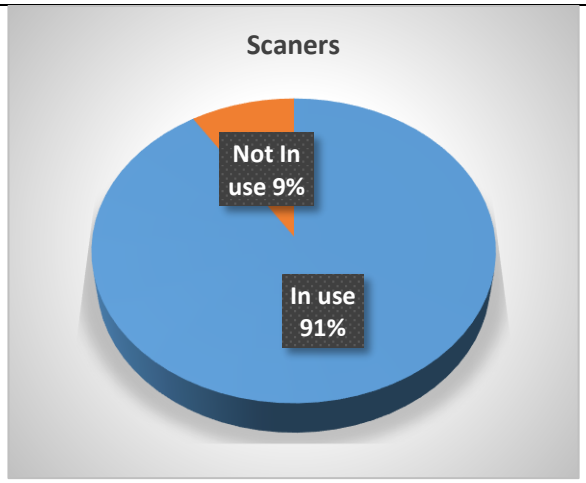


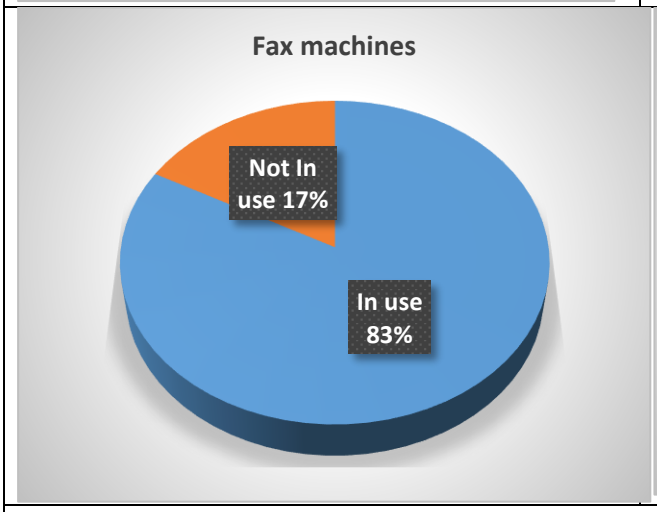


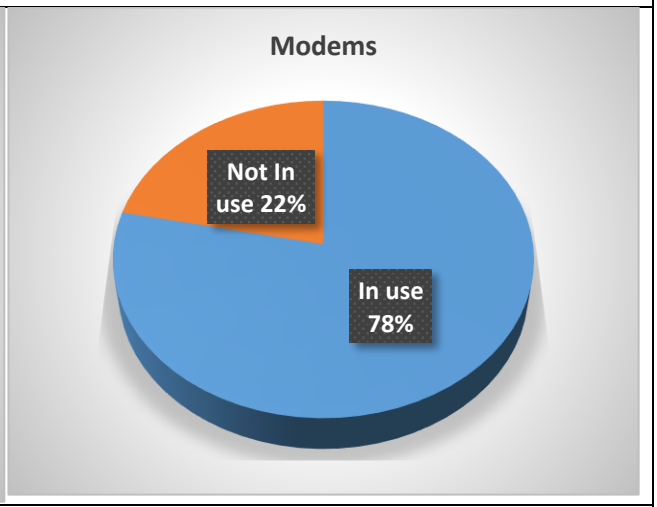




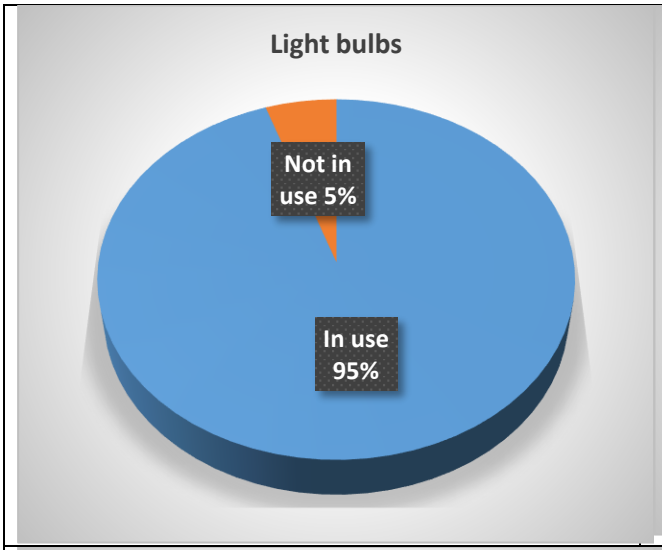


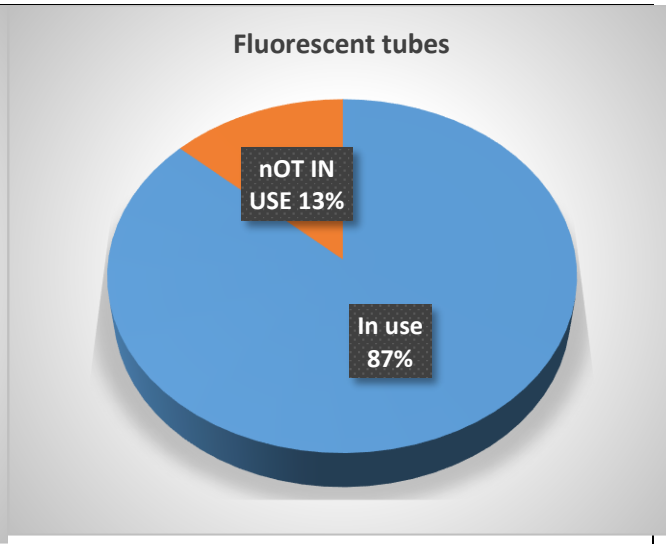


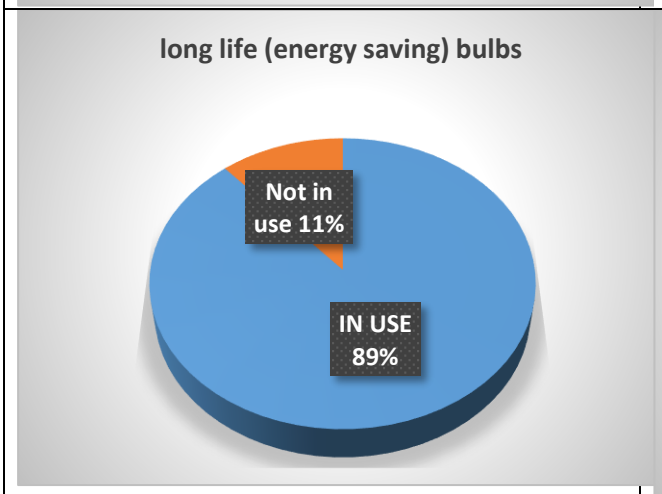


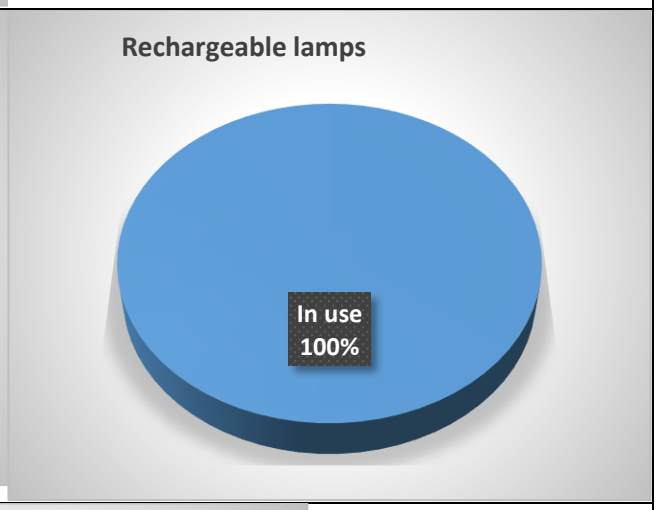


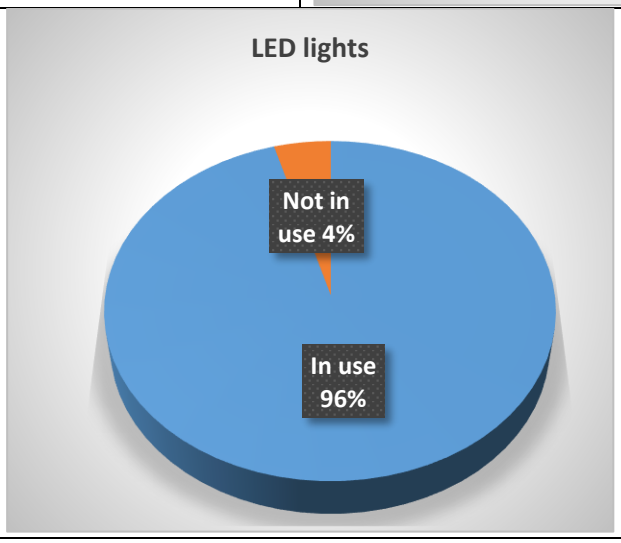
Lightning Electrical and Electronic Equipment


Light bulbs
Not in use 5%
In use 95%

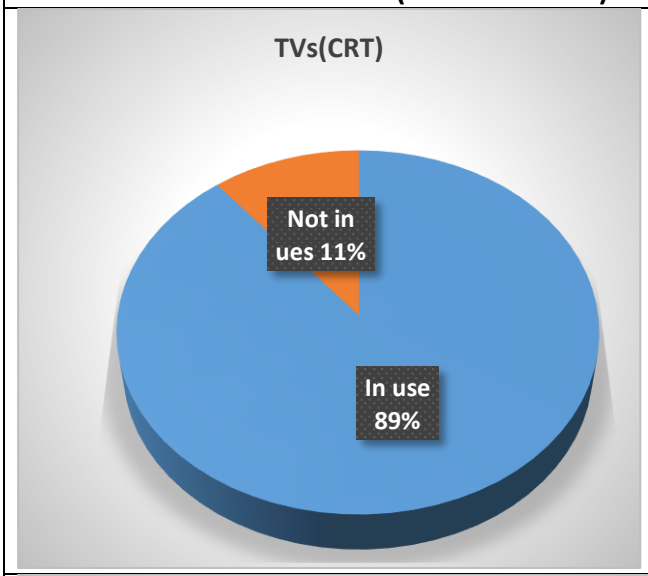

Fluorescent tubes
nOT IN USE 13%
In use 87%

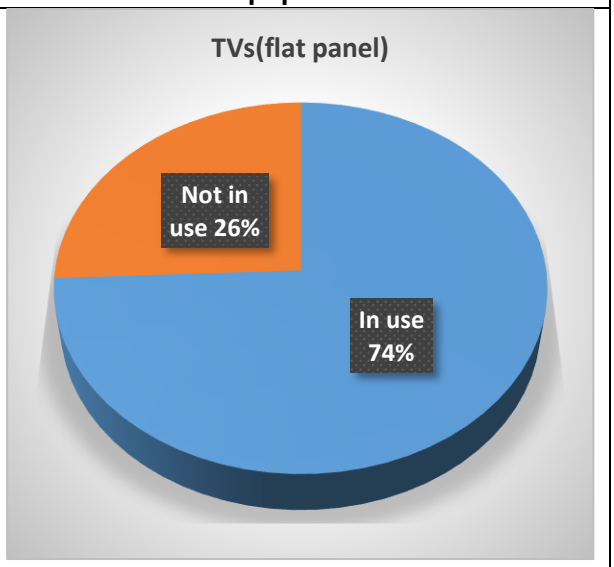

long life (energy saving) bulbs
Not in use 11%
IN USE 89%

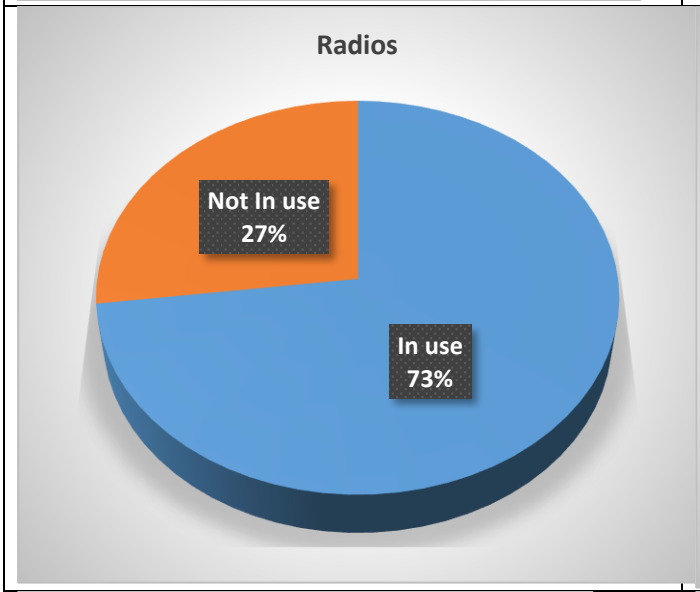

Rechargeable lamps
In use 100%

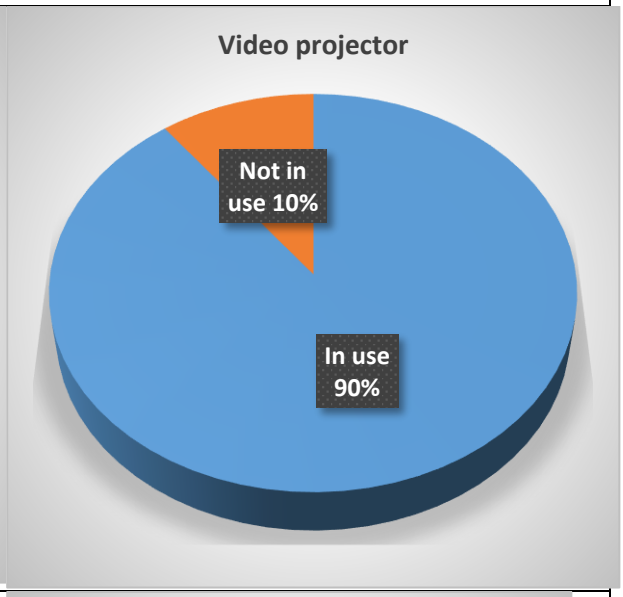

LED lights
Not in use 4%
In use 96%

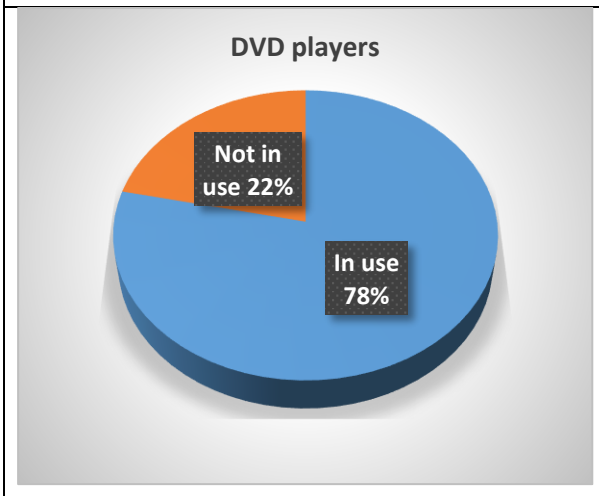
Household (Entertainment) Electrical & Electronic Equipment

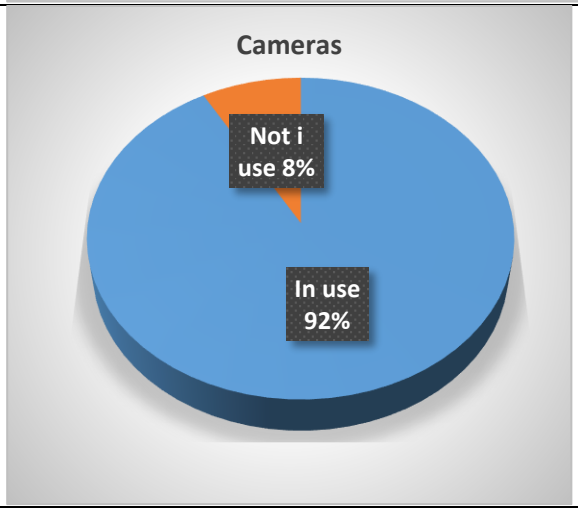




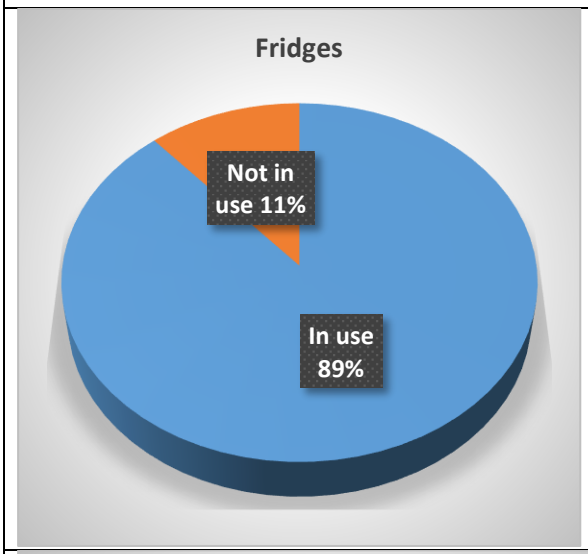


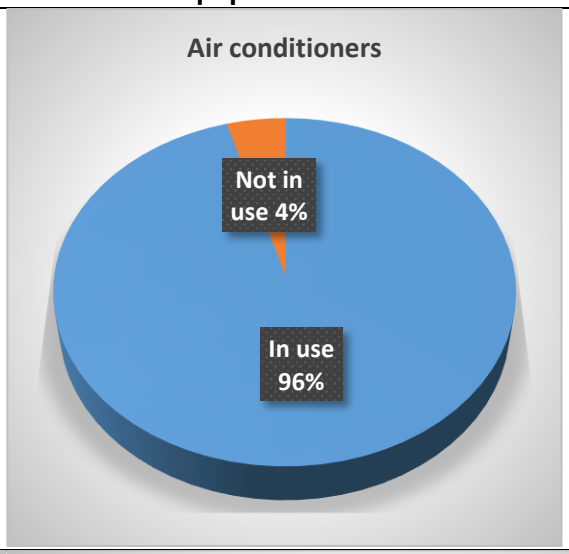


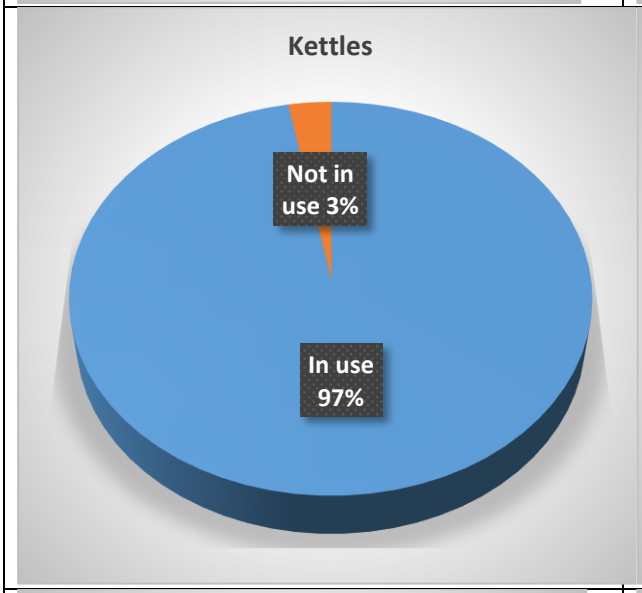


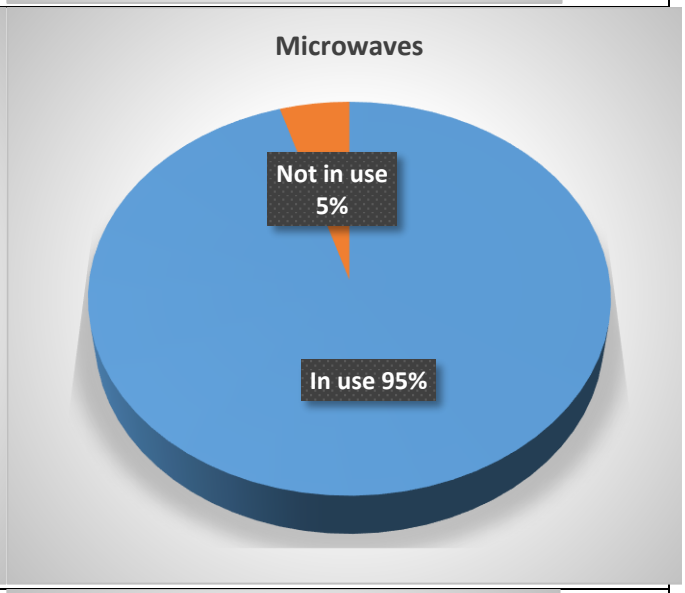


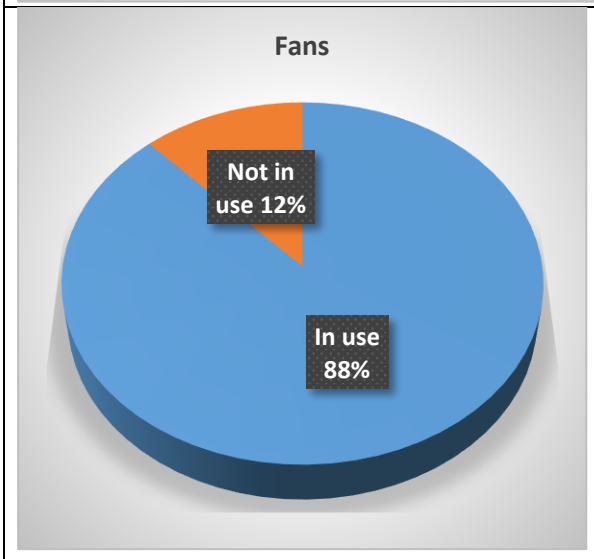
Household Electrical & Electronic Equipment

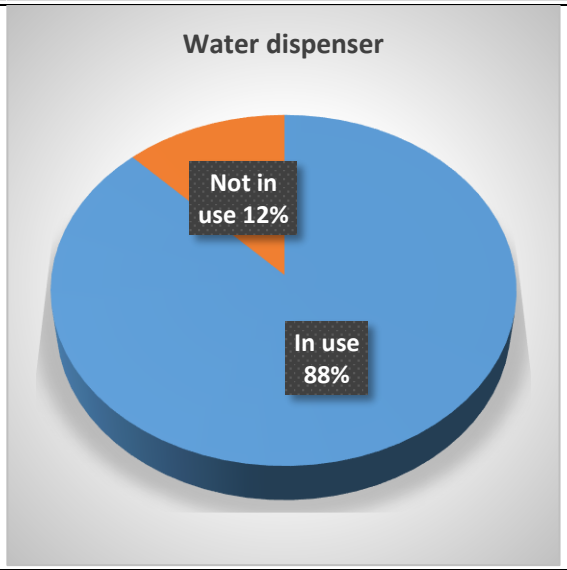






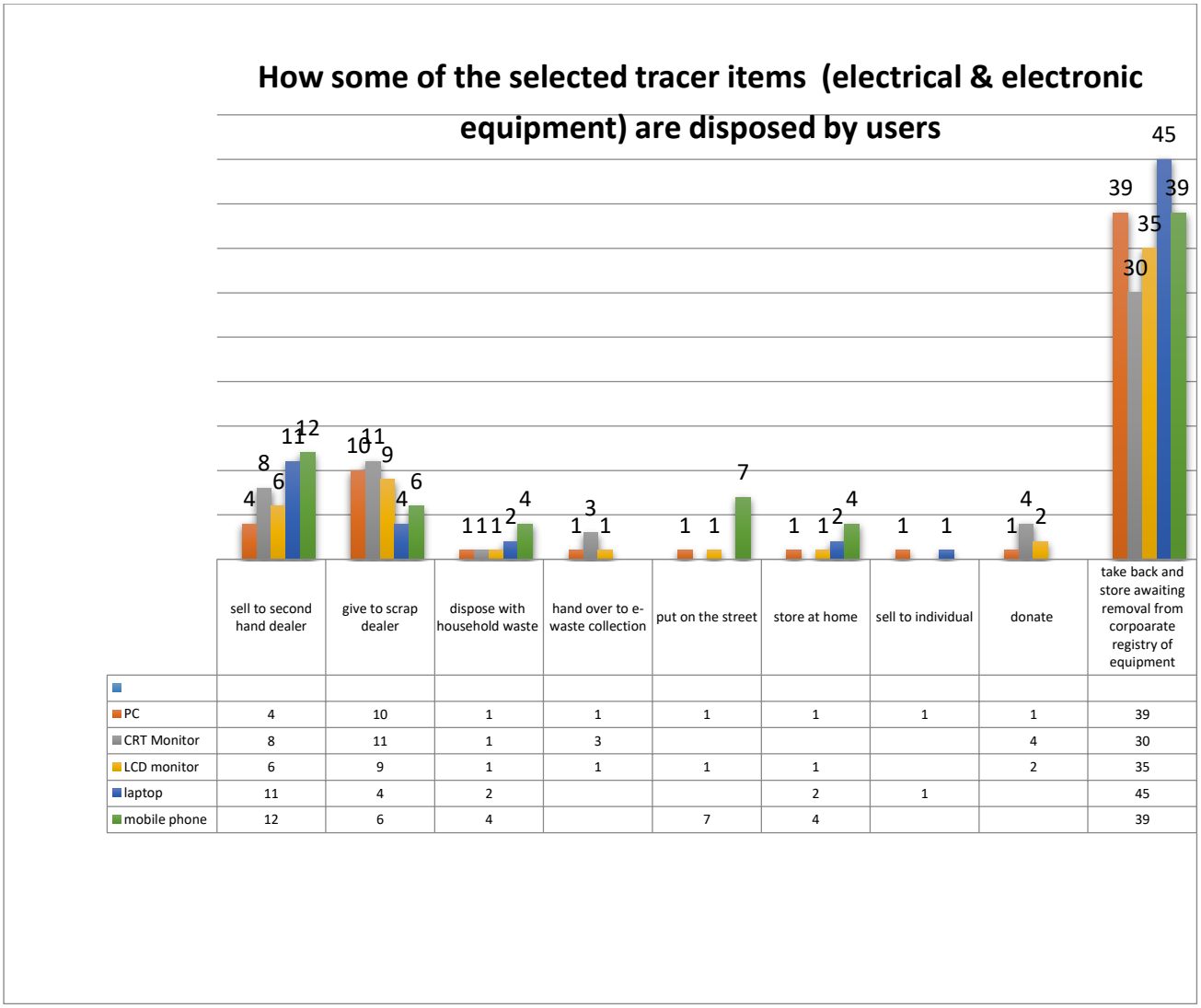




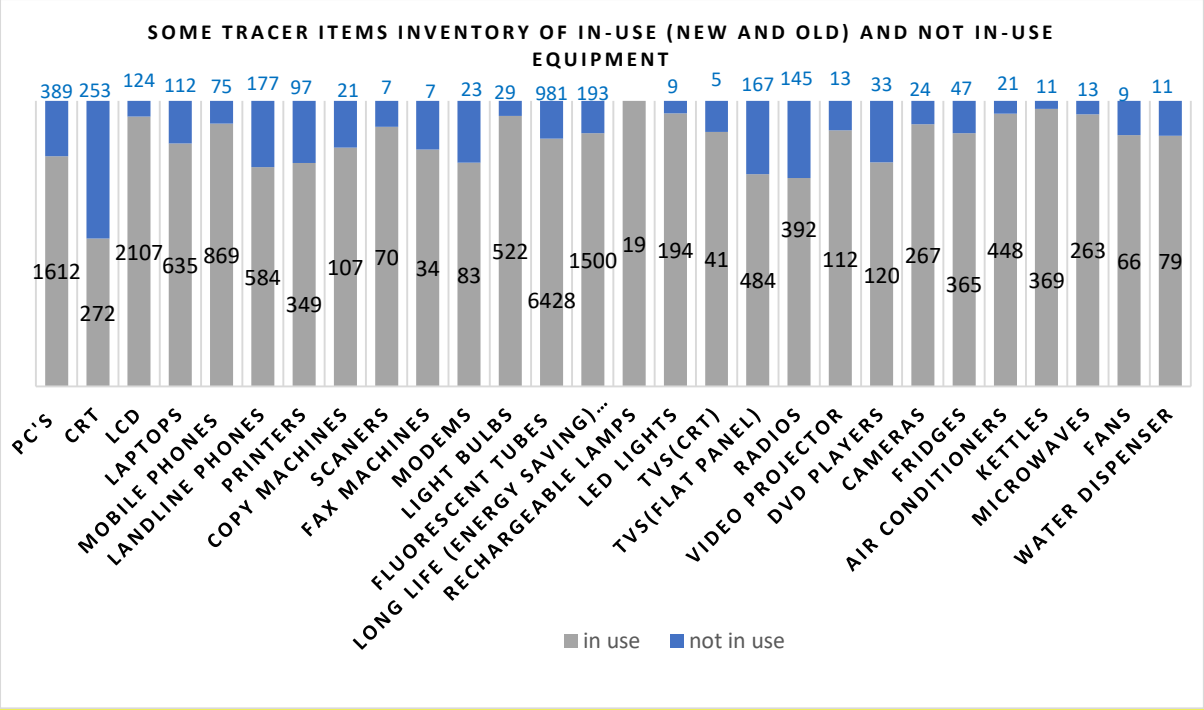


The current ratio between in-use (new and old) and not in-use equipment is very high with all the tracer items. Of note is that the not in-use equipment are either defunct and/or broken therefore considered waste by any standard and definition. Further to that almost all the in-use equipment are 2-5 years old. These equipments are at their end-of-life stage. Since none of the respondents indicated that they have a policy regarding extended user responsibility beyond the end-of-life stage of the equipment, presenting a major challenge when it comes to the final disposal all these equipment in the next few of years to come.

All the respondents indicated that they purchase their equipment from general distributors, retail outlets, none indicated that they purchase from the formal second-hard market an indication that consumers are purchasing equipment from established operators therefore these operators should be obligated to extend their responsibility and deploy ways of playing a role in final equipment disposal.



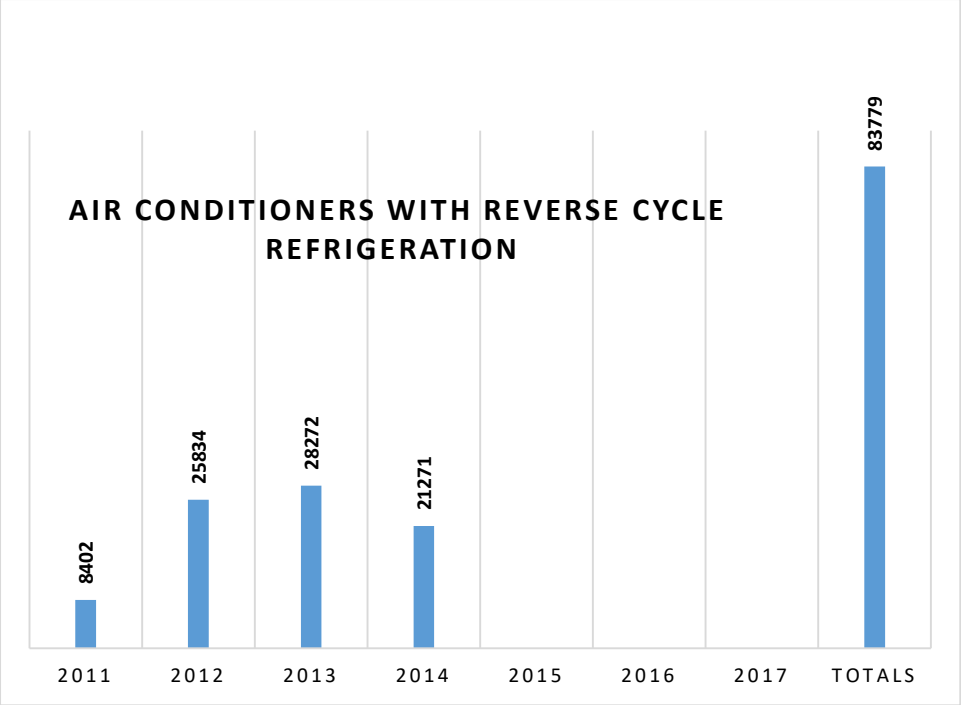
	sell to second hand dealer	give to scrap dealer	dispose with household waste	hand over to e-waste collection	put on the street	store at home	sell to individual	donate	take back and store awaiting removal from corpoarate registry of equipment
PC	4	10	1	1	1	1	1	1	39
CRT Monitor	8	11	1	3				4	30
LCD monitor	6	9	1	1	1	1		2	35
laptop	11	4	2			2	1		45
mobile phone	12	6	4		7	4			39

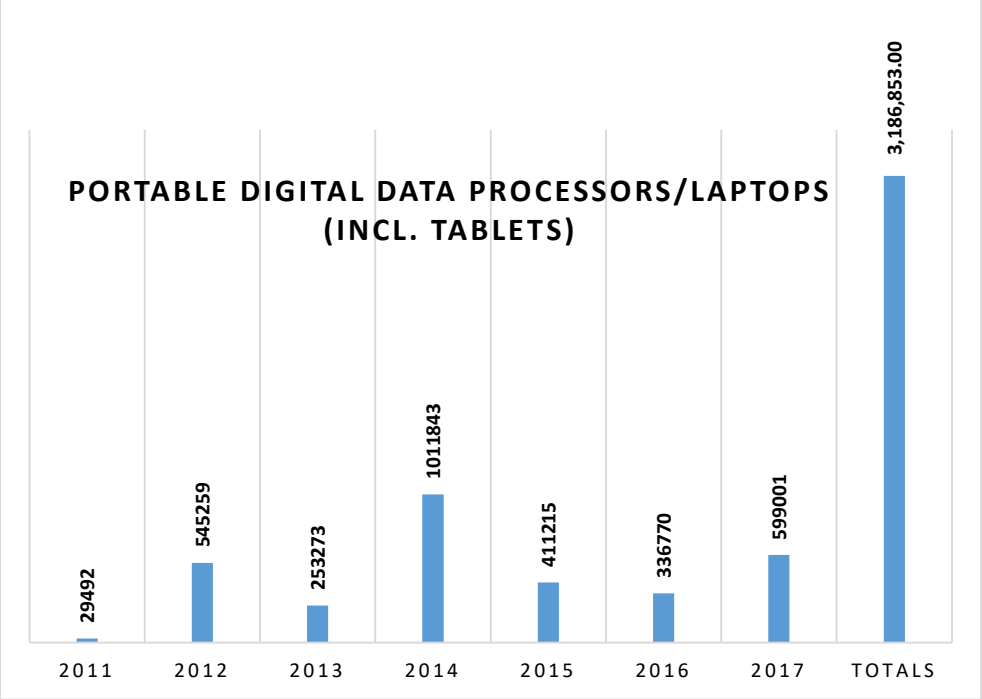


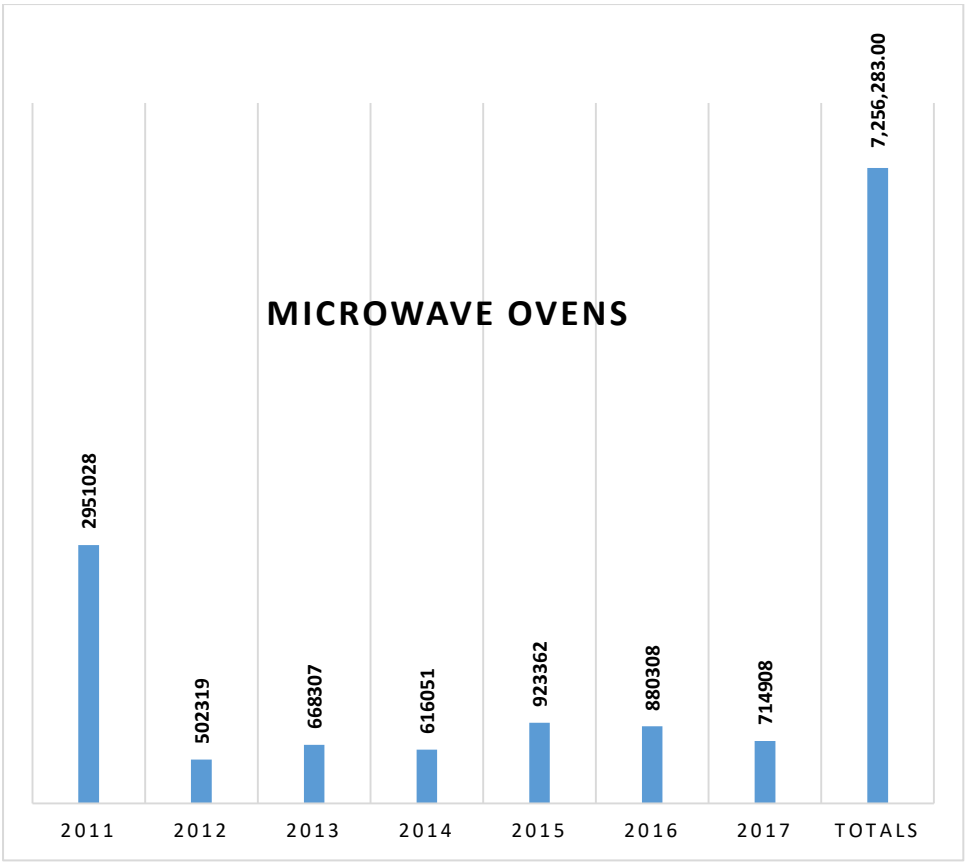
The current ratio between in-use (new and old) and not in-use (defunct/broken) equipment is very high, with desktop all the tracer items an indication that implying that soon these equipment will get to their end-of-life and will be ready for discarding.
Since all the respondents indicated that they purchase their equipment from general distributors, retail outlets, none indicated that they purchase from the formal second-hard market an indication that consumers are purchasing equipment from established operators therefore these operators should be obligated to extend their responsibility and deploy ways of playing a role in final equipment disposal.

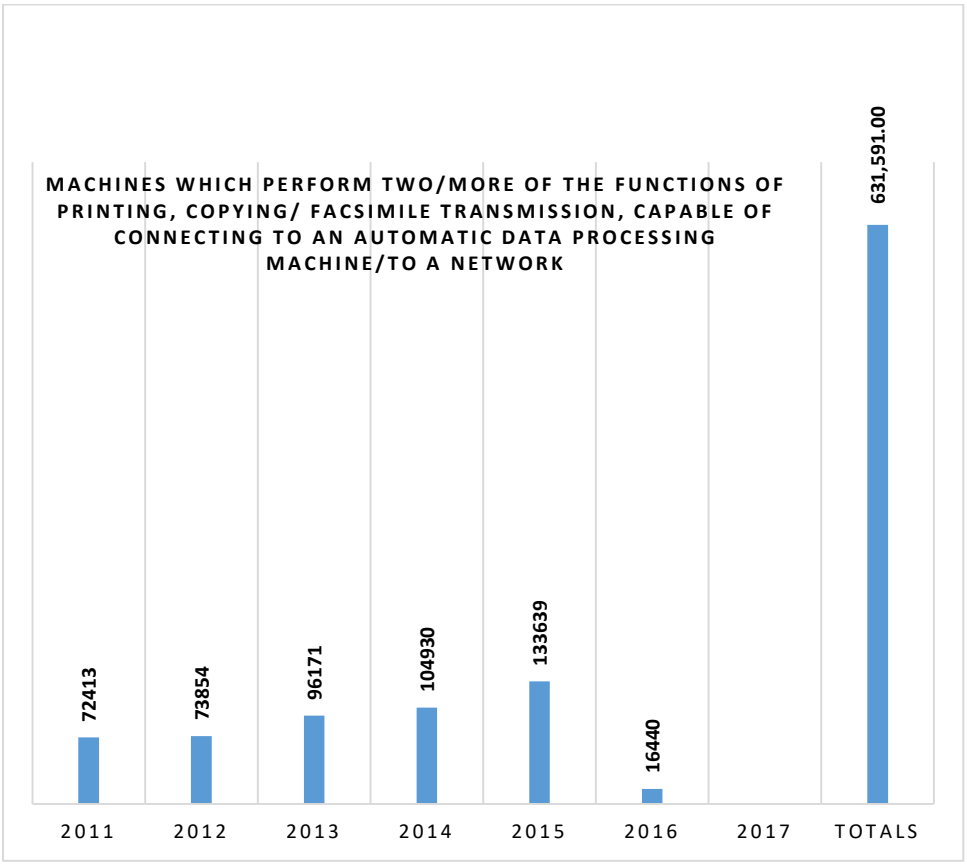
IMPORT DATA OF SOME ELECTRICAL AND ELECTRONIC EQUIPMENT (TRACER PROCUCTS)

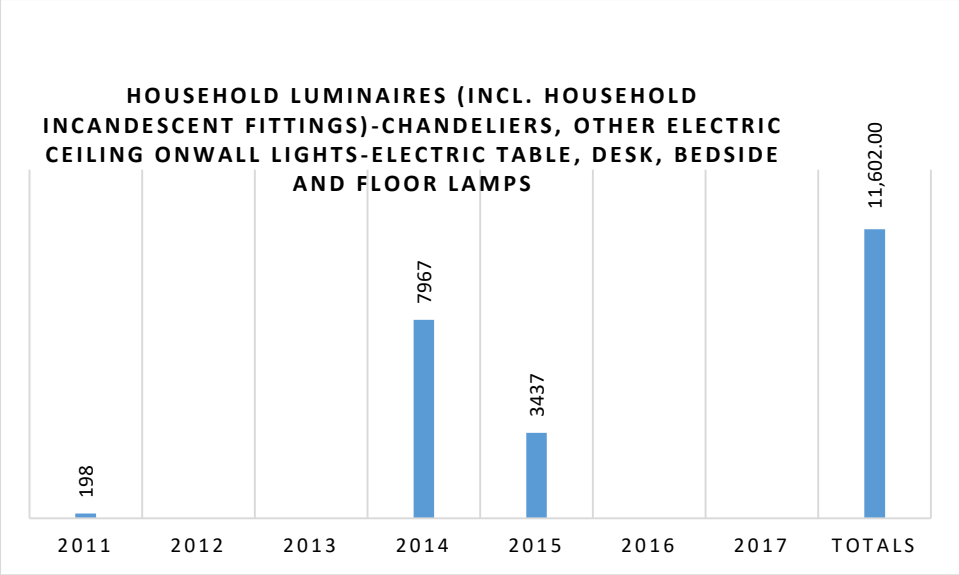
Following are the quantities of some of the tracer products imported into the country received from the customs and duty national office through the Swaziland Revenue Authority. Further analysis of quantities need to be done in another study. The large import quantities cannot be justified under this study a detailed material balance and other support assessment analysis can only justify the consumption rates as reflected in these import figures.

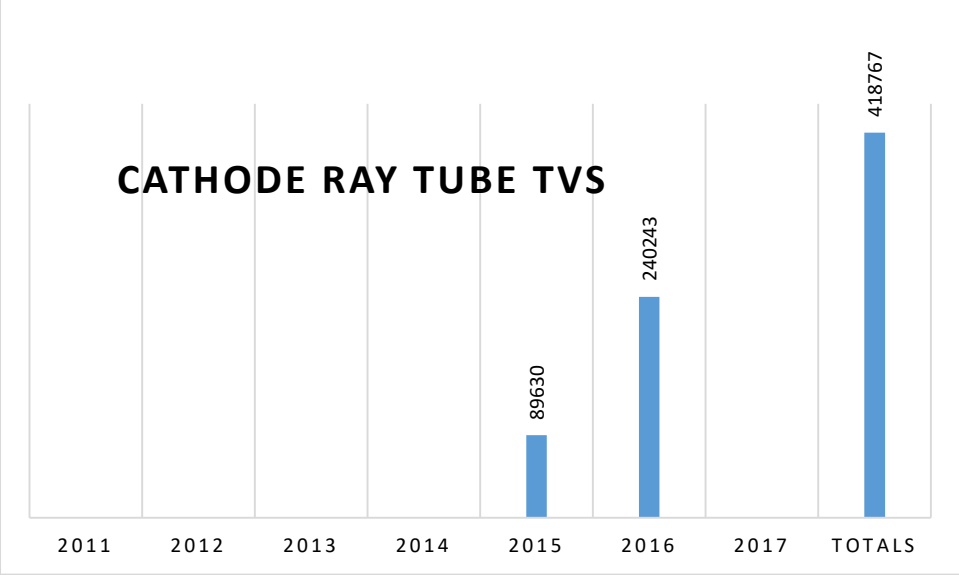

AIR CONDITIONERS WITH REVERSE CYCLE REFRIGERATION
8402
25834
28272
21271
83779
2011
2012
2013
2014
2015
2016
2017
TOTALS

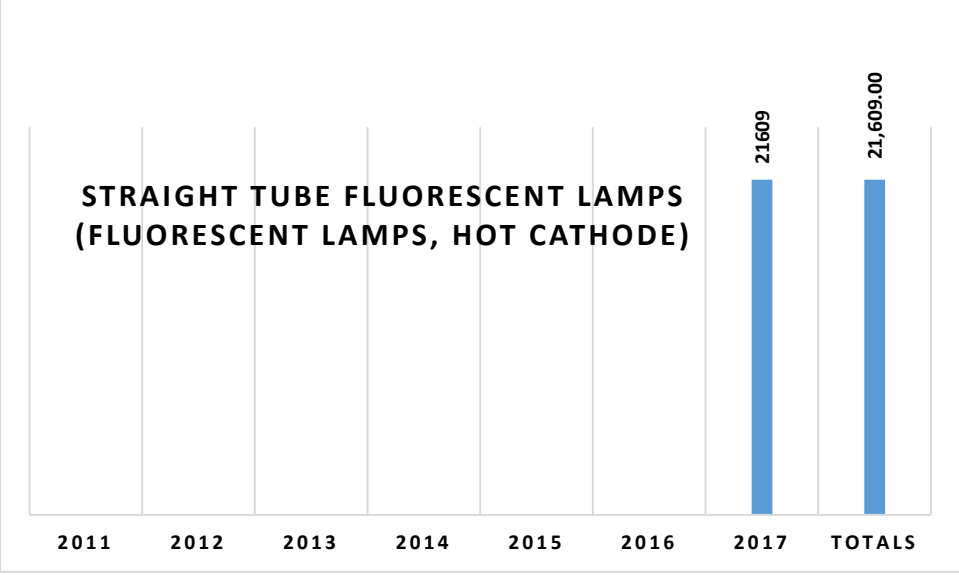

PORTABLE DIGITAL DATA PROCESSORS/LAPTOPS (INCL. TABLETS)
29492
545259
253273
1011843
411215
336770
599001
3,186,853.00
2011
2012
2013
2014
2015
2016
2017
TOTALS


MICROWAVE OVENS
2951028
502319
668307
616051
923362
880308
714908
7,256,283.00
2011
2012
2013
2014
2015
2016
2017
TOTALS


MACHINES WHICH PERFORM TWO/MORE OF THE FUNCTIONS OF PRINTING, COPYING/ FACSIMILE TRANSMISSION, CAPABLE OF CONNECTING TO AN AUTOMATIC DATA PROCESSING MACHINE/TO A NETWORK
72413
73854
96171
104930
133639
16440
631,591.00
2011
2012
2013
2014
2015
2016
2017
TOTALS


HOUSEHOLD LUMINAIRES (INCL. HOUSEHOLD INCANDESCENT FITTINGS)-CHANDELIERS, OTHER ELECTRIC CEILING ONWALL LIGHTS-ELECTRIC TABLE, DESK, BEDSIDE AND FLOOR LAMPS
198
7967
3437
11,602.00
2011
2012
2013
2014
2015
2016
2017
TOTALS


CATHODE RAY TUBE TVS
89630
240243
418767
2011
2012
2013
2014
2015
2016
2017
TOTALS


STRAIGHT TUBE FLUORESCENT LAMPS (FLUORESCENT LAMPS, HOT CATHODE)
21609
21,609.00
2011
2012
2013
2014
2015
2016
2017
TOTALS

SWOT ANALYSIS

The assessment recognized that the current unstructured e-waste management system has both strengths and weaknesses. Some of the key strengths include that volumes are still at a manageable level; that it generates employment and revenue for Swazis; that Ministry of Tourism and Environmental Affairs with SEA are developing an integrated waste management policy; and that there is significant general recycling activities taking place in the country.

In terms of weaknesses, the assessment has revealed that the lack of an e- waste management system has led to e-waste being stockpiled at homes, offices and repair shops, and that there is limited national capacity to process e-waste.

The fact that the informal sector of stakeholders in the e-waste management system are not recognized by the existing policy and legislative framework is worsening the situation.

These weaknesses are compounded by the fact that at the ports of entry and the people generally are not able to distinguish between new ICT equipment and re-furbished ICT equipment. This is because of the 'false' declaration and weak monitoring/inspection of the quality of goods hence a significant amount of second-hand and re-furbished stock, with a short life span, is finding its way into the country.

The lack of waste management policy with a distinguished e-waste component and regulatory framework as well as clear mechanisms to separate hazardous waste including e-waste from other solid waste has led to final disposal being hazardous, with environmental consequences.
However, on the positive, e-waste management has created employment opportunities and the informal recycling activities and those that have been developed around disposal facilities and dumpsites can be formalized. It was noted that available funds, such as Environment Fund, the Tinkhundla (Constituency) Development Fund and the Youth Fund, can be used by small community based development groups and entrepreneurs to improve the lives of the various communities.

Other opportunities include the fact that some retailers and distributors are showing commitment to take back defunct used and broken equipment under the product warranty and insurance and that there are some stakeholders, in particular consumers (users), are willing to contribute to e-waste management.

Significantly, some municipalities have allocated land as buy-back centres for recyclable waste streams wherein e-waste collection is also earmarked to be part of the recyclables.

(Strengths and weaknesses are internal factors - Opportunities and threats generally relate to external factors)

Strengths	Weaknesses
✓ The environmental management regulatory authority (SEA) has taken note of the e-waste challenge and key stakeholders are involved. ✓ Volumes are at a manageable level ✓ Employment creation and revenue generation ✓ Ministry in process of developing an integrated waste management Policy ✓ Draft National Waste Management Strategy in place	× Low national priority for e-waste × Lack of coordinated approach across government ministries to deal with e-waste challenges × Lack of awareness of the need for an e-waste management system × Limited national capacity to process e-waste

✓ Regulator has built e-waste management into waste management licensing	× Lack of a mechanism to separate e-waste from other waste streams × No or limited extended producer/supplier responsibility × Lack of collection systems leads to e-waste being stockpiled at homes, offices and repair shops.
Opportunities * Willingness by some stakeholders to contribute to e-waste management * Some municipalities have allocated land for buy-back centres where local e-waste recycling can be started. * Employment opportunities * The informal business in recycling found around dumpsites can be formalized * Some suppliers and service providers like Sdeez (Authorised Samsung service provider) have shown commitment to take back malfunctioning genuine and old Samsung cell phones. (???equipment) * Leveraging on existing e-waste management facilities in neighbouring South Africa * Environment Fund available that can be used by small community driven entrepreneurs * Government stockpiled equipment can be accessed to increase volumes and business case for recycling	**Threats** × No regulatory and policy structures to safeguard health, environmental and social consequences of e-waste × Limited capacity of government agencies to deal with e-waste × Visible environmental impact (e-waste has environmental consequences) × Significant amount of second-hand equipment in the market with short lifespan × Political buy-in and continuity uncertainty (government changes every 5years)

PRELIMINARY CONCLUSION(S)

From the assessment, the following key conclusion(s) can be drawn;

- The e-waste phenomenon is relatively new in Swaziland. Decisions made today will affect our environment in the future.
- E-waste management policies are lacking, and there is no legislation to deal properly with the challenge
- Because there are no e-waste disposal options available and there is very low level of understanding of the residual value of e-waste, there is high accumulation of old ICT equipment in homes, offices and repair shops.
- For the recycling of e-waste, Swaziland heavily depends on the informal (unorganized) sector as only a handful of organized e-waste recycling material collection entities (businesses) are available.
- The desire for the latest electronic gadget even if the one in use still works perfectly fine thus e-waste is expected to be a huge problem in the future, given the ever increasing rise in importation since 2011. It is therefore imperative that measures are put in place to address the emerging challenge;
- From the importer/distributer, consumer to the final disposer, knowledge on where to discard e-waste is lacking.
- The electrical and electronic equipment waste management challenge is not a simple one, it is caused by a combination of complex issues over and above the ones outlined above including but not limited to a lack of a national e-recycling infrastructure and low public awareness of what can be recycled and how and most electronics are still not typically designe*d* to be recycled.
- A large number of workers are involved in crude dismantling of electronic items for their livelihood and their health is at risk. There is an urgent need to plan a preventive strategy in relation to health hazards of e-waste handling among the workers in the informal waste management. This calls for scaling up information sharing and awareness and education at all levels and sectors and such information and awareness should be provided to the workers in the informal sector regarding safe handling of e-waste and personal protection.

PRELIMINARY RECOMMENDATIONS

Arising from the conclusions the following recommendations are proposed:

a) End-of-life volumes are moderate and can be handled well.
b) There are indications that unsound recycling and disposal is practiced. There are some indications that e-waste is disposed-of in an uncontrolled manner.
c) The majority of obsolete e-products is currently stored in government premises, offices or households awaiting future solutions.
d) Scrap metal collection centres are already host to active informal collection and look to be typically taking over the e-waste collection and recycling. As an informal e-waste collection and recycling system develops in an uncontrolled manner, severe negative environmental and health effects have to be anticipated, therefore, it is advisable to take proactive measures, including the following:
    i. further develop a system for e-waste collection from offices and businesses
    ii. Widen the scope to other e-products such as large household electrical and electronic equipment with better recycling value to augment for the non-value waste.
    iii. Develop solutions for non-valuable fractions
    iv. Develop a National and local e-waste Strategy and Action Plan with a financing mechanism for e-waste recycling
    v. Take into Account the whole life-cycle of electrical and electronic products for effective e-waste management.
    vi. MTEA needs to promulgate a policy and develop specific regulations on e-waste to govern the handling process from collection to final disposal, and licensing of key actors including ways they will be supported to ensure safety. Other ministries that need to be engaged are the Ministry of Information Communication and Technology and Ministry of Health.
    vii. MTEA through SEA and other stakeholders need to create awareness of e- waste and the safe handling of e-waste. A key focus should be to create awareness on how to dispose unusable equipment through an organised collection and disposal system.
    viii. Local Authorities should require that e-waste is collected and disposed of separately from solid waste by e-waste collectors hence waste sepatation at source is to be implemented and enforced.
    ix. SEA should establish a mechanism to raise funds for the expensive process of e-waste management. An option is to charge a fee to the importers/distributers/suppliers of used electrical and electronic equipment.

KEY PRIORITY AREAS & ROAD MAP

As a way forward, the pilot project has identified three priority areas that need immediate attention. The pilot project has further demonstrated conclusively the need to establish an e-waste management system including and supported by an enabling policy and regulatory framework.

Priority Action	Lead Stakeholders	Champion
Advocacy/awareness raising (creation)	MTEA, MHUD, Tinkhundla, SEA, Municipalities	Municipalities
Reform of the Regulatory framework to accommodate sustainable e-waste management	MTEA, SEA, Municipalities	MTEA
Setting up facilities for e-waste collection and processing	MHUD, SEA, Municipalities	Municipalities

Issue	Why an issue	Strategy/Plan	Responsibility	Time Frame
Policy	No policy framework to work with	Develop a policy framework with; * Extended producer/user responsibility. * Business opportunities * Illegal dumping consequences * Safe disposal procedures	MTEA (SEA)	2018 - 2020
	Disjointed policy, strategies and plan initiatives			
	Possibility of increasing dumpling			
Reform of the Regulatory framework	Existing regulations do not address e- waste management	* Develop licencing protocol for all e-waste operators and actors * Establish and sustain safe e-waste drop off points, storage and disposal sites * Set training standards for personnel handling e-waste to be enforced by the local authorities	SEA MOUD Municipalities	2018 - 2019
	No regulatory framework for e-waste management			
Impacts of e-waste	There is already a global concern and evidence of the negative environmental and social impacts of e-waste	* Establishment and sustaining an e-waste management (collection, storage and disposal) system.	SEA Municipalities	2017 - 2019
		* Build capacity and provide support to stakeholders (municipalities) to handle e-waste	MOUD SEA	2017 - 2018
		* Provide support to existing and upcoming e-waste management initiatives by municipalities and/or private sector as well as community initiatives.	MOUD Municipalities Tinkhundla	2017 - 2020
		* Raising awareness of e-waste management at all levels	SEA	
	Sale of some fractions generates income and employment (business) opportunities	* Promote and encourage investments in e-waste * Harness opportunities for increased income generation and job creation	Ministry of Commerce and Industry (MOCI)	On-going

PROJECT EXPENDITURE SUMMARY REPORT

The project "*Pilot Project on Environmentally sound management of e-wastes in Swaziland*" was funded by the European Union. The project is a part of the technical assistance of the Secretariat of the Basel Convention and is implemented by the Swaziland Environmental Authority (SEA).

Category	E-waste Swaziland	Unit Description	Quantity	Unit Cost (USD)	Total Cost (USD)	Expenditure (USD)
	Activity					
(i)	Staff and other personnel costs)	Project coordination costs	4	700	2,800	2,769
		National Consultant at a rate of USD 2000 per month (preliminary inventory of e-waste flows in Swaziland)	4	2,000	8,000	9,384
		Sub total			**10,800**	**1,2153**
(ii)	Travel	Transport costs for 34 participants to travel to the meeting venue located in the outskirts of the capital for two meetings at a standard rate of USD 20 per person per meeting	68	20	1,360	10,656
		Travel costs for an expert for two days stay in Swaziland			1,400	
		Sub total			**2,760**	
(iii)	Logistical arrangements and facilities	Lease costs for skip bins adequate for accepting and temporarily containing e-waste located across 10 locations for public use, including collection of e-waste skips/bins, transportation of e-waste skips/bins and separation of e-waste			3,904	
		Developing working tools to facilitate and support the on the job training for the demonstration training for 5-10 persons			4,000	
		Travel costs for an expert (from South Africa) for two days stay in Swaziland				
		Two coffee breaks for 34 participants at a rate of USD 7 per person for Inception meeting and Evaluation meetings	238	2	476	
		Two lunches for 34 participants at a rate of USD 25 per person for two meetings person for Inception meeting and Evaluation meetings	850	2	1,700	
		Venue and other workshop support	680	2	1,360	
		Sub total			**11,440**	**10,656**
	Total				**25,000**	**22,809**