



MAURITIUS RESEARCH COUNCIL
INNOVATION FOR TECHNOLOGY

E-WASTE QUANTIFICATION AND CHARACTERISATION

Final Report

July 2009

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REPORT

Presented By the MOLG and UTM

E- Waste Quantification And Characterisation

PROJECT REPORT

E- Waste Quantification And Characterisation

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Executive Summary

This report provides an indication of the quantity and the different types of electric and electronic waste (E-Waste) that exist in Mauritius. Surveys have been carried out at household levels, and on transfer stations. To support the survey, importation data for electronic goods have also been taken into consideration.

Four transfer stations namely Poudre D'or, La Laura, La Brasserie, and St Martin were considered, as well as the landfill of Mare Chicose. Waste from different regions (both rural and urban) transit through these transfer stations daily. In order to determine the E-waste compositions and quantities, E-waste characterisations were performed at each transfer stations. The E-waste was characterised on the basis of a predefined protocol, which is illustrated in a later section of the report. Random samples of waste from these different regions were collected and the E-waste retrieved was weighted, categorized and recorded according to the established protocol. This operation was effected on three occasions spanning over eight months, December 2007 till July 2008.

The household level survey has been carried out through questionnaires which were distributed to specific regions around the island. The collected data helped to estimate E-waste amounts at household levels. On the other hand, importation data was analysed in order to forecast lifespan of electric and electronic products.

Taking into consideration these three approaches, this report provides an indication of the amount and types of E-waste that could be generated on the island during the next two years.

1 Introduction

The term “Electronic waste”, denoted in short by the word “e-waste”, is a type of waste consisting of old, end-of-life or discarded appliances using electricity¹. “E-waste” is also used as a generic term embracing all types of waste containing electrically powered components. Waste electrical and electronic equipment contain both valuable materials as well as hazardous materials which require special handling and recycling methods. The hazardous substances found in the e-waste include substantial quantities of lead, cadmium, chromium and flame-retardant plastics. Cathode ray tubes and components with high lead content are considered dangerous to health. Inhaling or handling such substances and being in contact with them on a regular basis can damage the brain, nervous system, lungs, kidneys and the reproductive system. Working in poorly-ventilated enclosed areas without masks and technical expertise results in exposure to dangerous and slow-poisoning chemicals. Due to lack of awareness, workers are risking their health and environment as well. There is an urgent need for improvement in e-waste management covering technological improvement, institutional arrangement, operational plan, protective protocol for workers working in e-waste disposal and last but not the least education of general population about this emerging issue posing a threat to the environment as well as public health. The function elements of electronic waste are computers, entertainment electronics, cellular phones and other disposed electronic items.

1.1 Aims and Objectives

The main aim of the project is to get an insight of the percentage of e-waste out of the general waste. This figure is determined through the use of sampling and is explained in more detail in later sections. Other objectives of the project include an estimate of the quantities of e-waste that will be generated over the next five years based on importation data. An estimate of the amount of electronic waste, not being disposed in the transfer stations, is also estimated through the use of household surveys. The project's main

¹ H.T. Pandve, 2007, E-waste management in India: An emerging environmental and health issue, Indian Journal of Occupational and Environmental Medicine, 11(3), p116.

purpose is to create awareness about the dangers associated to e-waste and reduce the risks to the population and also the pollution of the environment resulting from unsafe e-waste handling

The relevant percentage and composition for the different elements of e-waste are of paramount importance and constitute a very important objective. In fact, this will assist the government to develop adequate strategies and policies for Mauritius, so as to deal with the growing problems associated to e-waste. Also, Government bodies as well as private stakeholders will benefit largely from the quantitative figures for new business prospects. This study is indeed first of its kind being carried out in Mauritius.

The report is divided into four sections namely

- 1) Analysis of Characterizations
- 2) Analysis of Import data relating to electrical and electronic products, Wholesaler survey and Forecast of e-waste.
- 3) Household level Survey and outcomes
- 4) Propose measures and recommendations

The procedures and techniques used are explained in full detail in the respective subsections. This report is the result of a joint collaboration between investigators from the Ministry of Local Government (MOLG) and the University of Technology, Mauritius and is expected to lead further research work. In this study, most data was unavailable and has to be retrieved through the use of questionnaire and for those information that was accessible, data pre-processing was carried out so as to render the existing data in a form amenable for analysis. The amount of e-waste retrieved as a percentage of the overall waste is 0.4 %.

2 Methodology

The different steps that were involved in the methodology rest on a predefined e-waste protocol, which was developed by the University of Technology, Mauritius. This protocol consists of a list of electrical and electronic products which may be classified into the following different categories namely:

- 1) Large Household Appliances: Electric Fans, Toasters, Air conditioner Appliances
- 2) Small Household Appliances: Kettle, Grinder/Coffee Machine, Rice cookers, Clock/Watches, Electric Knives
- 3) IT & Telecoms: Computer Parts, Printer Parts, CD, Tapes, Floppy disks, Cellular Phones
- 4) Consumer Equipments: Radio sets, Audio Devices, Consumer Appliances, Batteries, Remote Controls, TV
- 5) Lighting Equipments: Fluorescent Lamps, Bulbs
- 6) Electrical & Electronic Tools: Tooling Equipment
- 7) Toys, Leisure and Sports Equipments
- 8) Medical Devices
- 9) Monitoring and Control Instruments
- 10) Others: Purifiers, Motors

The collection of data was strictly based on this predefined protocol. The data used in this study was both secondary (data already exist/available) and primary in nature. Secondary data was obtained from local authorities, government authorities, professional authorities and research institutions. The main advantage of such data is the enormous saving in time and money. In this case, the secondary data were obtained from the customs department. On the other hand, primary data are data that have been collected from surveys and it involves getting data directly from the target population. The primary data pertaining to the e-waste project was collected through questionnaire at three different levels namely

- (1) Transfer station and Landfill Level
- (2) Wholesaler Level
- (3) Household Level

2.1 Transfer Station and Landfill survey

This survey was carried out in three stages spanning over nine months. Three stages were chosen at different points within a year, so as to depict the general variation in the quantity and type of e-waste discarded. The first stage started in December 2007, the second one in March 2008 and the last stage in August 2008. Each stage consisted of a maximum of six weeks, which involved sampling and characterisation of e-waste at each transfer stations and landfill. The waste sampled was of domestic type and the scavenging Lorries were chosen from different regions pertaining to the associated transfer station/landfill, so as to make the characterisation representative.

The sample size represents the amount of waste that was considered in each stage and transfer stations/landfill and its value was evaluated as 40 tonnes. The proportion of e-waste present in the waste collected is a key parameter for this study. Once this value was obtained, we can estimate the amount of e-waste at each transfer station and landfill. The Sample size η used for estimating the population proportion is given by the following formula

$$\eta = \frac{z^2 \pi (1 - \pi)}{e^2}$$

Where π is the value used to represent the population proportion, e is the desired margin of error and z is the critical value from the standard normal table.

As an example, based on the samples collected and the results obtained after analysis of data, we obtained an estimate of the population proportion to be 0.4 % for Poudre D'or. The associated margin of error associated with this sample size was found to be 6.2×10^{-4} and the population proportion was confined to the interval $0.338 \leq \pi \leq 0.462$, as a percentage. If we increase the sample size to 50 tonnes, the corresponding margin of error will be 5.5×10^{-4} while the associated confidence interval for the population proportion is $0.345 \leq \pi \leq 0.455$, as a percentage. The above figures were calculated on a 95 % confidence interval.

2.2 Wholesaler survey

The main objective behind the wholesaler survey is to obtain the average lifetime of electrical and electronic products, which is a key factor as it gives an indication of the conversion time for electrical and electronic products to turn into e-waste. As said earlier, the import figures of electrical and electronic goods to Mauritius for the past few years, was collected from the customs office. By using these import figures together with the mean life span of the electrical and electronic goods, an estimate of the amount of e-waste that will be generated in the next few years will be obtained.

A copy of the questionnaire used in the wholesaler survey is available in annex two.

2.3 Household survey

Finally a household survey was conducted by means of questionnaire in the month of August to November 2008, to determine the amount of discarded and unused electrical and electronic goods being stored at the household level. This will provide a more accurate figure of the amount of existing e-waste. The individuals interviewed were also asked whether they were in favour of a recycling e-waste program. Questions relating to the awareness and dangers of prolonged use of electrical appliances were also asked. One town namely Quatre-Bornes and villages in Grand-Port Savanne were targeted. The main reason behind this selection is that the distribution and characterisation of e-waste in urban and rural areas was also an important priority in this project. The questionnaire consisted of ten questions and it is present in annex three. The sampling method used in this survey is convenience sampling.

Convenience sampling is used in exploratory research where the researcher is interested in getting an inexpensive approximation of the truth. As the name implies, the sample is selected because it is convenient. This non-probability method is often used during preliminary research efforts to get a gross estimate of the results, without incurring the cost or time required to select a random sample. The use of this sampling method is

mainly justified by the fact that Mauritius is categorized between rural and urban regions. Also due to time constraints and resources, this method is the only feasible one.

As said earlier, the aim of the survey is to get an insight about the amount and type of broken or unwanted electrical and or electronic appliance present at household level. To achieve this, the average minimum and maximum weight of all those common electrical products that may be found in the homes of people, were computed. With reference to question four of the survey, the interviewer is asked about the kind and quantity of e-waste that he or she stores in his or her house. Based on that, the amount of waste present in households which were surveyed is measured by means of a min and max criterion by making use of the pre-computed weights. Of course, the list of electrical products present in the questionnaire is not exhaustive itself. The sample size considered was ninety two houses.

3 Analysis of First Characterisation

The aim of the characterisations is to give an overview about the quantity and the different types of E-waste that exist in Mauritius. To achieve this, All the four transfer stations namely Poudre D'or, La Laura , La Brasserie , St Martin and the landfill Mare Chicose were considered. The Waste collected from a given set of regions is converged to the associated transfer station. The e-waste retrieved, was characterised on the basis of protocol, explained earlier. Random samples of waste from these different regions were collected and the e-waste retrieved was weighted, categorized and recorded according to the established protocol.

As an illustration, the results of the first characterisation are shown below.

3.1 Poudre D'or Transfer station

There are seventeen regions falling under the jurisdiction of the Poudre D’or transfer station. The sample chosen was 40600 kg out of 1019540 kg. This was carried out on a weekly basis. The following table gives the amount and different types of e-waste material collected at this Transfer station. The amount of e-waste retrieved was approximately 159 kg.	Regions	Large House. Appli	Small House. Appli	IT & Telec	Consum. Equip.	Light Equip	Elect& Elect Tools	Toys, leisure &sports	Medical Devices	Monitor &control inst	others
	M.st Andre	4.2	1.24	0.15	0.56	0.72	0.5	0.44	0	0	0
	Triolet	9	0.7	0.068	0.17	4	2	0	0	0	0
	Petit Raffray	8.5	2.3	0.1	3.1	0	0.7	0	0	0	0
	Goodlands	0.45	0.6	0	0.57	0	3	0	0	0	0
	Plaines des Papayes	9	0.4	0.05	7.82	0.25	1	0	0	0	0

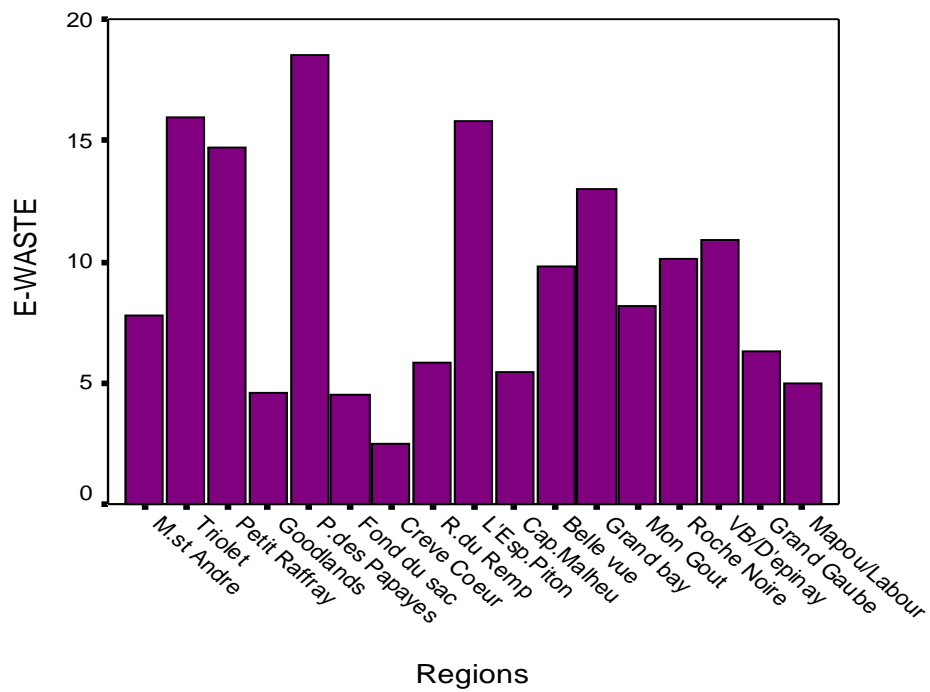
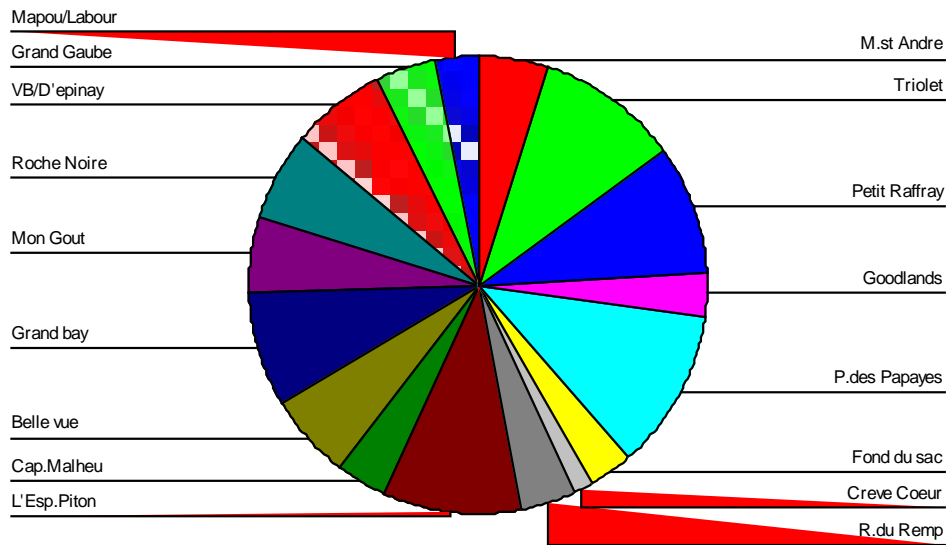
Fond du sac	0.22	0.21	0.265	0.66	0.19	3	0	0	0	0
Creve Coeur	0	0.09	0.5	0.62	0.3	1	0	0	0	0
Riviere du Rempart	0.8	1.05	0.75	0.235	0.02	0	0	0	0	3
L'Esperance Piton	1.6	0.21	0.24	13.3	0	0	0.25	0	0	0.22
Cap. Malheureux	4.4	0.2	0.15	0.58	0.035	0.09	0	0	0	0
Belle vue	0	1.26	8.315	0.2	0	0	0	0	0	0
Grand bay	8.3	4.46	0	0.18	0	0	0.03	0	0	0
Mon Gout	4.3	0.1	0.305	0.36	0.125	3	0	0	0	0.15
Roche Noire	8.8	0.17	0	0.18	0.5	0.5	0	0	0	0
Ville Bague /D'epinay	8.5	0.3	0.25	0.81	0	0	0	0	0	1
Grand Gaube	4.4	0.1	0	0.1	0.41	0	1	0	0	0.3
Mapou /Labourdonnais	3.6	0.77	0.15	0.06	0.07	0	0.1	0	0	0.22

The amount of waste sampled and e-waste collected at each region is also summarised in the following table

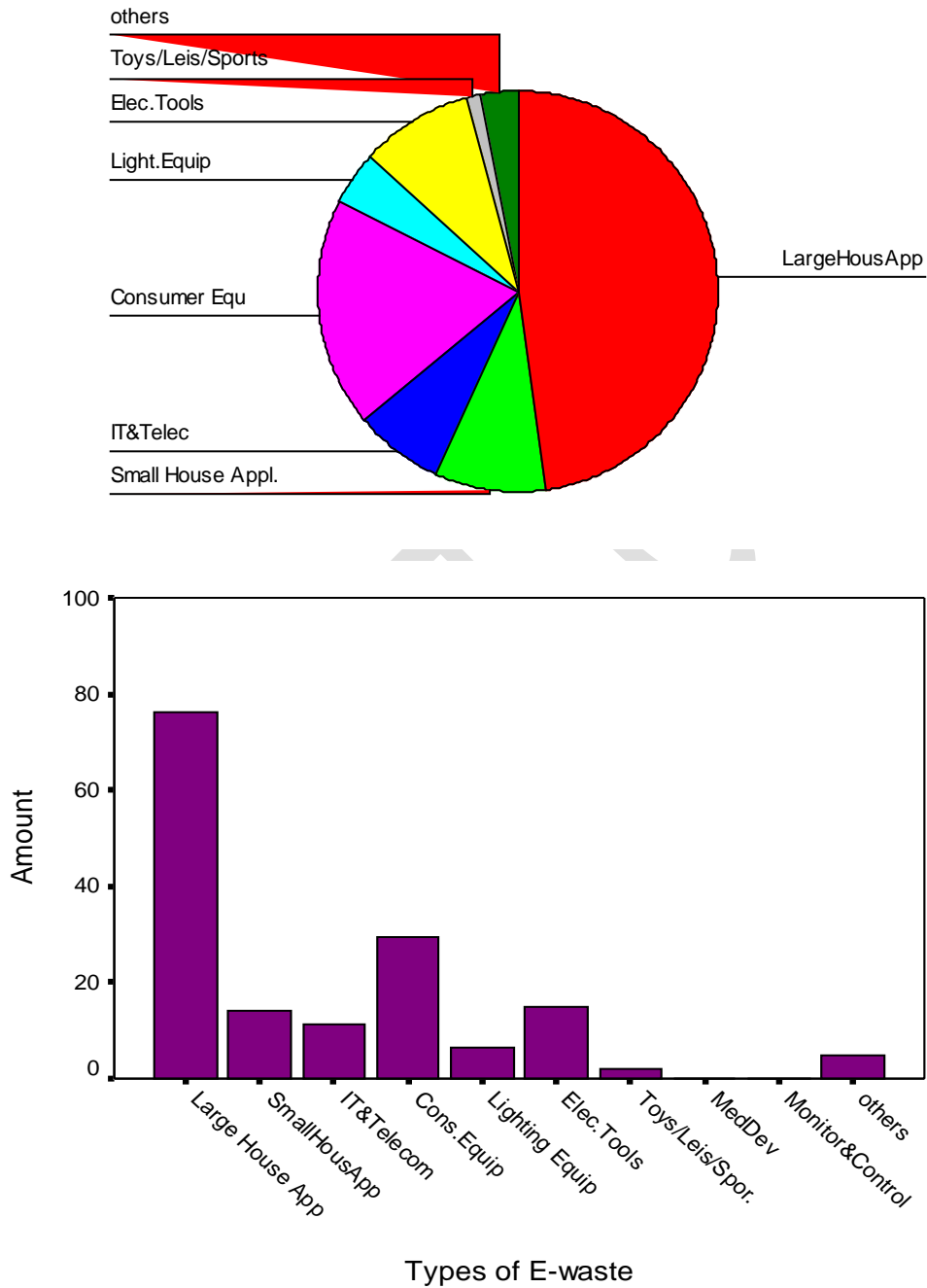
Region	Lorry Load(kg)	Sample weight(kg)	E-waste(kg)
Morc. st Andre	7620	2240	7.81
Triolet	10520	2860	15.938
Petit Raffray	8920	3540	14.7
Goodlands	11200	2580	4.62
Plainedes Papayes	8060	2440	18.52

Fond du sac	7340	2040	4.545
Creve Coeur	7340	2020	2.51
Riviere du Rempart	13400	4400	5.855
L'Esperance Piton	7580	1880	15.82
Cap. Malheureux	9760	3280	5.455
Belle vue	4480	1400	9.775
Grand bay	8740	2420	12.97
Mon Gout	4220	1000	8.19
Roche Noires	7920	1800	10.15
VilleBague /D'epinay	5180	2060	10.86
Grand Gaube	8080	2720	6.31
Mapou/ Labourdonnais	7200	1920	4.97

Distribution of E-waste At Poudre D'or Transfer Station



Characterisation of E-waste



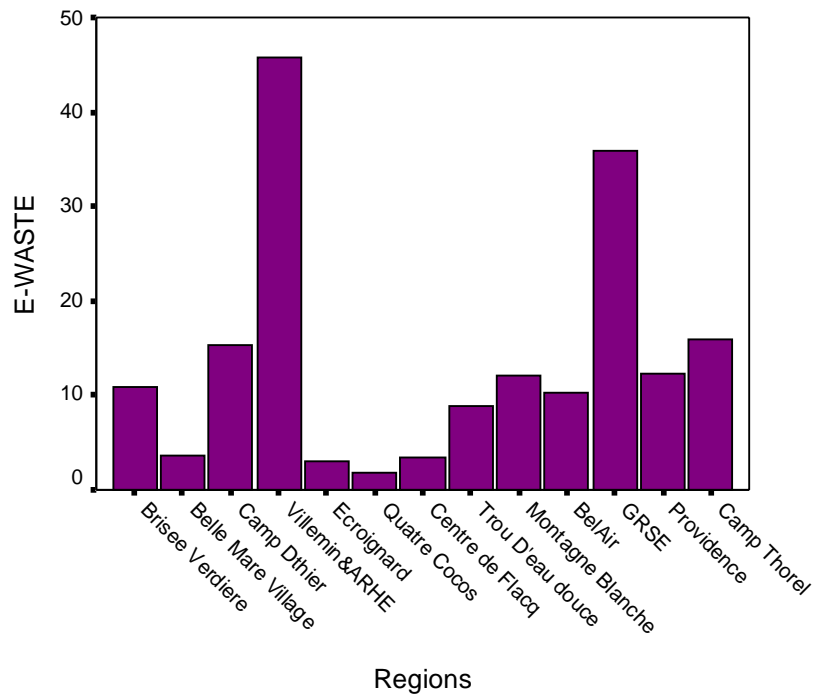
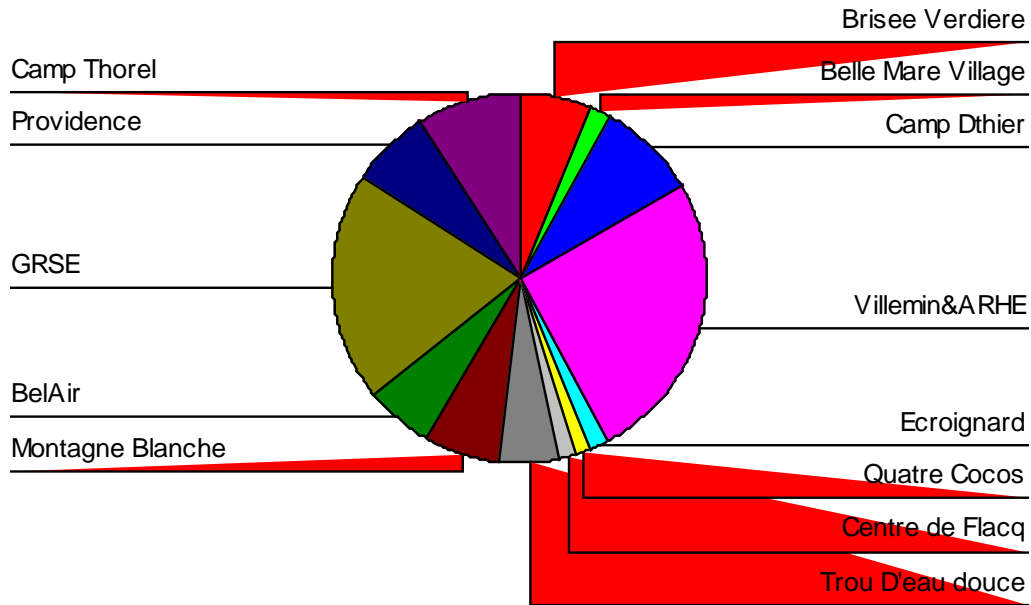
3.2 La Laura Transfer Station

The same analysis is carried out at la Laura station and the following results were obtained.

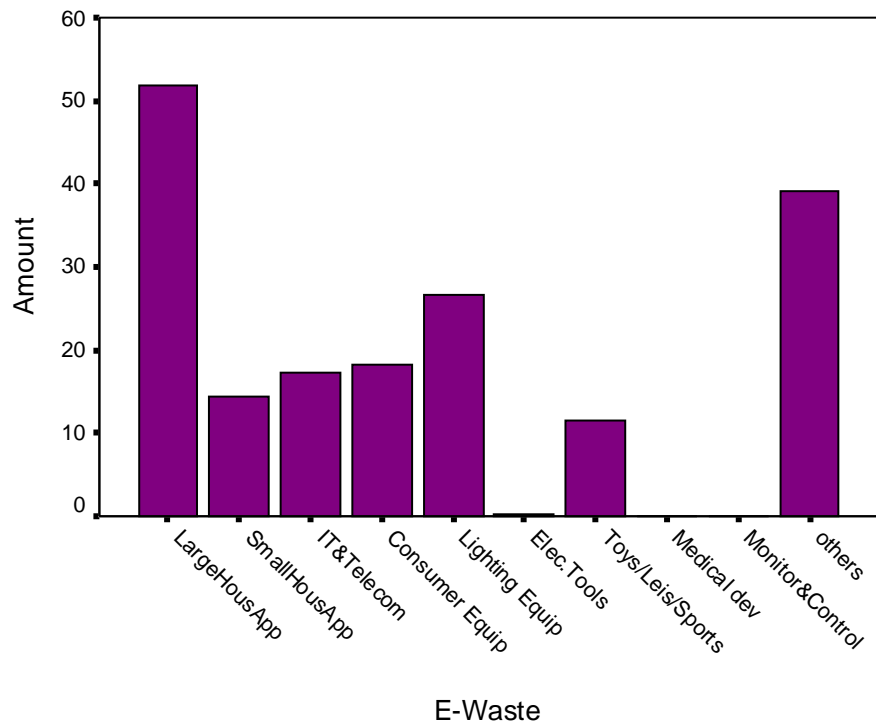
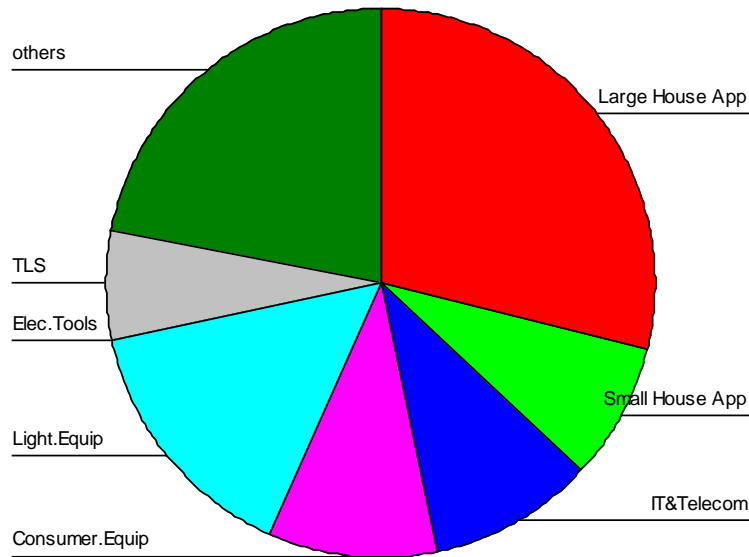
Regions	Large House. Appli	Small House. Appli	IT & Telec	Consum. Equip.	Light Equip	Elect& Elect Tools	Toys, leisure &sports	Medical Devices	Monitor &control inst	others
Brisee										
Verdiere	5.345	2.165	0.075	2.325	0.29	0	0	0	0	0.66
Belle Mare										
Village	0	0.7	0	0.625	1.115	0	1.275	0	0	0
Camp Dthier	3.15	0.615	4.705	0.155	3.525	0	3.155	0	0	0.1
Villemin&ARHE	9.14	1.69	0.275	0.835	0.24	0	1.76	0	0	31.92
Ecroignard	0	0.3	0	0.575	0.75	0	1.27	0	0	0.11
Quatre Cocos	0	0	0.07	0.215	0.58	0	0.36	0	0	0.55
Centre de										
Flacq	0	0	0.775	0.235	0	0.19	0.865	0	0	1.265
Trou D'eau										
douce	0	0.3	1.27	5.765	1.28	0	0.105	0	0	0.205
Montagne										
Blanche	4.645	2.65	2.345	0.5	0.715	0	0.57	0	0	0.585
BelAir	2.9	3.07	0.085	2.605	1.175	0	0	0	0	0.465
GRSE	13.98	0	1.765	3.195	15.485	0	1.125	0	0	0.42
Providence	3.045	1.31	3.37	0.93	0.125	0	0.665	0	0	2.865
Camp Thorel	9.735	1.6	2.595	0.275	1.265	0.13	0.27	0	0	0.08

Region	Lorry Load(kg)	Sample weight(kg)	E-waste(kg)
Brisee			
Verdiere	6640	2300	10.86
Belle Mare			
Village	6240	1820	3.715
Camp Dthier	11360	5860	15.405
Villemin			
&ARHE	9780	4000	45.86
Ecroignard			
	5940	1580	3.005
Quatre Cocos			
	6080	1680	1.775
Centre			
de Flacq	12420	4180	3.33
Trou D'eau			
douce	10040	4340	8.925
Montagne			
Blanche	9620	4340	12.01
BelAir			
	8640	4160	10.3
GRSE			
	7380	2900	35.97
Providence			
	7520	3180	12.31
Camp			
Thorel	4500	1320	15.95

Distribution of E-waste at La Laura Station



Characteristion of E-waste



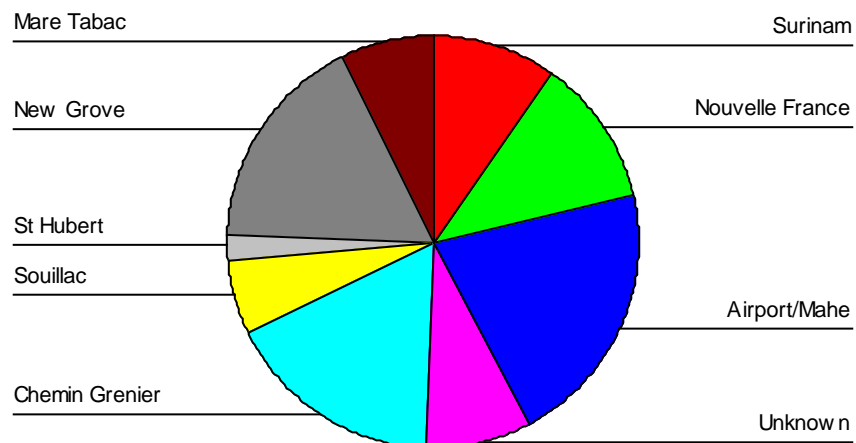
3.3 Mare Chicose Landfill

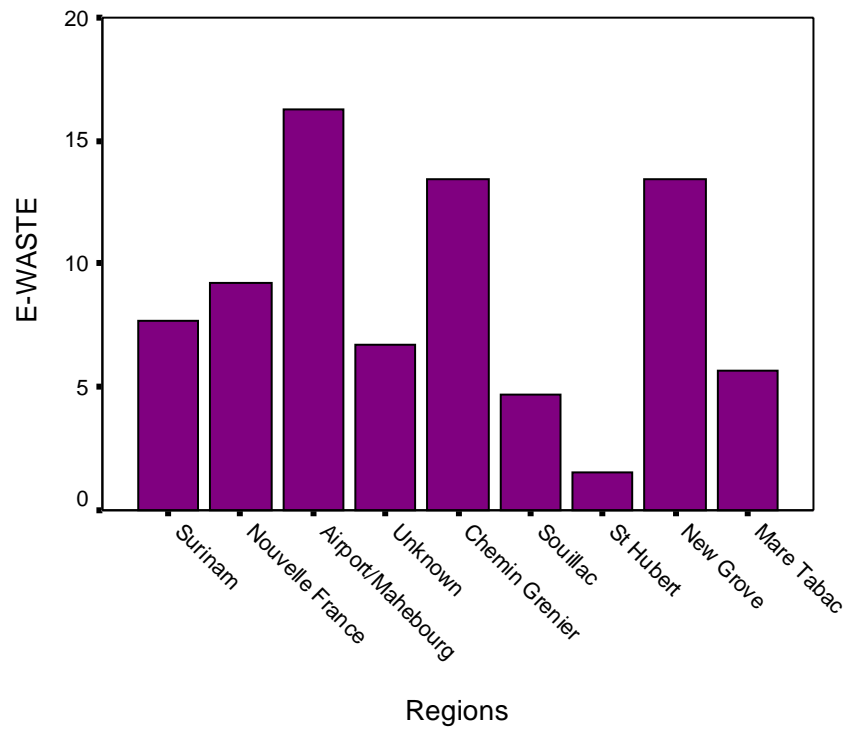
In the case of Mare-Chicose, the following results were obtained

Regions	Large House. Appli	Small House. Appli	IT & Telec	Consum. Equip.	Light Equip	Elect& Elect Tools	Toys, leisure &sports	Medical Devices	Monitor &control inst	others
Surinam	6.3	0.805	0.045	0.085	0.17	0	0.265	0	0	0
Nouvelle France	5.36	0	0.015	0.5	0.71	0.6	0	0	0	2.05
Airport/Mahebourg	1.35	1.215	0.2	7.775	5.72	0	0	0	0	0
Unknown	3.925	0	1.02	0.31	0.975	0.165	0.31	0	0	0
Chemin Grenier	3.72	0.51	0.21	6.16	0.82	0.42	1.25	0	0	0.315
Souillac	1.635	2.19	0.055	0.405	0.435	0	0	0	0	0
St Hubert	0.84	0	0	0.54	0	0.15	0	0	0	0
New Grove	2.085	0.315	0.655	4.705	0.465	3.295	0.25	0	0	1.705
Mare Tabac	0.12	0.445	0.28	1.135	0.145	0	0.42	0	0	3.145

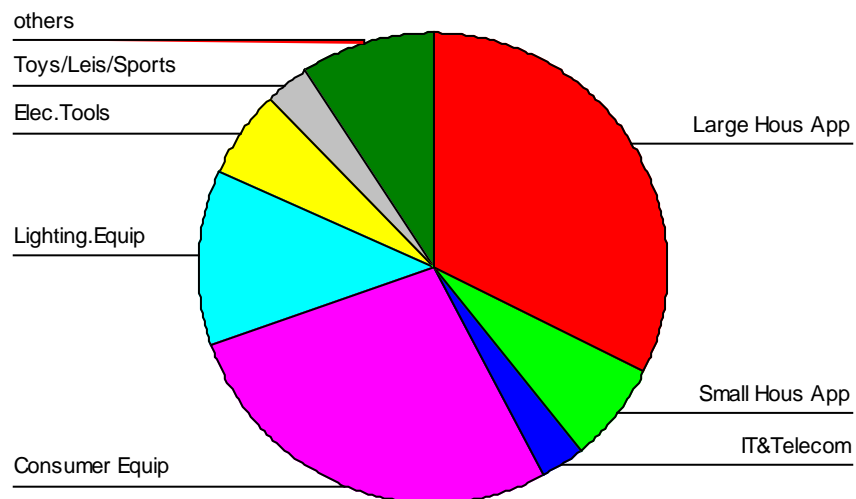
Region	Lorry Load(kg)	Sample weight(kg)	E-waste (kg)
Surinam			
	9480	3860	7.67
Nouvelle France			
Airport	15540	6860	9.235
/Mahebourg	14160	5260	16.26
Unknown	12600	6340	6.705
Chemin Grenier			
Souillac	8940	3240	13.405
	11840	3600	4.72
St Hubert			
	10460	4220	1.53
New Grove			
	10880	5220	13.475
Mare Tabac			
	14260	5540	5.69

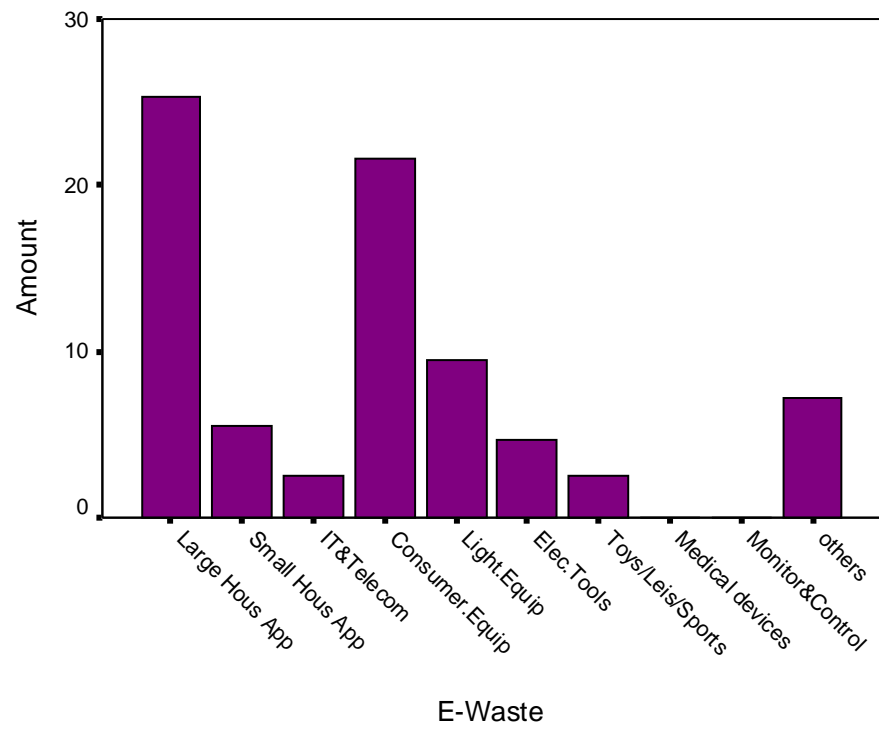
Distribution of E-waste at Mare-Chicose





Characterisation of E-Waste





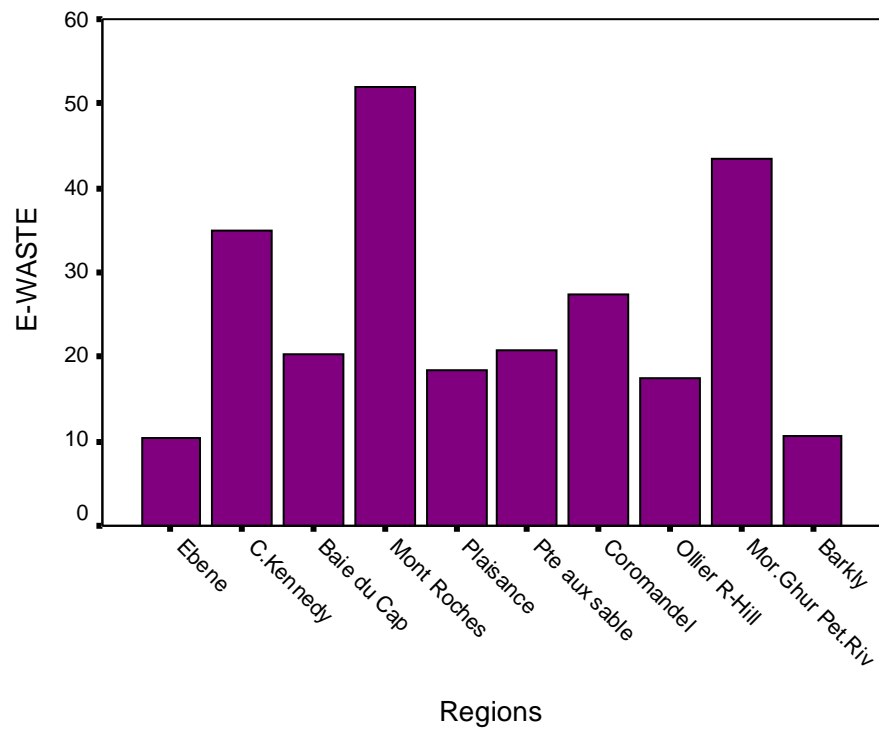
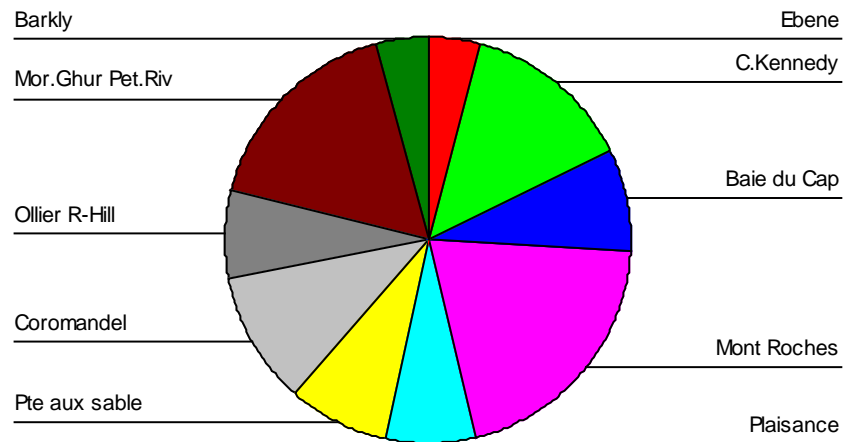
3.4 St Martin Transfer Station

The data collected at St Martin produced the results below.

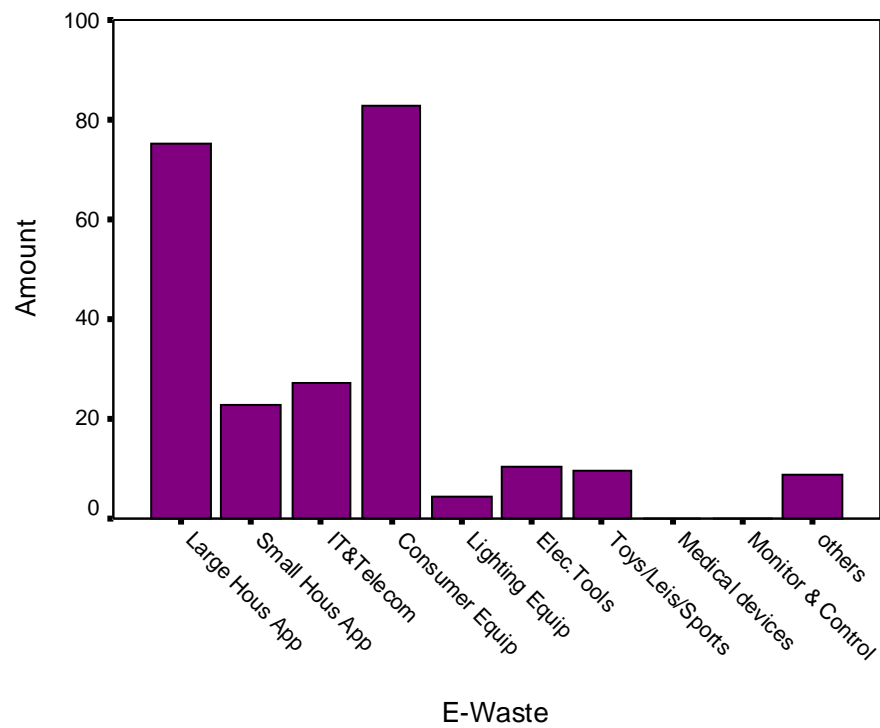
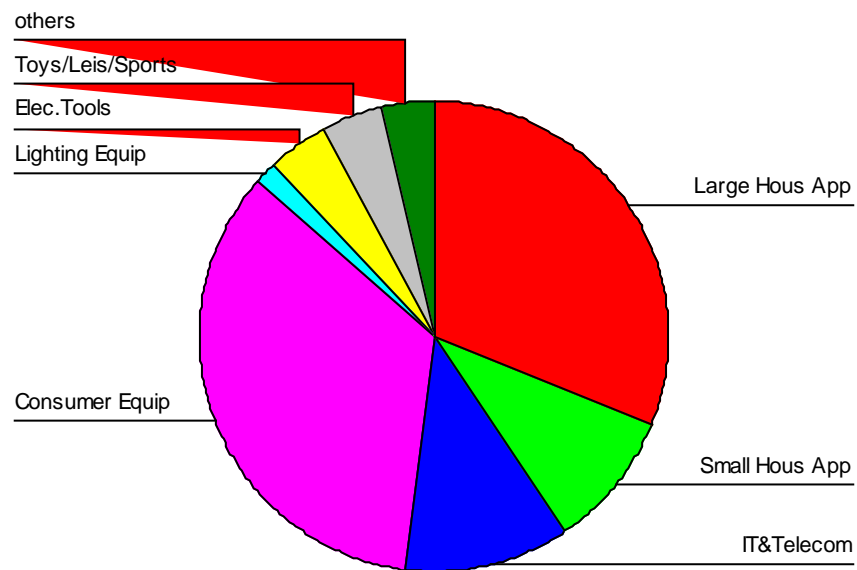
Regions	Large House. Appli	Small House. Appli	IT & Telec	Consum. Equip.	Light Equip	Elect& Elect Tools	Toys, leisure &sports	Medical Devices	Monitor &control inst	others
Ebene										
C.Kennedy	3.9	0.02	0.75	2.6	0.45	0.65	1.7	0	0	0.4
Baie du Cap	4	0.9	2	25.15	0.5	0.7	1	0	0	0.8
Mont Roches	13	4.5	0.08	0.95	0.34	0	1	0	0	0.5
Plaisance	13.3	1.4	10.27	25.68	0.205	1	0	0	0	0
Pte aux sable	2.6	2.26	1.61	5.24	0.31	4	0.015	0	0	2.3
Coromandel	2.9	0.7	10.91	3.83	0.17	0	1.2	0	0	1
Ollier R-Hill	22	4.1	0.355	0.15	0	0	0.2	0	0	0.5
Mor.Ghur	7	0.7	0.3	7.28	0.11	1	0.75	0	0	0.25
Pet.Riv Barkly	1.5	5.6	0.82	10.72	2.14	3	3.8	0	0	1.5
	5	2.5	0.08	1.29	0.1	0	0.1	0	0	1.5

Region	Lorry Load(kg)	Sample weight(kg)	E-waste (kg)
Ebene	7180	2320	10.47
Cite Kennedy	13840	5060	35.05
Baie du Cap	10340	3560	20.37
Mon Roches	4700	1220	51.7605
Plaisance	6840	2880	18.335
Pte aux sables	17140	6640	20.71
Coromandel	7040	3020	27.305
Ollier R-Hill	5720	1500	17.39
Mor.Ghurburrun Petite Riviere	19260	8820	29.08
Barkly	14200	5180	10.57

Distribution of E-waste at St Martin Transfer Station



Characterisation of E-Waste



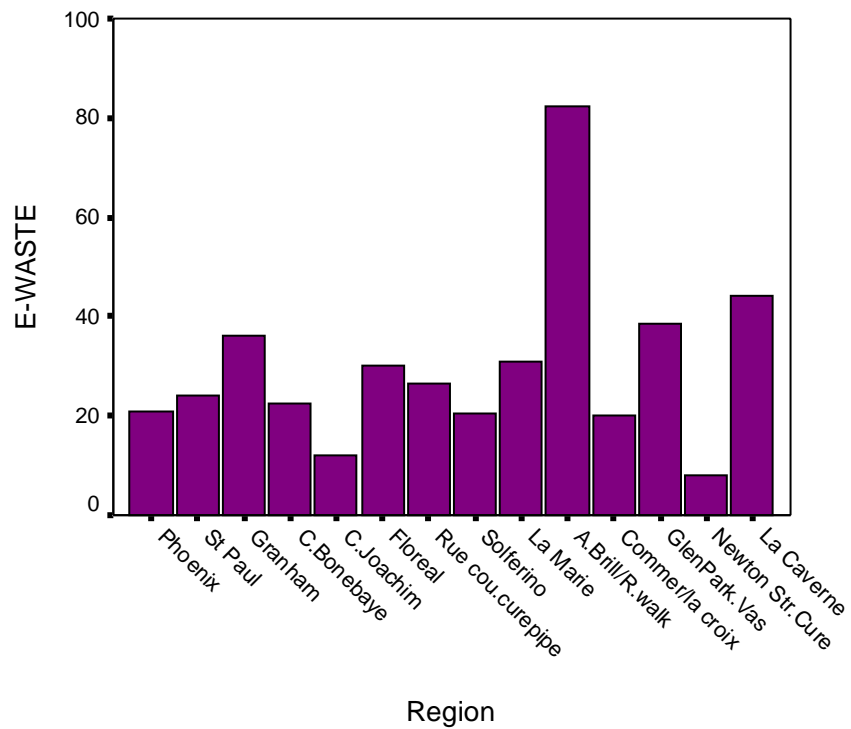
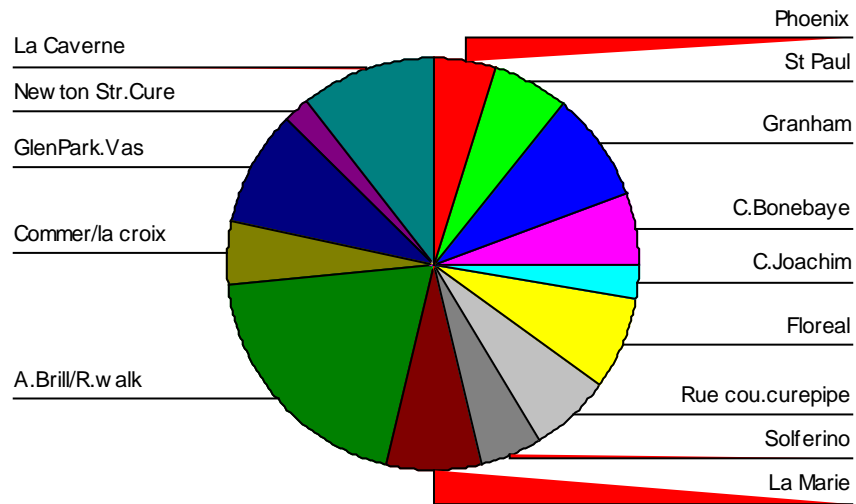
3.5 La Brasserie Transfer Station

The analysis of data at La Brasserie produced the following as output.

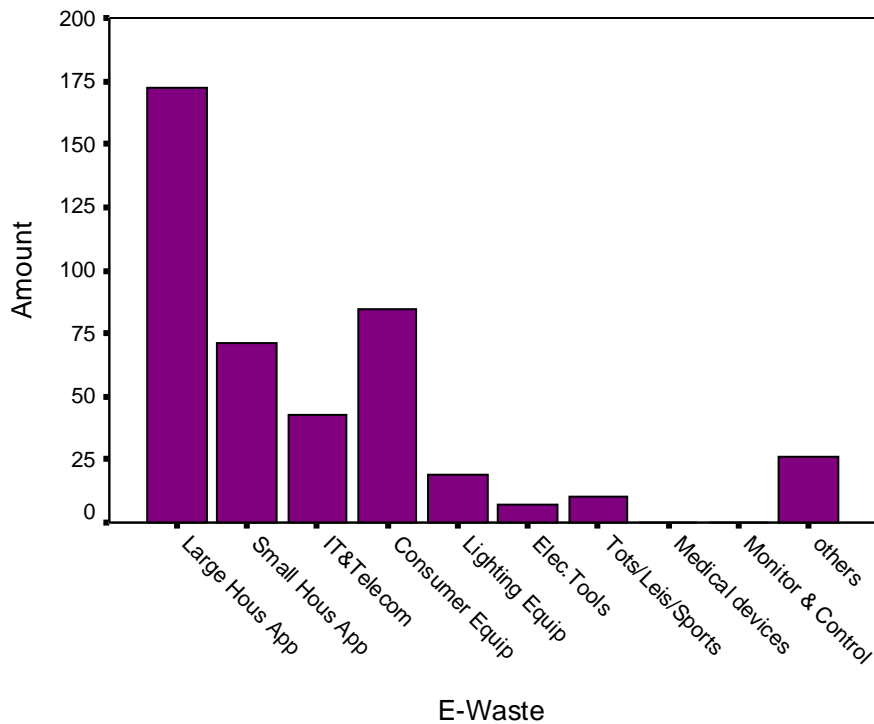
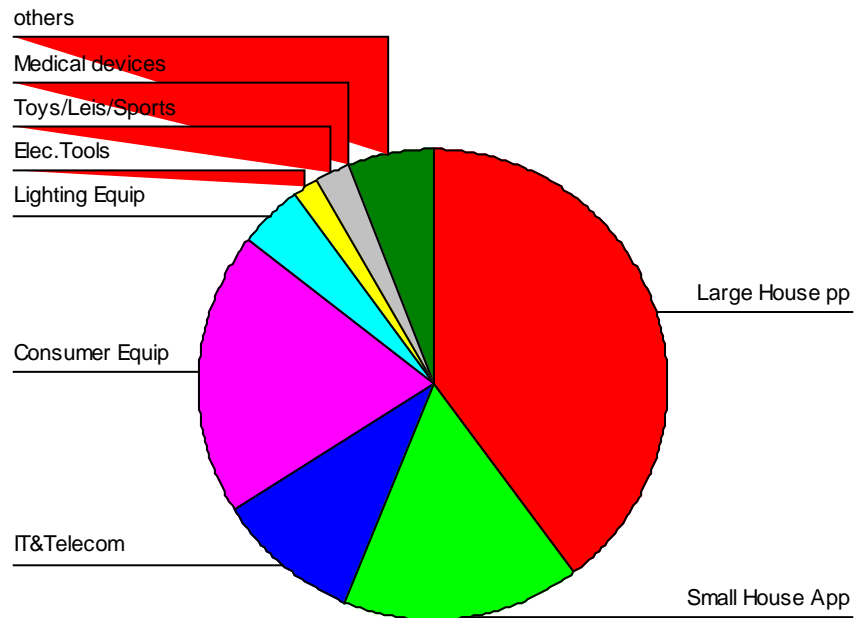
Regions	Large House. Appli	Small House. Appli	IT & Telec	Consum. Equip.	Light Equip	Elect& Elect Tools	Toys, leisure &sports	Medical Devices	Monitor &control inst	others
Phoenix	3	1	10.33	0.28	5.85	0	0.5	0	0	2.5
St Paul	18	5	0.42	0.28	0.39	0	0	0	0	0
Granham	24.2	6	1.23	2.74	1.9	0	0	0	0	2.5
Camp Bonebaye	11	2.33	0.5	5.18	0.54	3	0.14	0	0	0
Cite Joachim	3	8.1	0.1	0.33	0.28	0	0.1	0	0	0
Floreal	15.7	2.8	6.38	1.3	0.21	0	3.8	0	0	1.7
Rue couvent										
Curepipe	0	9.9	0.35	12.08	1.75	0	2.5	0.02	0	3
Solferino	11.5	3.85	1.65	1.08	0.35	0	1.9	0	0	3.1
La Marie	3	18	1	5.38	1.26	2	0.3	0	0	0
AlleBrillant /River walk	62	3.3	12.56	3.64	0	0	0.925	0	0	5.3
Commerson /la croix	16	0.9	0.41	23.7	5.97	2	0	0	0	0
GlenPark Vacoas	1.8	3.3	1.925	23.7	5.97	2	0	0	0	0
Newton Street										
Cure	5	2.5	0.35	0.15	0.18	0	0	0	0	0.2
La Caverne	0	7.25	7.68	28.4	0.2	0	0.5	0	0	7.4

Region	Lorry Load(kg)	Sample weight(kg)	E-waste (kg)
Phoenix			
	7700	3040	23.46
St Paul			
	7460	1960	24.09
Granham			
	5360	2800	38.57
Camp			
Bonebaye	8180	2780	22.69
Cite			
Joachim	11500	5040	11.91
Floreal			
	8740	2300	31.89
Rue couvent			
curepipe	10060	3420	29.6
Solferino			
	11320	4820	23.43
La Marie			
	9440	2280	30.94
A.Brill/R.walk			
	8700	3260	87.725
Commerson			
/la croix	10780	2200	48.98
GlenPark			
Vacoas	9720	4080	38.695
Newton			
Str.Cure	5460	1460	8.38
La Caverne			
	10020	2840	51.43

Distribution of E-waste at La Brasserie Transfer station



Characterisation of E-waste

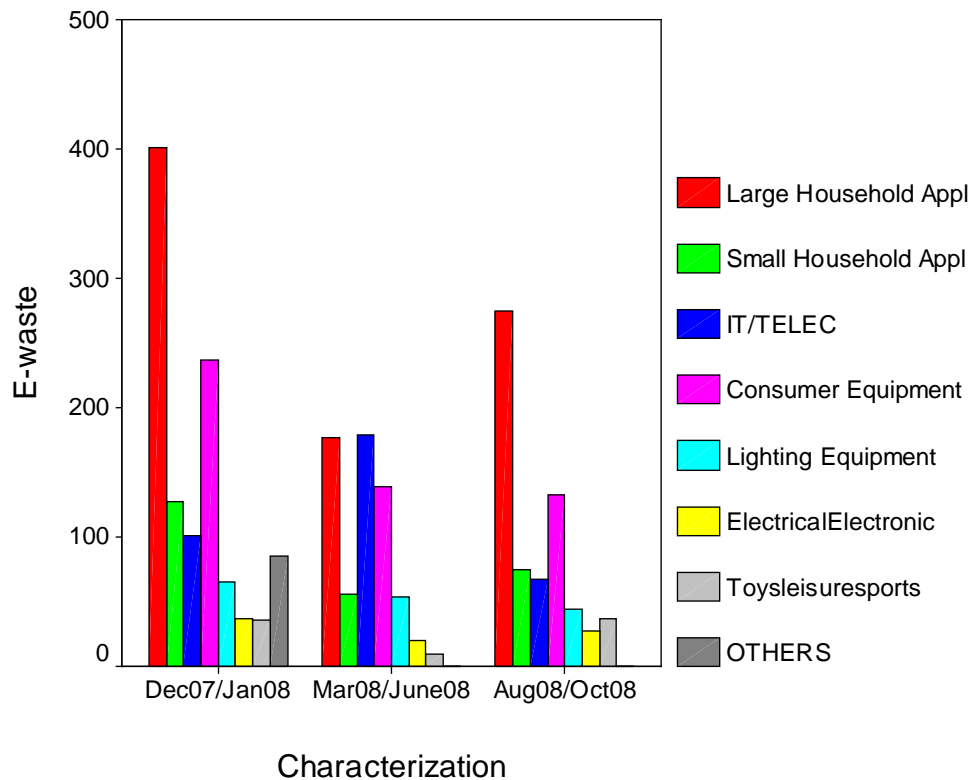


The results pertaining to the second and third characterisation are present in annex three and four respectively.

3.6 Outcome of Characterizations

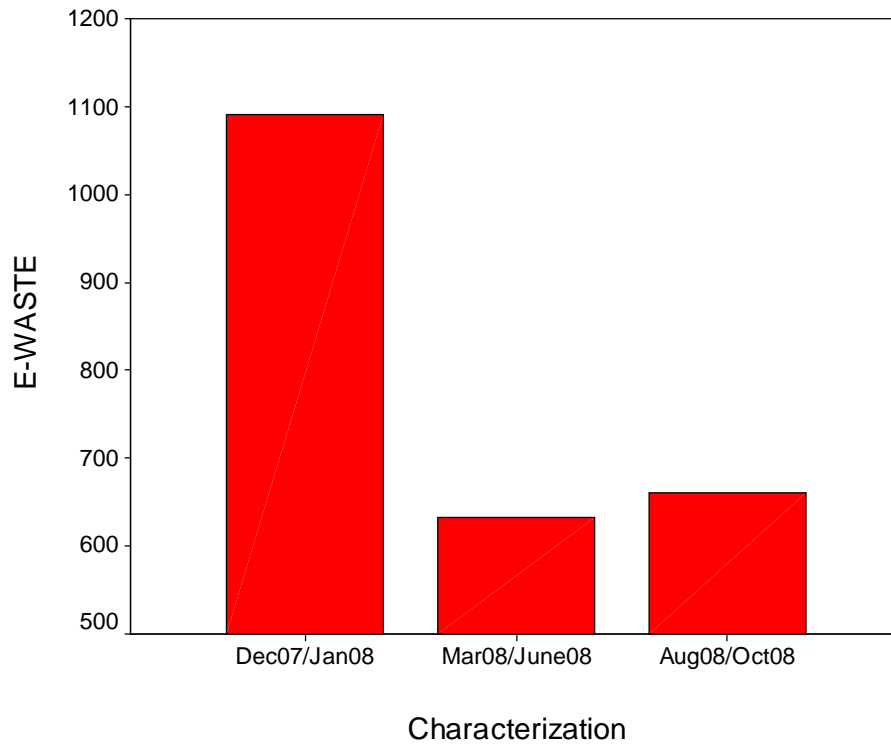
In this section, an analysis of the three characterizations is done simultaneously. This is carried out so as to depict any seasonal variation in the amount of e-waste being generated throughout the three collection periods. The seasonal factor was examined according to the type of e-waste, the transfer station and the overall amount of e-waste that was retrieved during each characterization. These are illustrated graphically by means of bar-charts.

3.7 Type of E-waste



The amount and type of e-waste collected over the three characterizations are summarized by means of the above multiple bar-chart. The seasonal index is not easily perceived when the analysis is done at the level of the type of e-waste. For instance, it is clear that a seasonal index exist for both large household appliances and consumer equipments. However the seasonal factor is not so apparent for the other categories.

3.8 Overall amount of E-waste (kg)



To get an idea about the magnitude of the seasonal index at a macroscopic level, the overall amount of e-waste is computed for the different characterizations and its corresponding bar-chart drawn (see above figure). This clearly shows the amount of e-waste generated in the period December 07-January 08 is considerable, implying that a significant seasonal index do exist. The amount of e-waste retrieved in the sample of forty tones was insignificant and it constituted mainly of small components of e-waste. (about 0.4% of the total waste)

4 Analysis of Import data of electrical and electronic goods

In this section, an estimate of the potential amount of electrical and electronic goods that might be converted to e-waste in the coming years is determined. Four main categories were concerned in the computation of this estimate. They are:

- 1) Large household appliances
- 2) Small household appliances
- 3) Consumer equipments
- 4) IT and Telecommunication equipments.

The forecast of e-waste require two important parameters which are namely the quantity of electrical goods reaching the country every year and the average lifespan of electrical products. Importation data was obtained at the customs department. The average lifespan of electrical and electronic was obtained through a wholesaler survey. Details of which are given in section 4.2.

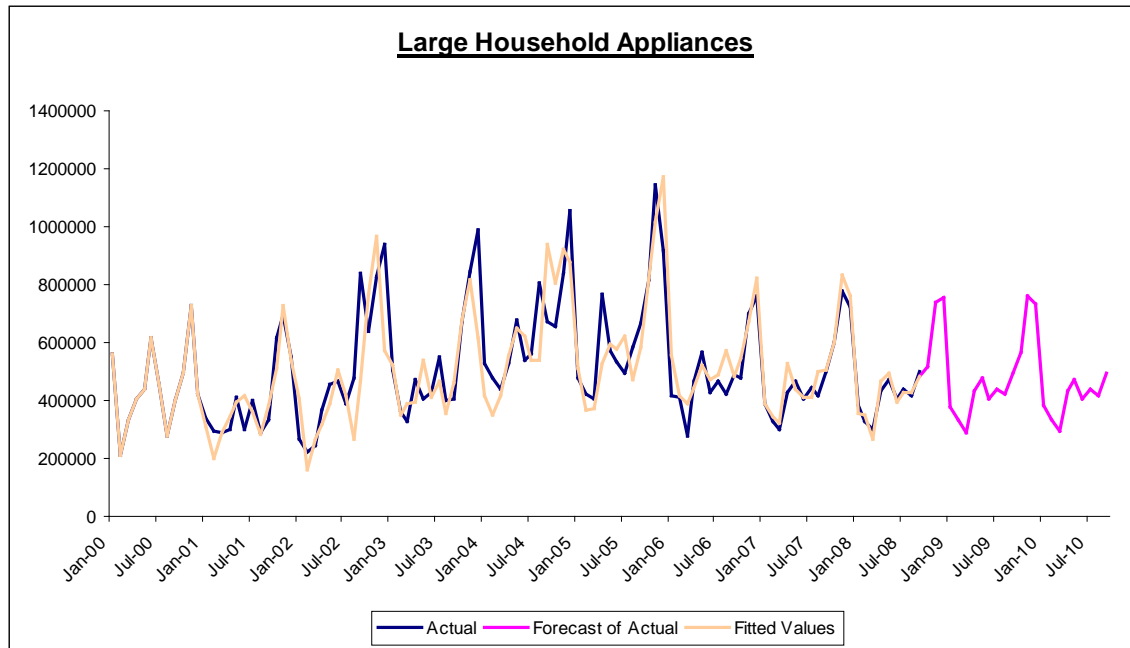
4.1 Analysis of Importation Data – Large Household Appliances

For each item in the different categories, an analysis of their importation data was performed by making use of Time series techniques, based on moving averages. The main motivation behind the use of such a technique is due to the time factor present in the importation data.. Also, trend in the data set may be depicted. The variation of importation is illustrated graphically, making the identification of seasonality effect possible. Also, time series analysis allows prediction of importation in the short and long

run. The following table describes the monthly importation of the different items pertaining to large household appliances. The figures in bold for the period September 2008 to September 2010 represent the actual forecast for importation.

Monthly Importation of Large Household Appliances / Kg											
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
January	563463	339964	266990	507704	528587	478896	416508	387020	352986	377464	381290
February	208637	291702	224571	359056	478296	423114	412473	344890	350453	334956	331136
March	333457	287707	244733	330355	437215	402960	279195	319550	264622	289236	295775
April	406834	297810	366740	474260	529396	765833	465806	528409	466155	435503	431826
May	440428	411679	458320	404093	677004	573061	565802	437433	495816	475689	470727
June	616335	297650	468188	429024	537674	531771	426664	411574	394280	403156	403529
July	455744	400268	386998	547765	561870	497044	466349	410077	425538	436663	438744
August	276348	290223	477988	397731	808004	584646	421112	499503	428464	420176	418451
September	398329	333464	838080	406778	672682	663904	491133	505655	485496	493134	494953
October	495696	614328	636998	672158	654082	815892	476243	597863	515463	564273	-
November	727017	696645	827620	842876	838224	1142650	701922	831085	739772	760925	-
December	423193	550831	939812	988946	1056869	914526	760145	760736	758296	734337	-

When the above data is displayed graphically, the following time series is obtained for large household appliances.



The graph goes through a series of cycles with crest occurring around the month of December and trough around the month of July. The pink section of the graph corresponds to the forecast period.

The analysis of the importation data for the other categories is illustrated in annex six.

4.2 Wholesaler Survey

As mentioned earlier, a wholesaler survey was carried out during the months of May to June 2008. A copy of the questionnaire is present in annex two. The main objective was to determine the average life span of electrical and electronic goods, which is a key variable in the forecast of the amount of e-waste. This was achieved by first identifying a potential list of wholesalers dealing with electrical and electronic appliances, and this constituted the population. Ten main wholesalers were identified and five of them constituted the sample.

4.3 Survey Results

The average lifespan in years of the different items present in large household appliances is illustrated in this section. The first and second column for each wholesaler denotes the minimum and maximum life span of each item respectively. As an example, the minimum and maximum lifespan of large cooling appliances given by wholesaler 1 are nine and thirteen years old respectively.

LARGE HOUSEHOLD APPLIANCES										
Item	Wholesaler		Wholesaler		Wholesaler		Wholesaler		Wholesaler	
	1		2		3		4		5	
Large cooling										
Appliances	9	13	3	8	5	15	5	9	5	15
Electric hot										
plates/stoves	-	-	3	5	-	-	5	9	-	-
Microwave	8	10	2	6	2	7	5	9	-	-
Electric Fans	7	8	2	4	1	6	1	9	-	-
Air										
conditioners	10	15	3	8	5	12	5	9	4	7
Toaster	-	-	1	3	1	2	3	7	3	4
Electric										
Ovens	5	7	3	6	4	12	5	9	-	-
Rice Cooker	2	3	1	5	1	2	3	7	-	-
Others	7	9	3	6	3	10	6	9	7	10

The lifespan of the products constituting the other categories is illustrated in annex six.

Importation of Large Household Appliances /tonne							
Year	2000	2001	2002	2003	2004	2005	2006
Large cooling Appliance	4	1	-	-	3	0.3	0.4
Electric hot plates/stoves	153	154	231	312	525	355	-
Microwave	174	238	355	390	473	506	231
Electric Fans	463	546	678	736	677	648	375
Air conditioners	602	532	775	908	1173	1264	856
Toaster	25	45	50	42	56	80	46
Electric Ovens	31	29	56	49	91	89	46
Rice Cooker	140	123	177	171	178	206	146

4.4 Forecast of E-waste

In this subsection, an outline to estimate the actual and future amount of e-waste for large household appliances based on the lifespan of the different items is explained. The importation data of the different items present in this category is first sought. This is given in the following table.

The minimum of the minimum and the maximum of the maximum of the average life span are then computed. The following table illustrates the results obtained when this procedure is carried out.

LARGE HOUSEHOLD APPLIANCES /years		
Items	Minimum Life Span	Maximum Life Span
Large cooling Appliances	3	15
Electric hot plates/stoves	3	9
Microwave	2	10
Electric Fans	1	9
Air conditioners	3	15
Toaster	1	7
Electric Ovens	3	12
Rice Cooker	1	7
Others	3	10

Based on the above importation data and the results of the wholesaler survey, a forecast of the amount of e-waste is estimated both in the short and long run. This figure is based on the above minimum and maximum life span of electrical products. This is illustrated in the next tables.

4.5 Forecast Based on Minimum Life Span

Year	Amount Of E-waste/tonne							
	2001	2002	2003	2004	2005	2006	2007	2008
Large cooling Appliance	-	-	4	5	5	5	7.7	7.9
Electric hot plates/stoves	-	-	153	307	538	850	1375	1730
Microwave	-	174	412	768	1158	1631	2136	2368
Electric Fans	463	1009	1686	2422	3100	3747	4121	-
Air conditioners			602	1135	1909	2817	3991	5255
Toaster	25	70	112	162	218	298	344	-
Electric Ovens	-	-	31	60	116	165	256	345
Rice Cooker	140	263	439	611	789	995	1141	-
Total	628	1516	3439	5470	7833	10508	13372	9706

4.6 Forecast Based on Maximum Life Span

Amount Of E-waste/tonne									
Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Large cooling									
Appliance	-	-	-	-	-	-	-	-	4
Electric hot									
plates/stoves	-	-	153	307	538	850	1375	1730	2329
Microwave	-	-	-	174	412	768	1158	1631	2136
Electric Fans	-	-	463	1009	1687	2423	3100	3747	4121
Air									
conditioners	-	-	-	-	-	-	-	-	602
Toaster	25	70	120	162	218	298	344	-	-
Electric									
Ovens	-	-	-	-	-	32	61	1159	1650
Rice Cooker	140	263	440	611	789	995	1142	-	-
Total	165	333	1176	2263	3644	5366	7180	8267	10842

The same procedure is carried out for the other categories and the results are displayed in annex six. The actual and forecast amounts represent large volume of e-waste as compared to the amount of e-waste retrieved at the transfer and landfill level. This gap of figures justifies the conduction of a survey at the household level.

5 Analysis of Household Level Survey

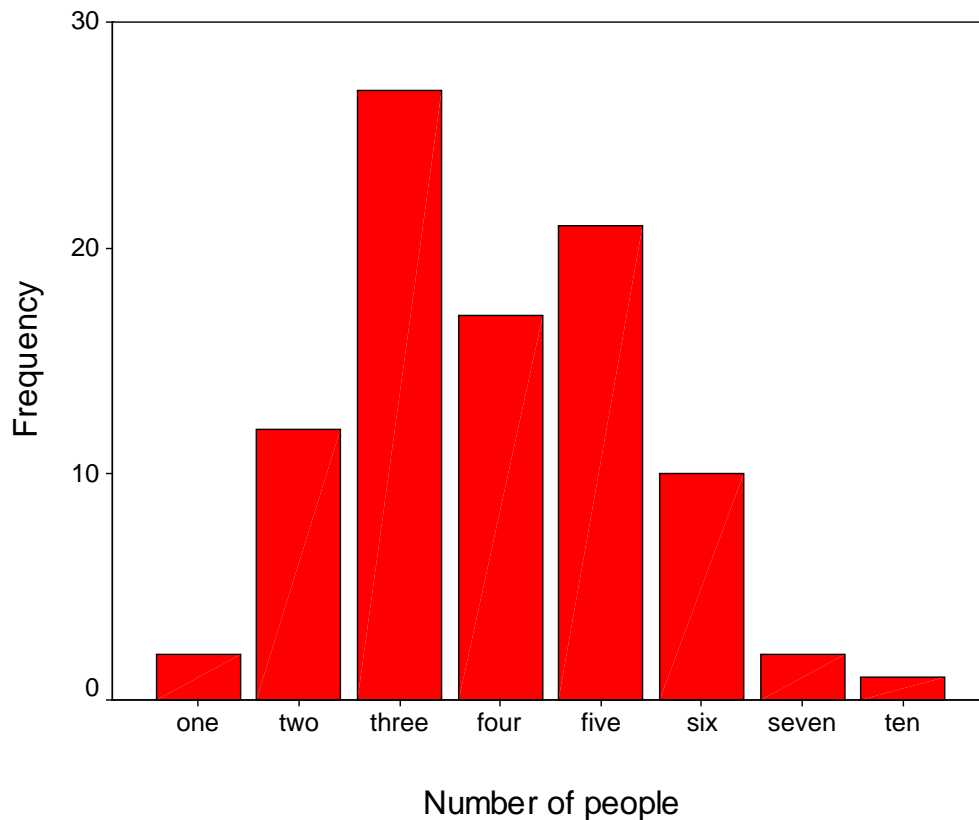
As mentioned earlier, the household survey was conducted in Quatre-Bornes and regions pertaining to Grand-Port Savanne. The variation in the amount and characterization of e-waste was sought between rural and urban areas.

5.1 *Quatre-Bornes*

The analysis pertaining to Quatre-Bornes is two-fold. The quantity of electronic waste is first evaluated at the minimum weight for both usable and unusable categories. The graphs and results obtained are illustrated in the following sections.

5.2 *Number of people in the Household*

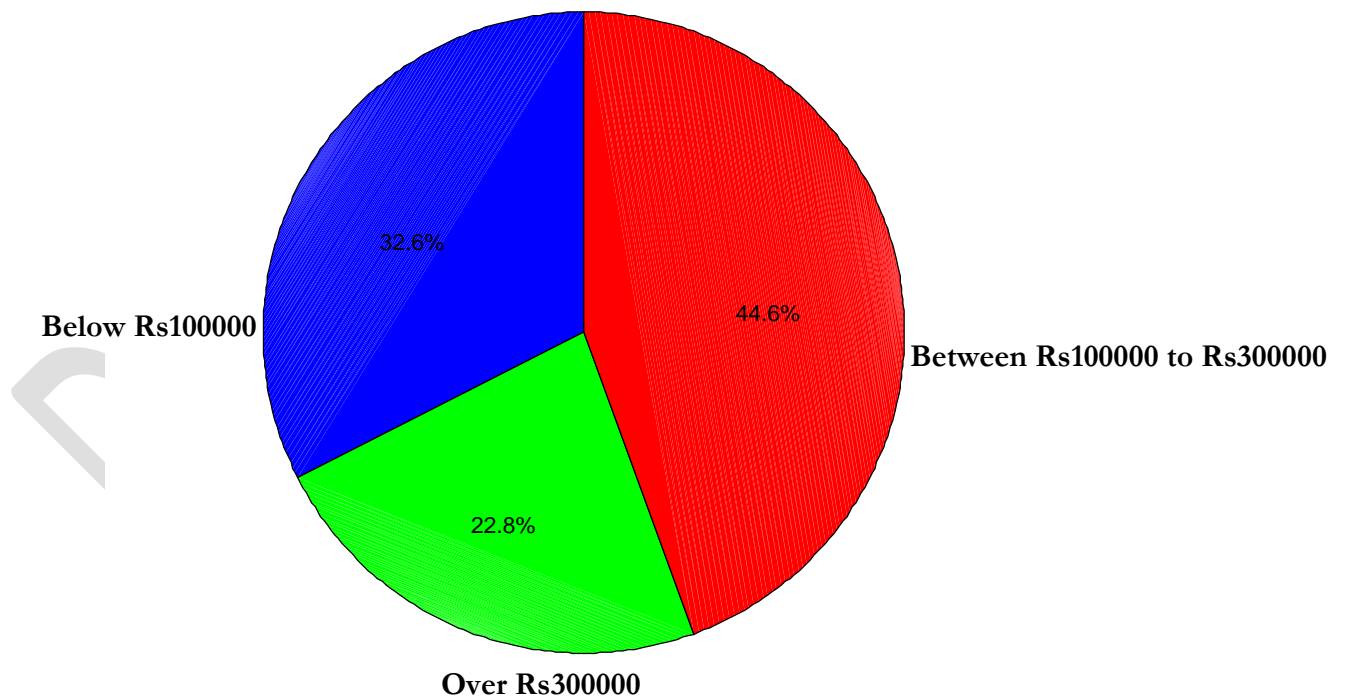
For each individual interviewed, the number of people present in his household is recorded. This is illustrated graphically by means of a bar-chart.



The correlation coefficient “r” which measures the strength of the linear association between two variables, was determined for the number of people in the household and the e-waste generated. The value obtained was -0.003, which that the two variables under consideration are weakly correlated.

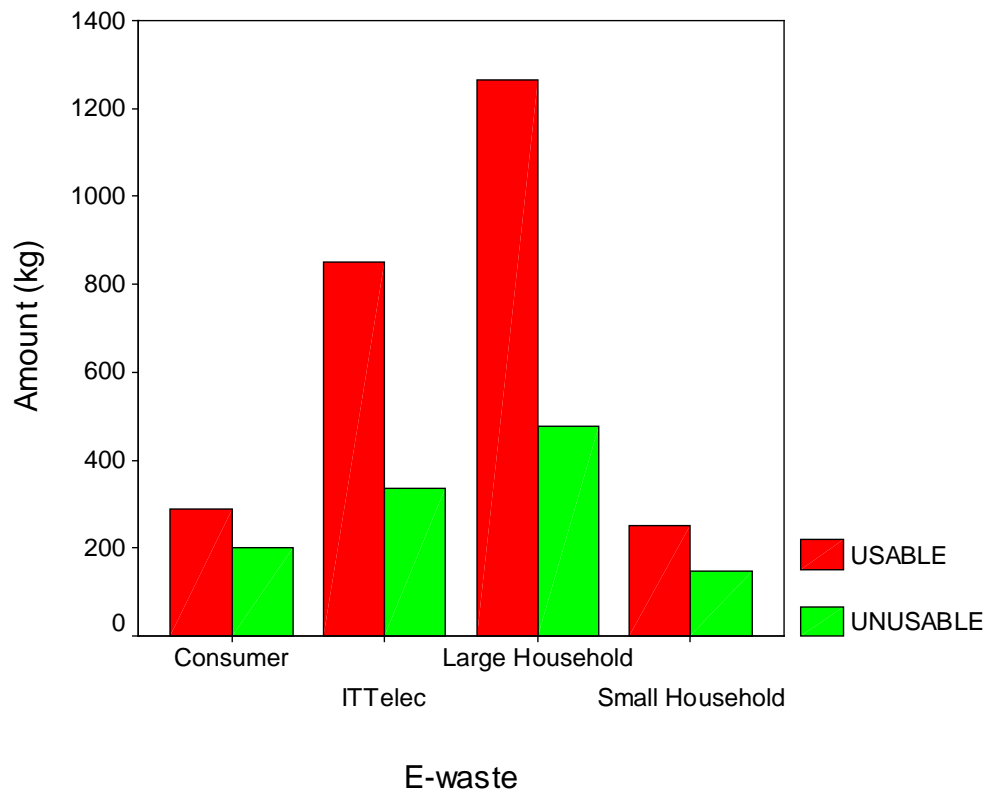
5.3 *Income Group*

The income group which represents the yearly household income was categorized into three main groups namely “Below Rs 100000”, “Between Rs 100000 and Rs 300000” and “above Rs 300000”. The distribution of income obtained in the region of Quatre-Bornes is represented by the following pie-chart.

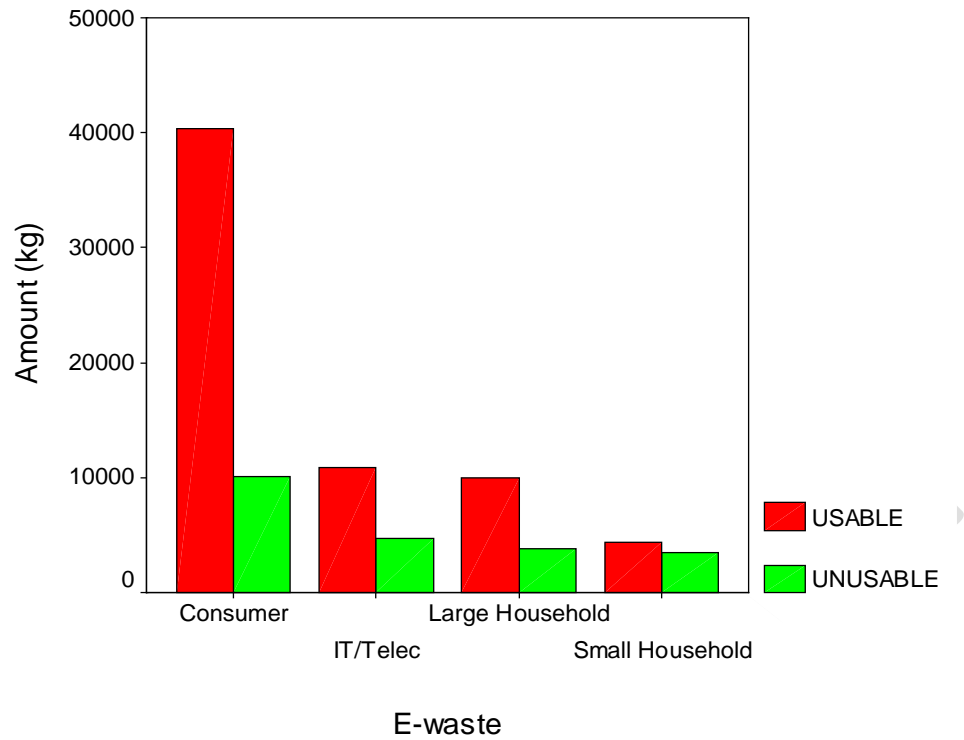


5.4 E-waste characterization and Quantification at Household Level

The minimum quantity of e-waste expressed in kg and as a function of usable and unusable items is illustrated by the following dual bar-chart for the region of Quatre-Bornes.

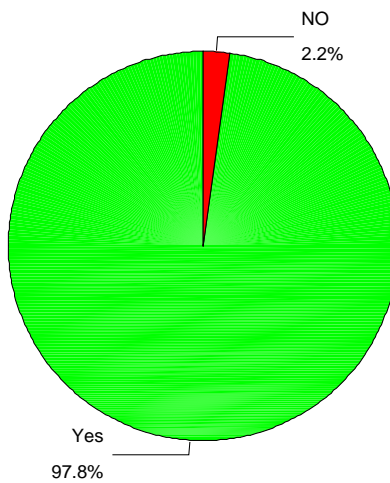


The same procedure is repeated for the maximum quantity of e-waste and the corresponding bar-chart is shown below.

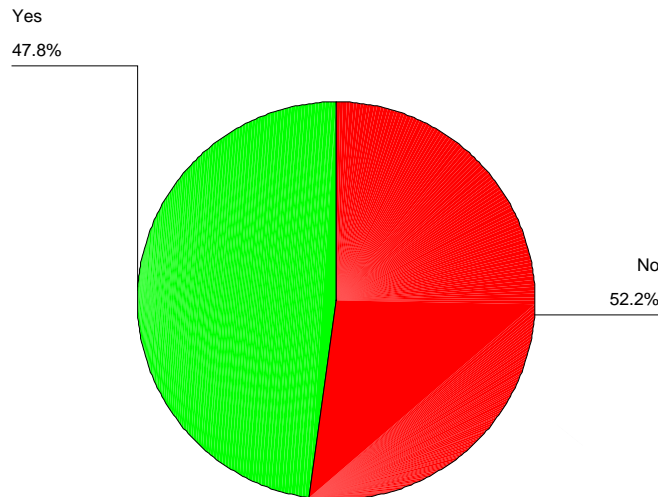


5.5 Recycling Program

In this question, people were asked to express their views if an e-waste recycling program is developed.

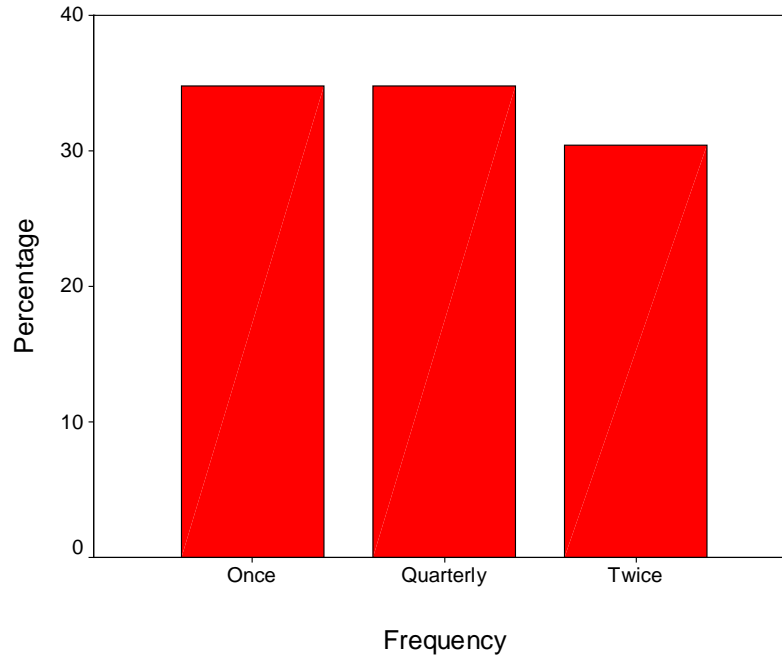


Most people agree with the implementation of the e-waste program, as illustrated with the above pie-chart. When the same question was asked to them again with the additional information that if the e-waste program incurred a cost, will they agree to pay? More than 50 % of the people interviewed took the “NO” stand as illustrated by the following pie-chart.



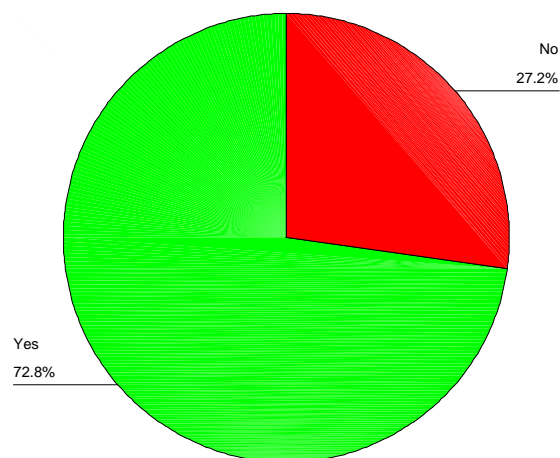
5.6 Frequency

If the e-waste recycling program is developed, the question, which arise is how often the collection of e-waste should be carried out. The answers that are possible for this question are once per year, twice per year and quarterly. The response obtained by the people interviewed is illustrated graphically by means of a bar-chart.

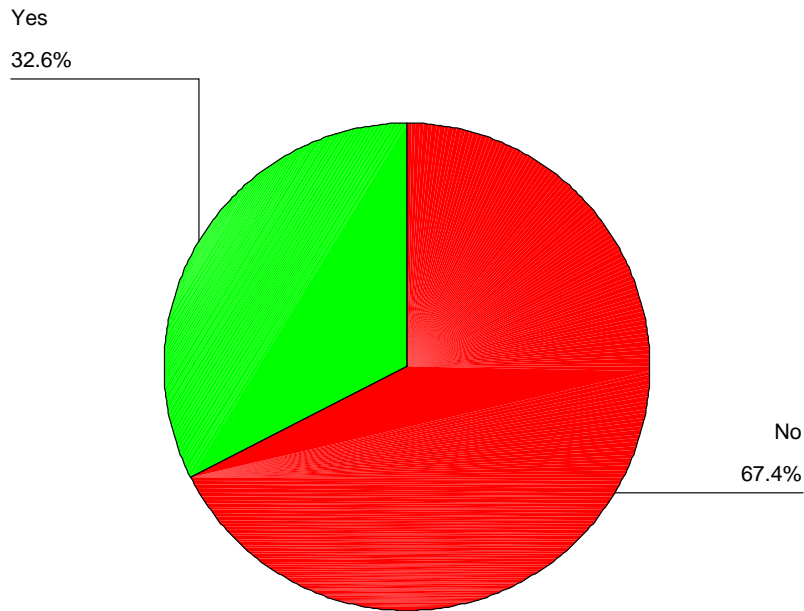


5.7 Awareness and Threats

Another important question that arose during the interviews was related to lifespan of electrical products. People were asked whether they were aware that some of their electrical or electronic appliance has gone beyond their lifespan, though they are still working properly. The corresponding feedback obtained is shown by the following pie-chart.



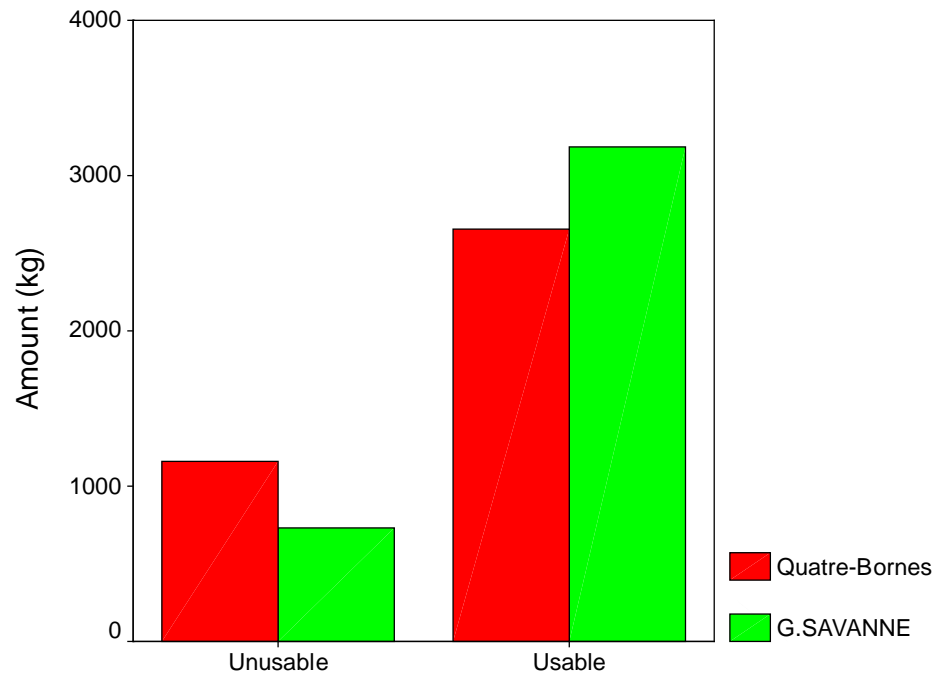
The threat associated with the prolonged use of such products was the last question that was asked to interviewers. More than 60 % of the persons surveyed claim that there were no threats with the continued use of these products. Of those people who answered differently, the main threats identified were electric shocks and loose connections leading to fire and even explosion.



The results of the survey pertaining to Grand-Port Savanne are illustrated in annex five.

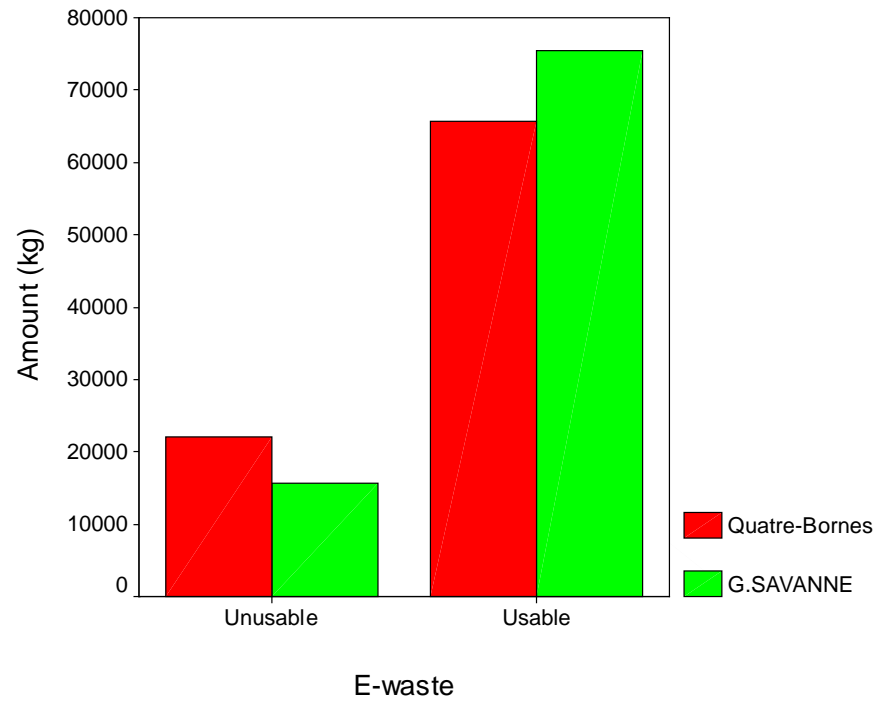
5.8 Comparison of E-waste in Urban and Rural Regions

A comparison of the minimum amount of e-waste generated for both urban and rural regions is represented by the following dual bar-chart. The amount of unusable items tends to be smaller in rural areas when compared to urban areas.



E-waste

The same analysis is carried out for the maximum weight of e-waste and the corresponding bar-chart is shown below.



6 ANNEX ONE

Date:	Time:
Transfer Station:	Lorry Reg No:
Lorry Load (Kg):	Sampling Weight (Kg):
Region Serviced by lorry:	No of bins:

	Amount	Weight
Category 1: Large Household Appliances		
Large Cooling Appliances		
Electric Stoves		
Electric hot plates		
Microwave		
Electric Fans		
Air Conditioner Appliances		
Toaster		
Electric Ovens		
Rice Cooker		
Others:		
Category 2 : Small Household Appliances		
Vacuum/Carpet Cleaners		
Other Cleaning Appliances		
Sewing, Knitting, weaving and other processing for textile Appliances		
Irons		
Fryers		
Grinder/Coffee machines		
Electric Knives		
Appliances for hair-cutting, hair drying, tooth brushing , shaving, massage and other body care appliances		
Clocks, watches, and equipments for measuring time		
Kettle		
Others:		
Category 3 : IT & Telecoms		
Computers		
Printers		
Computer Parts		
Printer Parts		

Handheld Computers		
Scanners/ Copying Equipments		
Laptop		
Electronic Calculators		
Electronic Typewriters		
Fax/Telex		
Telephones		
Cellular Phones		
Network Devices		
	Amount	Weight
CD, DVD, Mini Disc		
Floppy Disks		
Others:		
Category 4 : Consumer Equipments		
Radio Sets		
Television		
Tapes		
Video camera		
Video Recorder		
Video Player		
Hi-fi/ /Audio Player/Loudspeaker/ Microphones		
Musical Instrument		
Electrical Switch, socket, plugs		
Remote Controls		
Batteries		
Others:		
Category 5 : Lighting Equipments		
Luminaries for Fluorescent Lamps		
Fluorescent Lamps		
Bulbs		
Other Lamps		
Category 6 : Electrical & electronic tools		
Tooling Equipments		
Others:		
Category 7 : Toys, leisure & Sports equipments		
Electric/Electronic Toys		
Video Games		
Computers for biking, diving, running, rowing,		

etc		
Electrical Sports Equipment		
Others:		
Category 8 : Medical Devices		
Electronic Glucometer		
Blood Pressure Meter		
Others:		
Category 9: Monitoring & control instruments		
Smoke Detector		
Heating Regulators		
Thermostat		
	Amount	Weight
Measuring, Weighting or adjusting appliances		
Others:		
Others		

7 ANNEX TWO

Average Lifetime of Electrical and Electronic Products

Date		Surveyed Person	
Company		Surveyor	
Location		Stock Range	
Telephone Number		Time	

Electrical Appliances	Low End	Middle end	High End
Television set			
DVD player			
VCD player			
Video player			
HI-FIS			
Radio Cassette			
Home Theatre			
Car-audio			
MP3/MP4 player			
Dish Water			
Refrigerators			
Freezer			
Washing Machine			
Dryer			
Cooker			
Cooker hood			
Built-in-oven			
Vacuum Cleaner			
Hob			
Cast Burner			
Table Gas Burner			
Pressure Cleaner			
kettle			
Hotpot			
Iron			

Sandwich maker/Toast/Grill			
Mixer/Grinder/Blender			
Bread Maker			
Oven			
Rice-Cooker			
Pressure Cooker			
Juicer			
Bathroom Scale			
Kitchen Scale			
Steamer			
Coffee Maker			
Personal Care			
Mobile Phones			
Fan			
Cooler			
Air-Conditioners			
Gym equipments			
Motorcycles			
Bicycle			
Play Stations			
Drill			
Angle Grinder			
Stew Pan			
Deep Fryer			
Frypan			
Tawa			
Kadhai			
casserole			
Gas Water Heater			
Water Tank			
Sewing Machine			
Desktops			
Camcorders			
Laptops			
Printers			
Monitors			

Digital camera			
Tapes			
Floppydiscs			
Scanners/Photocopymachin			
Elec.Calculators			
Elec.typewriters			
Music Instrument			
Other Peripheral Devices			
Others			

8 ANNEX THREE

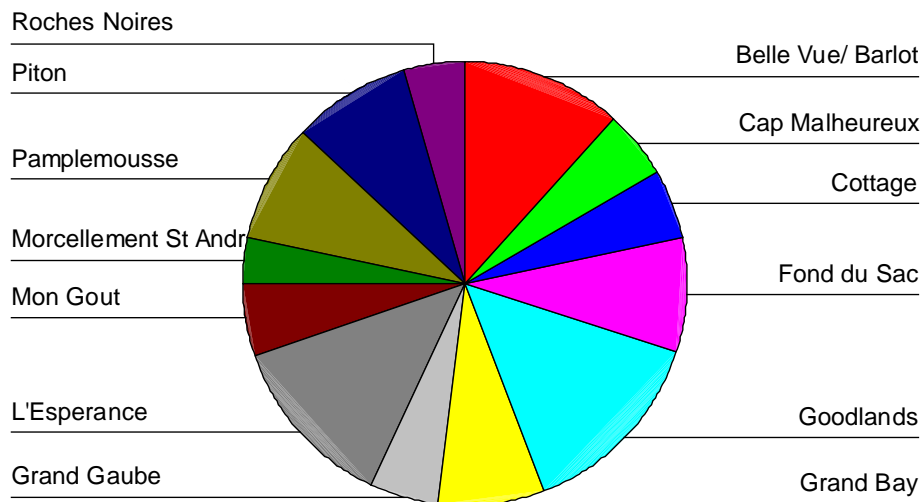
8.1 Analysis of Second Characterization

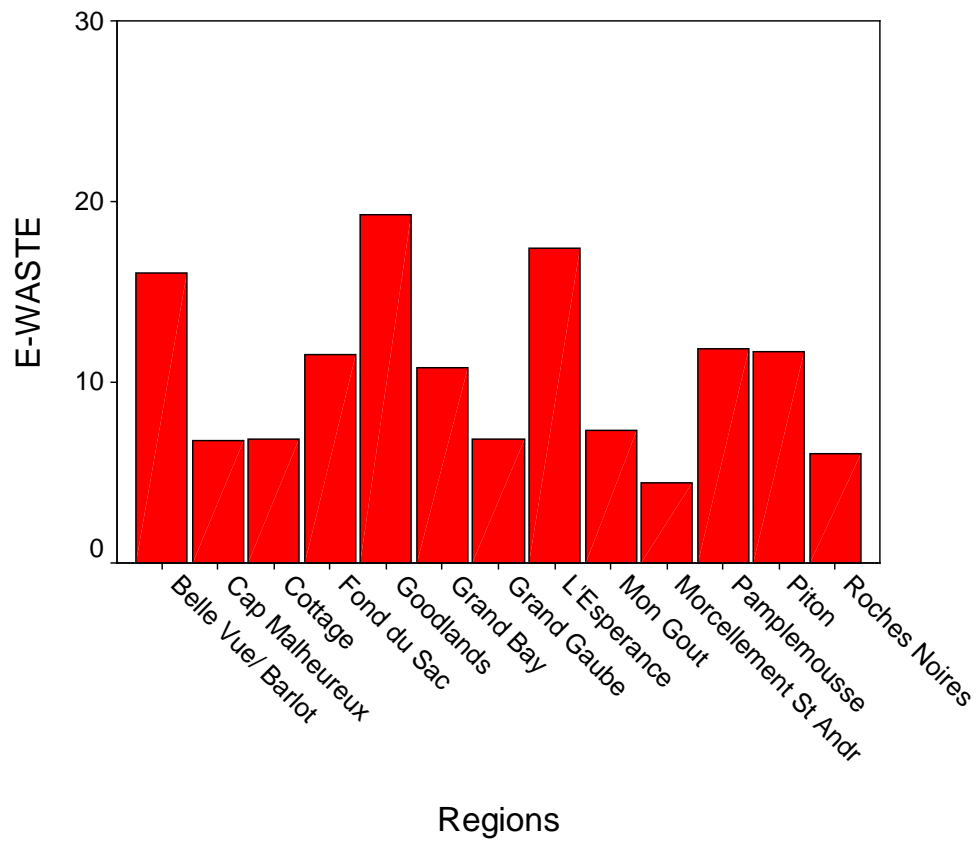
8.1.1 3Poudre D'or Transfer Station

Region	Large House. Appli	Small House Appli.	IT & Telec	Consum Equip.	Light Equip.	Elect& Elect Tools	Toys, leisure & sports	Medica Device	Monitor & control Instru.	Other
Cap										
Malheureux	6.115	0.335	0.05	0.09	0.105	0	0.11	0	0	0
Fond du Sac	4.315	1.15	0.28	3.1	1.475	1.22	0	0	0	0
L'Esperance	12.305	0.045	0.13	2.26	1.62	0.295	0.73	0	0	0
Belle Vue/										
Barlot	7.96	2.335	0.035	0.535	2.77	2.12	0.29	0	0	0
Pamplemou										
sse	4.185	0.19	0.015	5.105	2.02	0.28	0.09	0	0	0
Grand										
Gaube	0	0.02	0.695	1.395	4.7	0	0.04	0	0	0
Morcellemen										
t St Andre	3.63	0.13	0.34	0.065	0.275	0	0	0	0	0
Roches										
Noires	5.565	0.3	0	0.115	0.09	0	0	0	0	0
Mon Gout	2.115	1.135	0.29	3.7	0.135	0	0	0	0	0
Grand Bay	5.56	1.205	0	2.39	1.675	0	0	0	0	0
Goodlands	2.095	3.21	0.215	13.605	0	0.155	0	0	0	0
Cottage	3.315	0.135	0	2.52	0.9	0	0	0	0	0
Piton	8.105	0	0.205	2.42	1.1	0	0	0	0	0

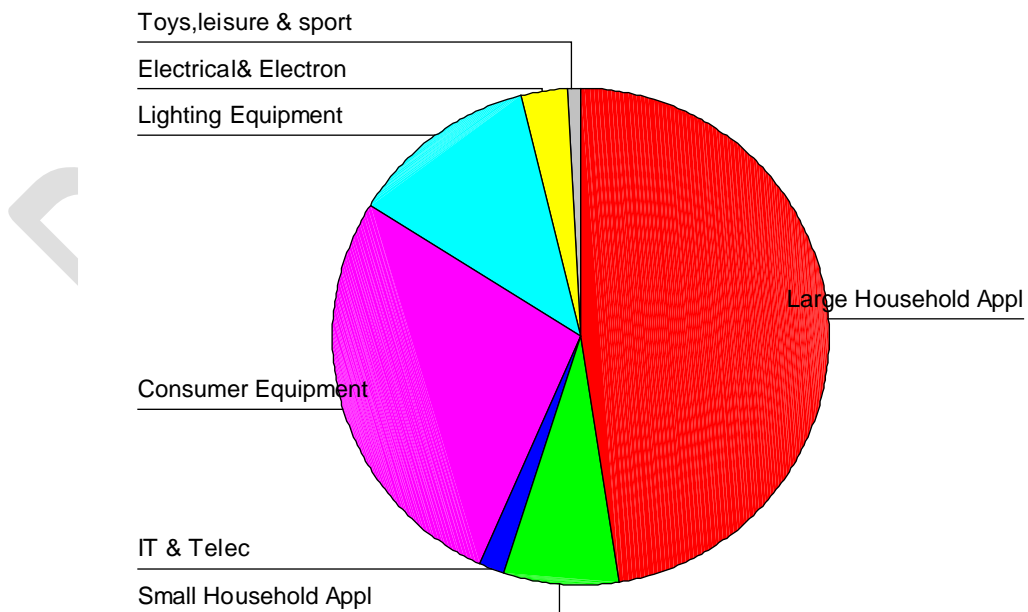
Region	Lorry Load(kg)	Sample Weight(kg)	E-waste(kg)
Cap Malheureux	13480	4640	6.805
Fond du Sac	8120	2800	11.54
L'Esperance	7580	3400	17.385
Belle Vue/ Barlot	7160	2480	16.045
Pamplemousse	7800	3140	11.885
Grand Gaube	7600	2240	6.85
Morcellement St Andre	8400	3080	
Roches Noires	9140	3040	4.44
Mon Gout	7460	2100	6.07
Grand Bay	10260	3860	7.375
Goodlands	12840	4280	10.83
Cottage	7800	2440	19.28
Piton	7860	2240	6.87
			11.83

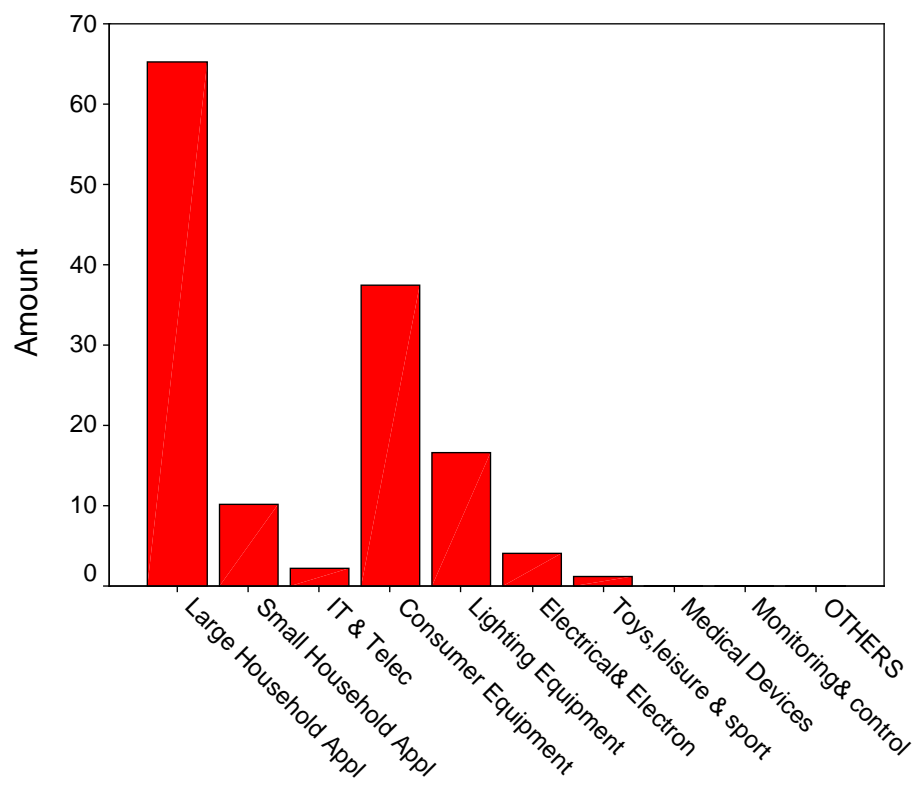
Distribution of E-waste At Poudre D'or Transfer Station (2)





Characterisation of E-waste



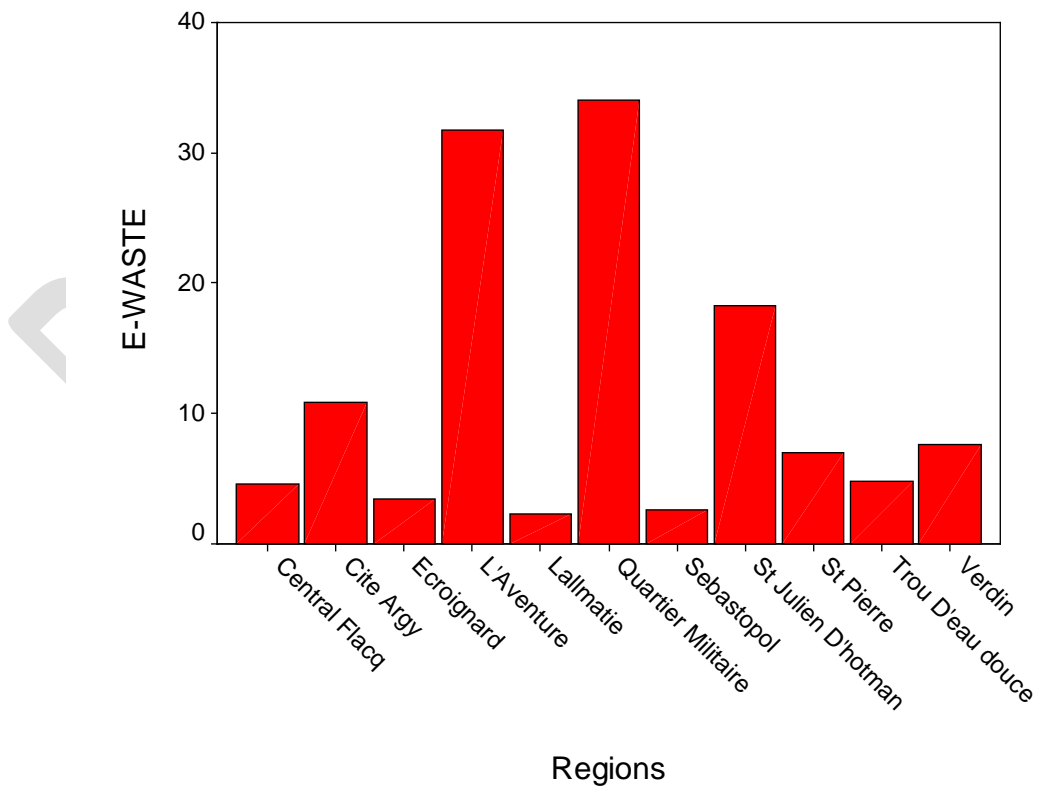
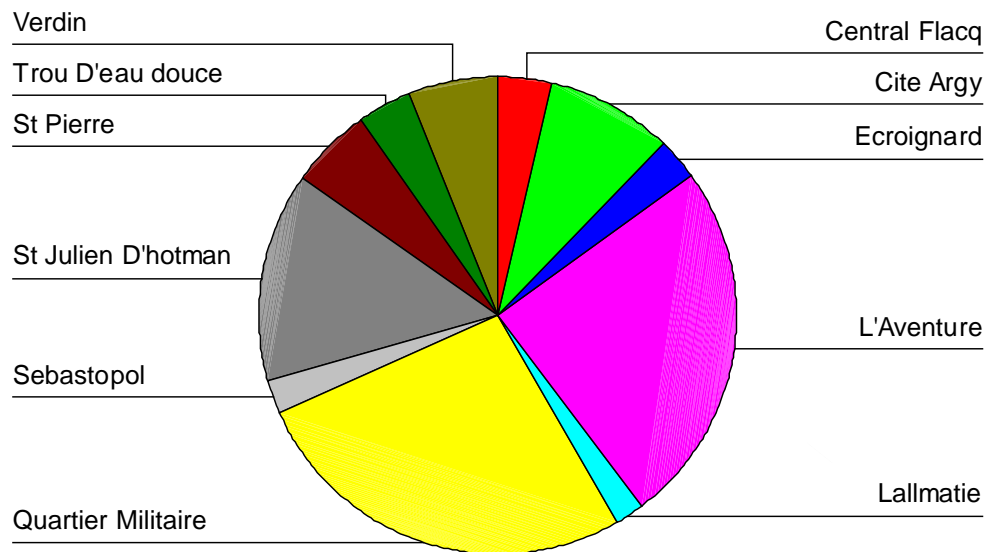


8.1.2 La Laura Transfer Station

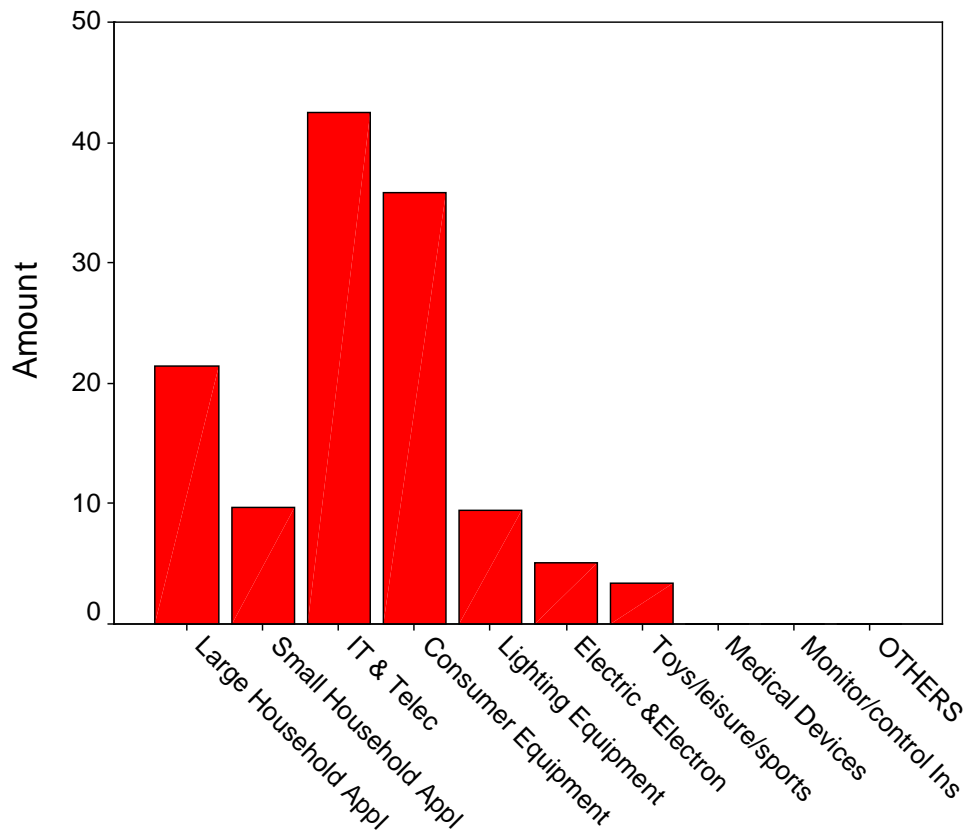
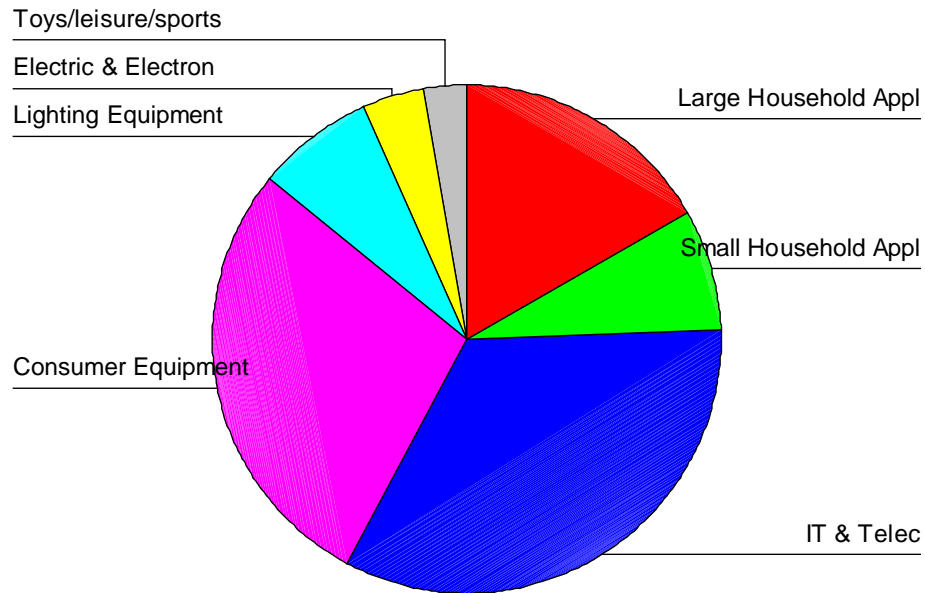
Region	Large Hous e. Appli	Small House Appli.	IT & Telec	Consum Equip.	Light Equip.	Elect& Elect Tools	Toys, leisure & sports	Medica Device	Monitor& control Instru.	Other
L'Aventure	1.73	1.165	22.87	3.305	2.225	0.48	0.025	0	0	0
Quartier Militaire	5.61	0	15.81	10.815	0.09	0.995	0.695	0	0	0
Trou D'eau douce	1.335	0.225	0.175	1.785	0.095	0	1.165	0	0	0
Sebastopol	1.21	0.22	0.145	0.08	0.105	0.81	0	0	0	0
St Pierre	4.11	0.125	0.02	0.085	1.76	0.5	0.445	0	0	0
Lallmatie	0	0.385	0	1.115	0.435	0.385	0.025	0	0	0
Ecroignard	1.51	1.22	0.08	0.23	0.21	0.2	0	0	0	0
Verdin	0	2.25	1.82	0.055	2.625	0	0.855	0	0	0
St Julien										
D'hotman	0	1.35	0.725	15.085	0.035	1.04	0	0	0	0
Central Flacq	1.955	1.615	0.795	0.245	0	0	0	0	0	0
Cite Argy	3.91	1.16	0.095	2.995	1.84	0.64	0.235	0	0	0

Region	Lorry Load(kg)	Sample Weight(kg)	E-waste(kg)
L'Aventure	10180	4380	31.8
Quartier Militaire	7740	3320	34.015
Trou D'eau douce	9680	3980	4.78
Sebastopol	9240	3560	2.57
St Pierre	7020	2620	7.045
Lallmatie	10680	4120	2.345
Ecroignard	14140	5600	3.45
Verdin	12800	4120	7.605
St Julien D'hotman	7040	2600	18.235
Central Flacq	12160	3800	4.61
Cite Argy	11960	3400	10.875

Distributuion of E-waste At La Laura Transfer Station (2)



Characterisation of E-waste

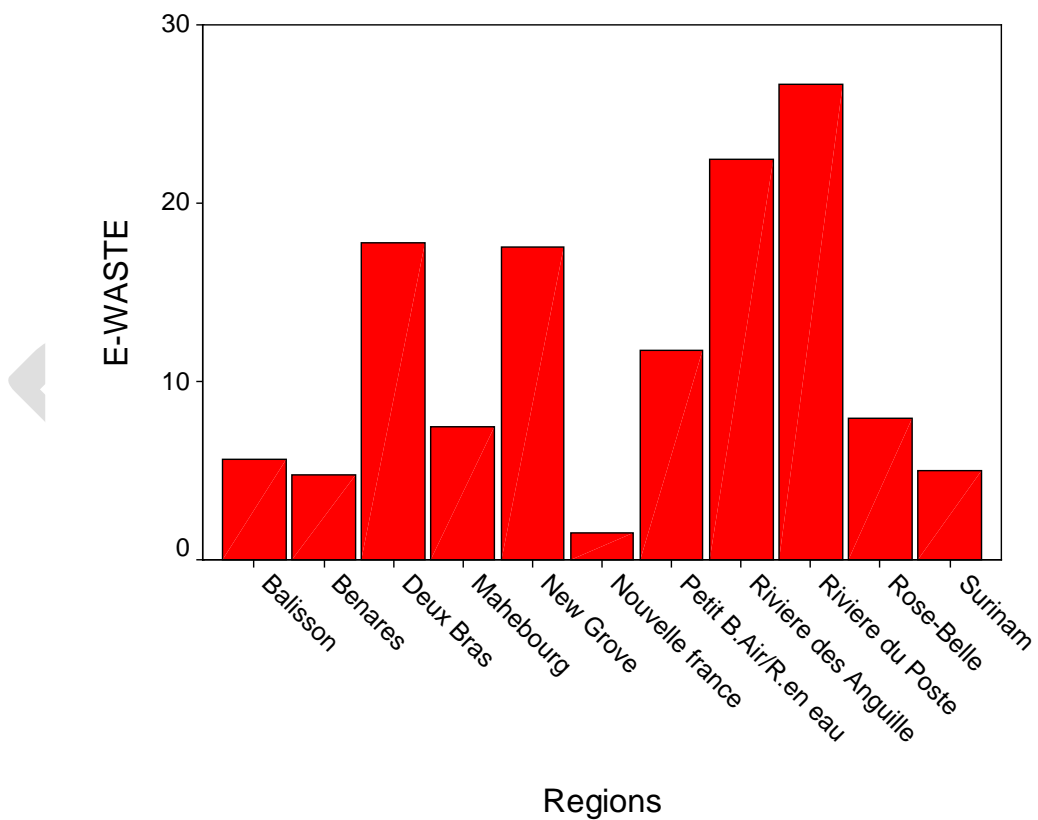
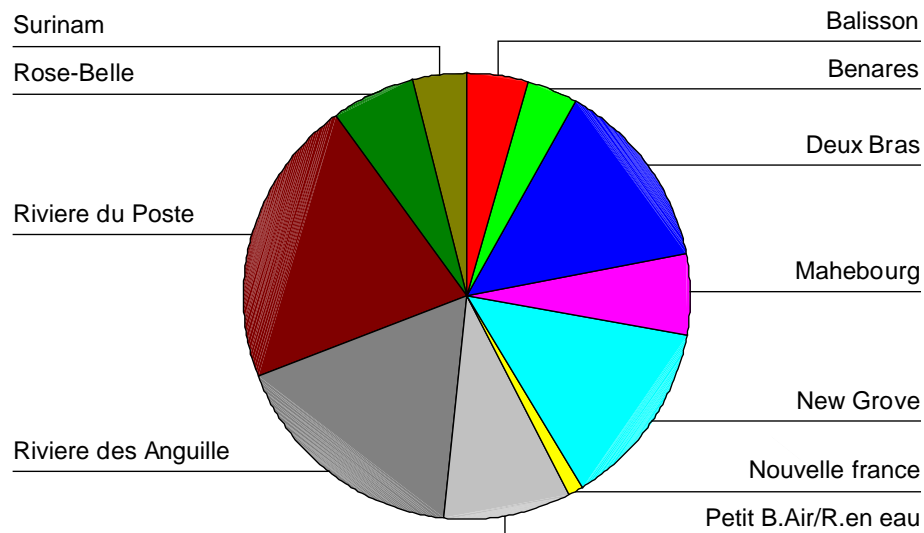


8.1.3 Mare-Chicose Transfer Station

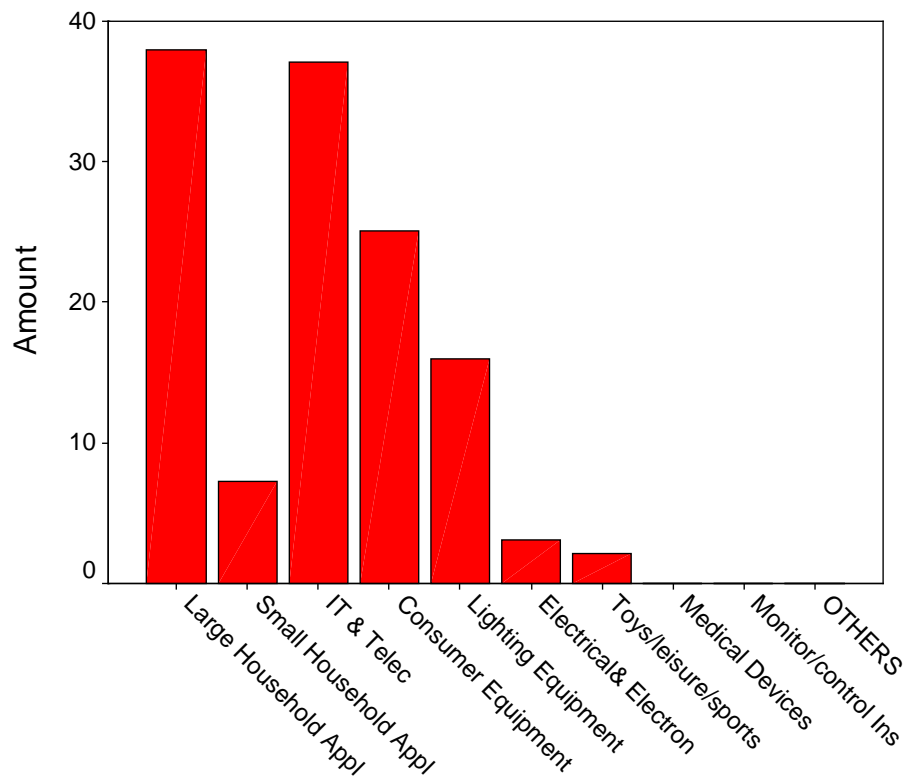
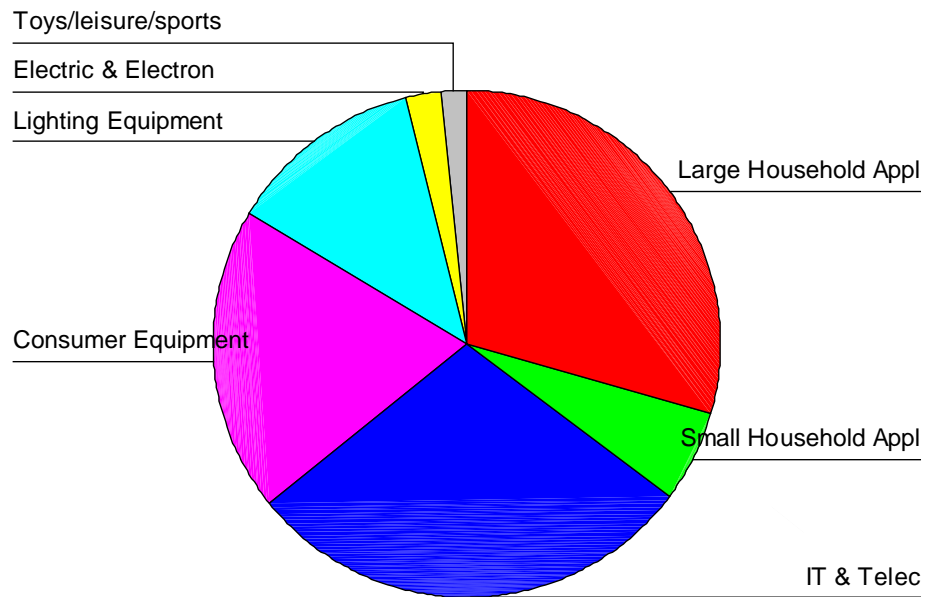
Region	Large House. Appli	Small House Appli.	IT & Telec	Consum Equip.	Light Equip.	Elect& Elect Tools	Toys, leisure & sports	Medica Device	Monitor& control Instru.	Other
Mahebourg	2.65	1.185	3.12	0.06	0.28	0.195	0	0	0	0
Riviere des Anguilles	6.64	2.475	5.39	2.025	4.98	0.645	0.31	0	0	0
Nouvelle france	0	0	0.095	0.615	0.795	0	0.035	0	0	0
Surinam	0	1.075	1.52	1.56	0.34	0.51	0	0	0	0
Balisson	1.67	0	2.28	1.35	0.155	0.165	0	0	0	0
Benares	0	0.605	1.975	1.025	0.33	0.295	0.495	0	0	0
Rose-Belle	1.76	1.33	0.125	3.065	0.82	0.55	0.28	0	0	0
Riviere du Poste	5	0.2	17.95	1.94	1.38	0	0.195	0	0	0
Petit BelAir /Riche en Eau	6.47	0.145	3.39	0.72	0.745	0.265	0	0	0	0
New Grove	3.51	0	1.29	11.34	0.78	0.43	0.2	0	0	0
Deux Bras	10.29	0.235	0	1.345	5.34	0	0.605	0	0	0

Region	Lorry Load(kg)	Sample Weight(kg)	E-waste(kg)
Mahebourg	13560	4620	7.49
Riviere des Anguilles	7900	2200	22.465
Nouvelle france	10720	4300	1.54
Surinam	9500	3120	5.005
Balisson	9240	2800	5.62
Benares	12000	3820	4.725
Rose-Belle	10660	4280	7.93
Riviere du Poste	9860	4140	26.665
Petit BelAir /Riche en Eau	8420	2640	11.735
New Grove	10760	4320	17.55
Deux Bras	9980	3580	17.815

Distribution of E-waste At Mare-chicose Transfer Station (2)



Characterisation of of E-waste

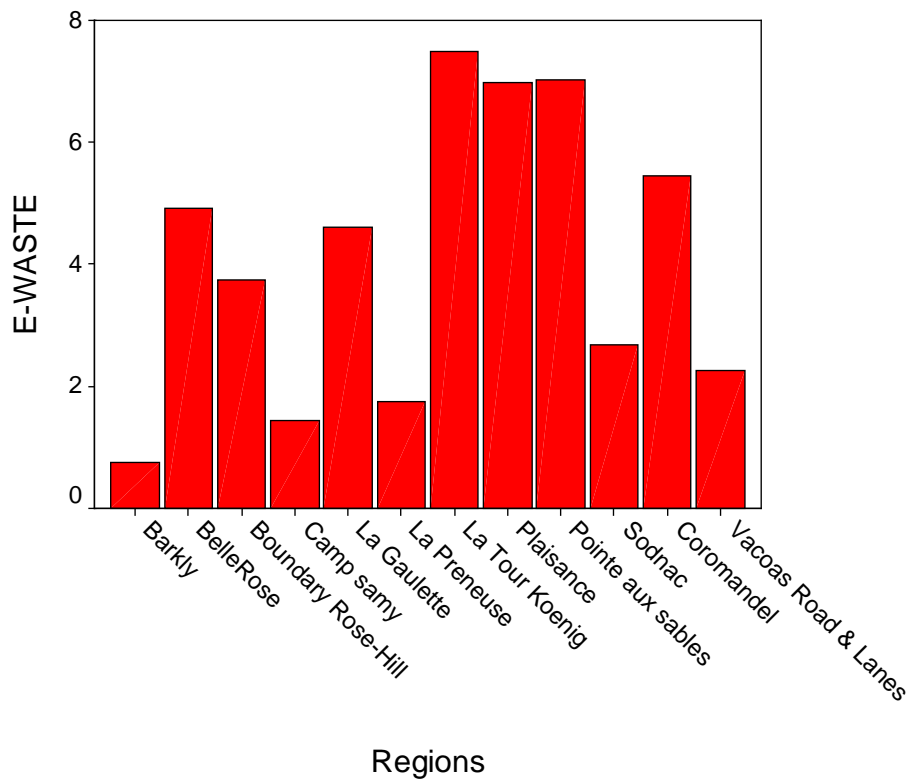
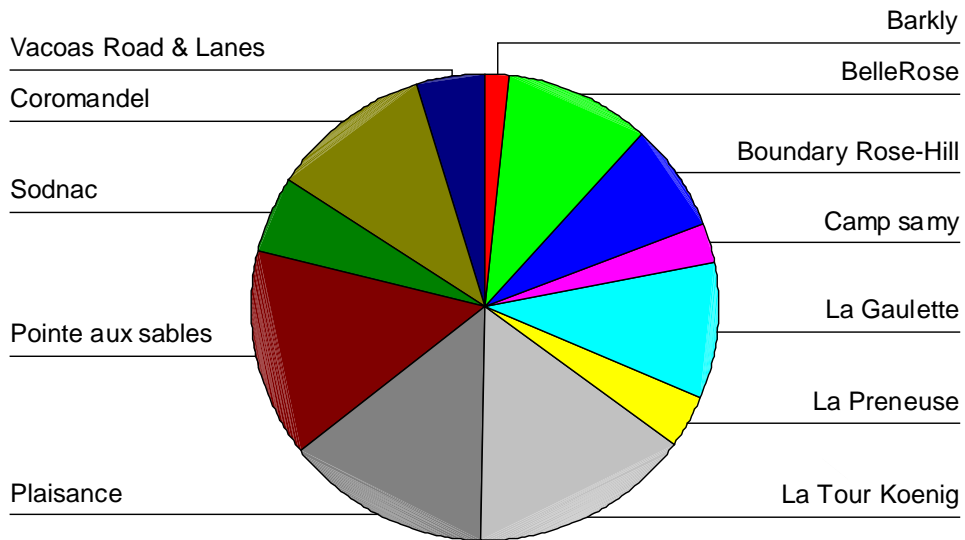


8.1.4 St Martin Transfer Station

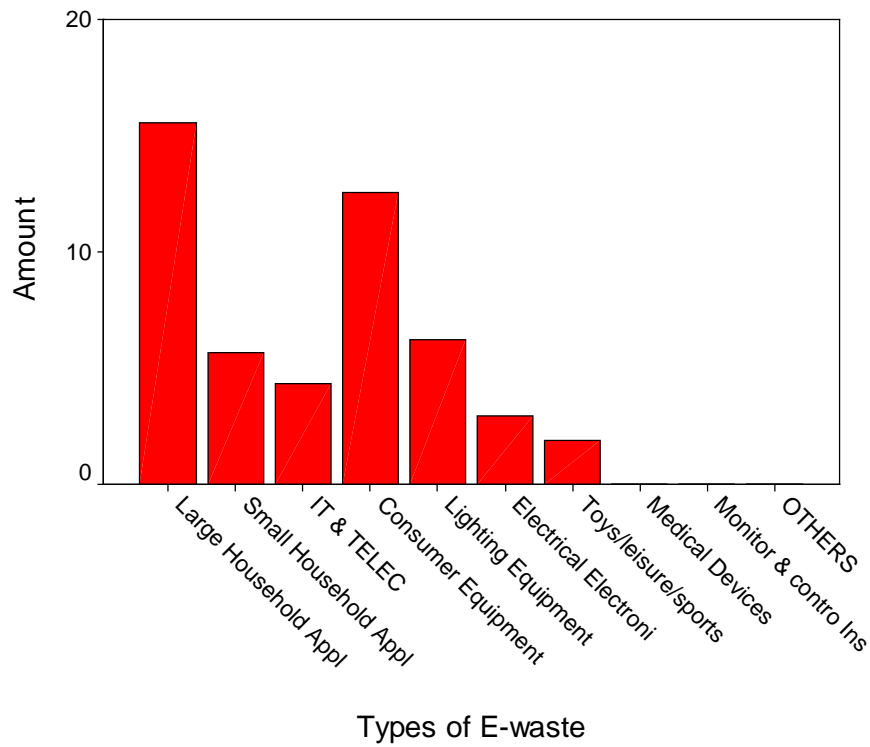
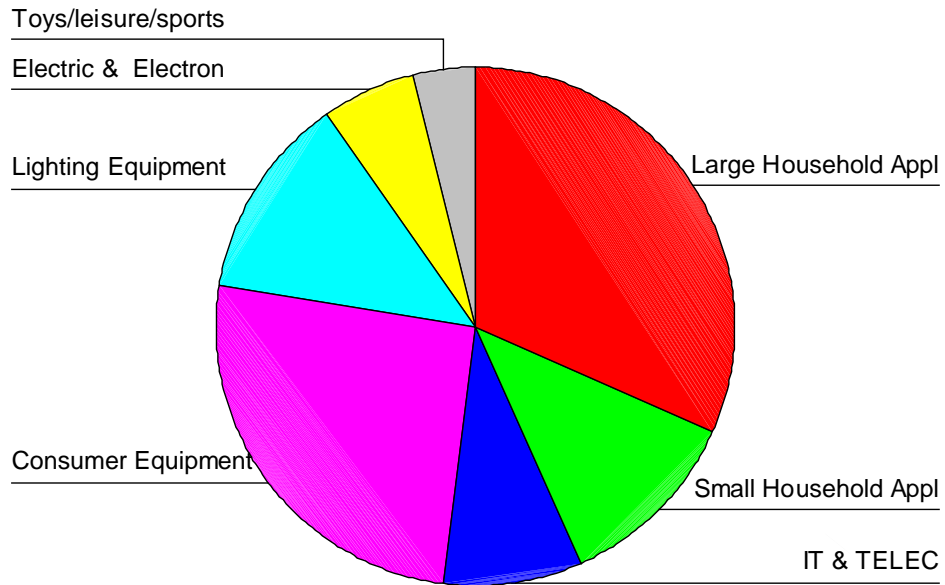
Region	Large House. Appli	Small House Appli.	IT & Telec	Consum Equip.	Light Equip.	Elect& Elect Tools	Toys, leisure & sports	Medica Device	Monitor& control Instru.	Other
Boundary Rose-Hill	0	0.76	0.035	0.88	0.38	1.655	0.03	0	0	0
Plaisance	0	0.615	0.265	5.56	0.545	0	0	0	0	0
Barkly	0	0	0	0.115	0.265	0.375	0	0	0	0
La Tour Koenig	4.035	1.87	0.495	0.5	0.19	0.39	0	0	0	0
BelleRose	1.865	0	2.315	0	0.4	0.135	0.195	0	0	0
Pointe aux sables	1.385	0.88	0.03	1.755	1.79	0	1.185	0	0	0
La Gaulette	3.165	0	0.035	0.46	0.515	0.205	0.23	0	0	0
Vacoas Road & Lanes	0	0.23	0.69	0.9	0.44	0	0	0	0	0
Unknown	3.9	0	0.185	0.315	0.895	0	0.165	0	0	0
Camp samy	0	0.36	0	0.7	0.375	0	0	0	0	0
La Preneuse	0	0	0.125	1.28	0.19	0.16	0	0	0	0
Sodnac	1.21	0.945	0.145	0.07	0.24	0	0.065	0	0	0

Region	Lorry Load(kg)	Sample Weight(kg)	E-waste(kg)
Boundary Rose-Hill	7640	2640	3.74
Plaisance	6780	2780	6.985
Barkly	14280	5680	0.755
La Tour Koenig	15320	4520	7.48
BelleRose	6240	2000	4.91
Pointe aux sables	8600	4200	7.025
La Gaulette	20660	9060	4.61
Vacoas Road & Lanes	7420	3160	2.26
Coromandel	6420	2600	5.46
Camp samy	12180	3820	1.435
La Preneuse	9260	2400	1.755
Sodnac	6920	1520	2.675

Distribution of E-waste At St Martin Transfer Station (2)



Characterisation of E-waste

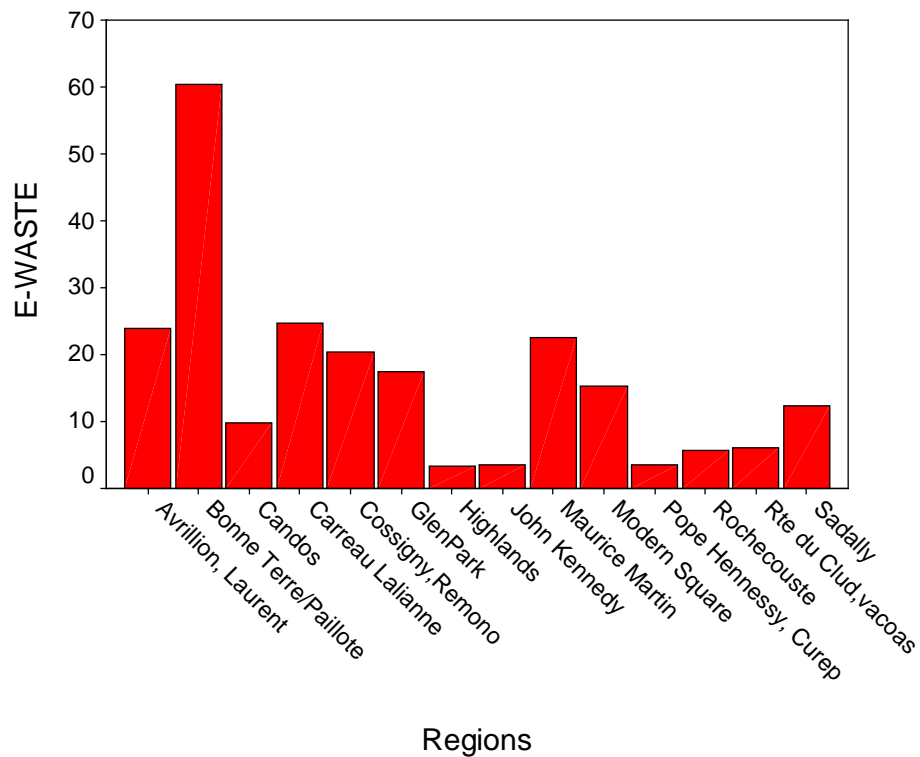
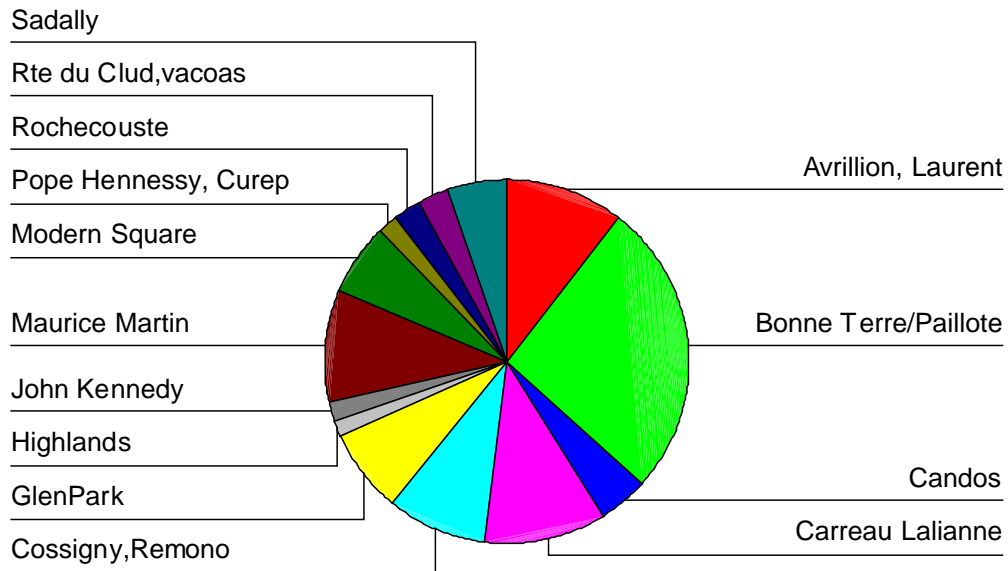


8.1.5 La Brasserie

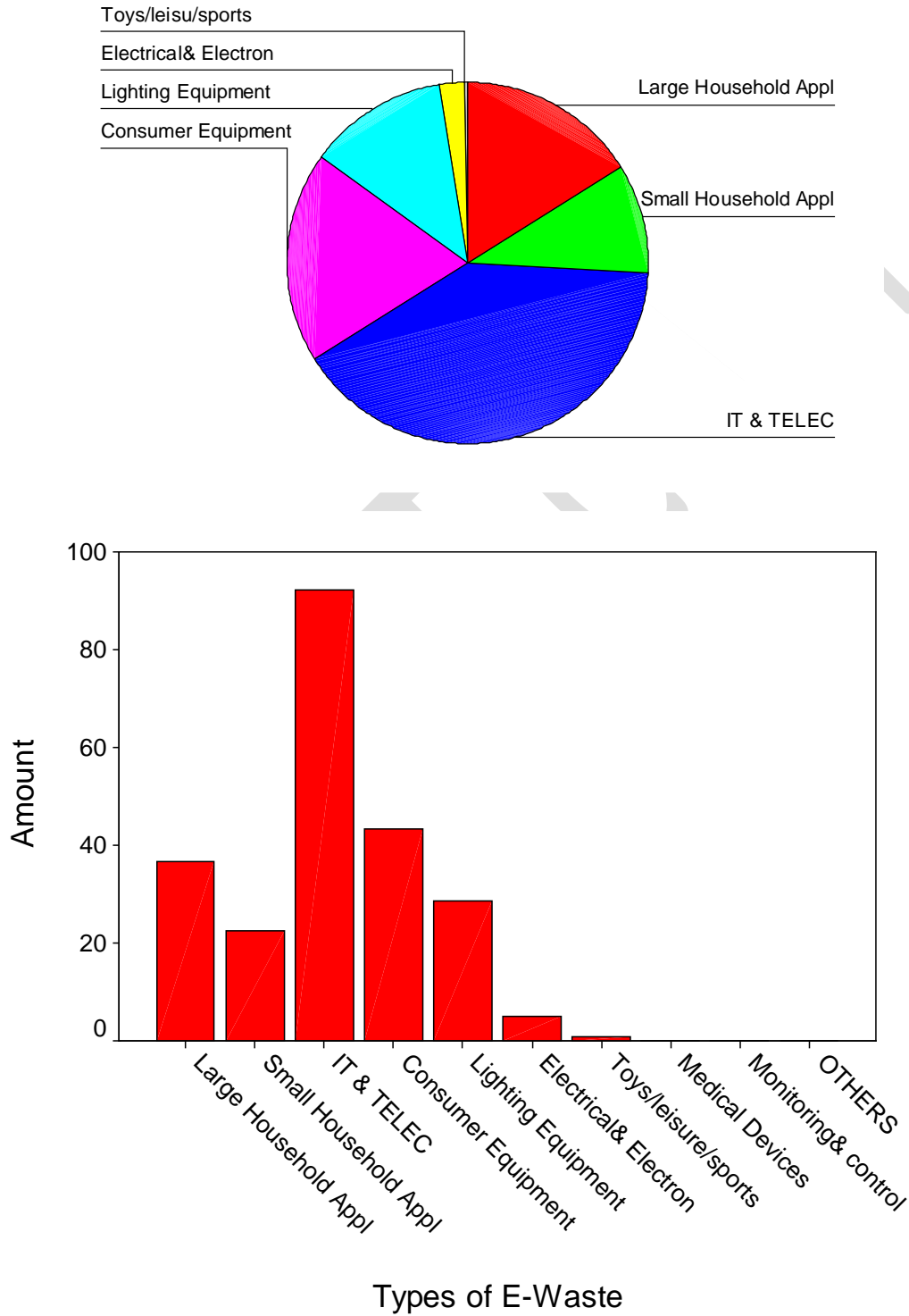
Region	Large House. Appli	Small House Appli.	IT & Telec	Consum Equip.	Light Equip.	Elect& Elect Tools	Toys, leisure & sports	Medica Device	Monitor& control Instru.	Other
Candos	1.405	3.51	0.045	1.02	3.165	0.425	0.24	0	0	0
Highlands	0	1.165	0.145	1.9	0.205	0	0	0	0	0
Cossigny, Remono	10.925	2.36	0.12	2.91	2.81	1.3	0	0	0	0
Carreau Lalianne	9.855	2.78	11.73	0.21	0.105	0	0	0	0	0
Rte du										
Clud, vacoas	0	2.485	0.23	0.025	3.285	0	0	0	0	0
Pope Hennessy,										
Curepipe	0	2.615	0.035	0.62	0.315	0	0	0	0	0
Maurice Martin	0	1.295	18.65	1.345	1.205	0	0.085	0	0	0
Avrillion, Laurent	0.74	2.235	11.56	8.5	0.835	0.135	0	0	0	0
Rochecouste	2.155	0	2.875	0.18	0.5	0	0	0	0	0
Modern Square	1.205	2.405	0.22	7.54	3.845	0	0	0	0	0
Bonne										
Terre/Paillote	0	0	46.415	10.015	1.56	2.385	0	0	0	0
GlenPark	7.755	0	0	8.03	1.425	0	0.23	0	0	0
Sadally	1.315	0.135	0.04	0.975	9.025	0.88	0.045	0	0	0
John Kennedy	1.29	1.545	0.165	0.2	0.2	0	0.195	0	0	0

Region	Lorry Load(kg)	Sample Weight(kg)	E-waste(kg)
Candos	10360	3940	9.81
Highlands	8260	2840	3.415
Cossigny, Remono	10860	2620	20.425
Carreau Lalianne	9020	2620	24.68
Rte du Clud, vacoas	7500	2180	6.025
Pope Hennessy, Curepipe	5920	1660	3.585
Maurice Martin	11200	2440	22.58
Avrillion, Laurent	6440	2500	24.005
Rochecouste	6540	2320	5.71
Modern Square	10520	3480	15.215
Bonne Terre/Paillote	11020	4600	60.375
GlenPark	8460	2940	17.44
Sadally	8300	2860	12.415
John Kennedy	9100	3740	3.595

Distribution of E-waste At La brasserie Transfer Station (2)



Characterisation of E-waste



9 ANNEX FOUR

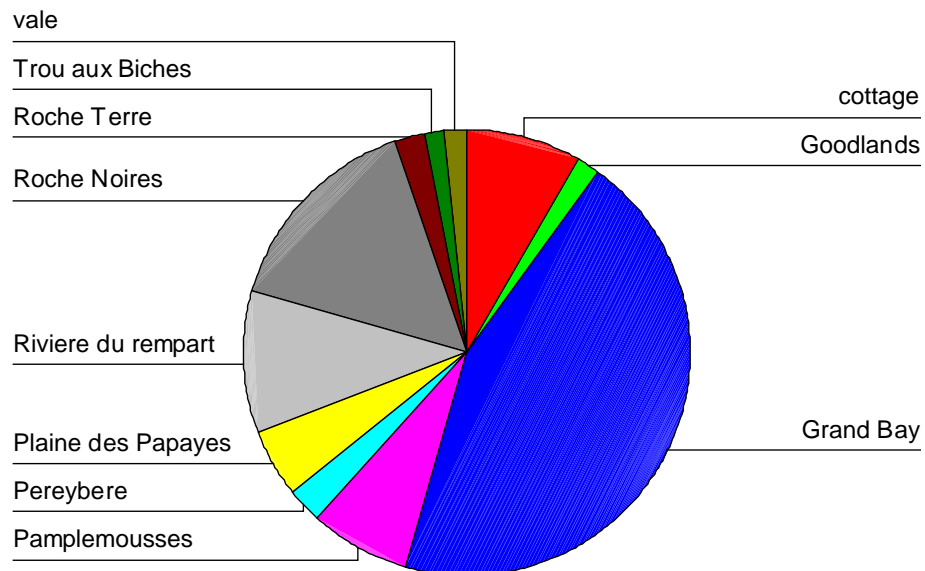
9.1 Analysis of Third Characterization

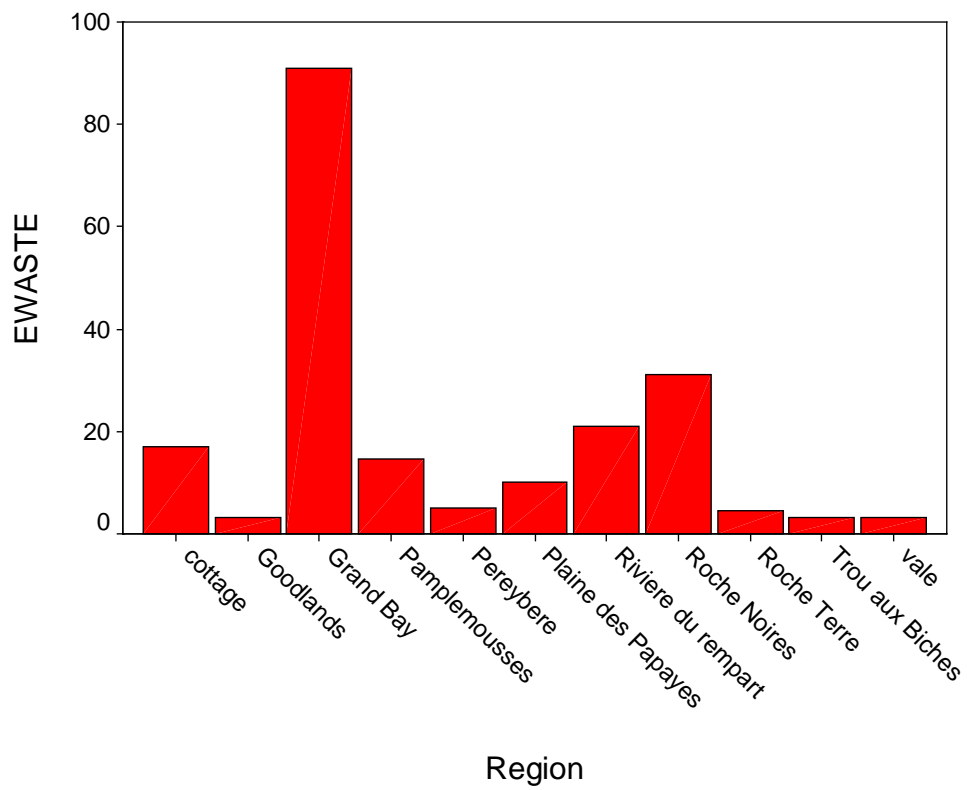
9.1.1 Poudre D'or Transfer Station

Region	Large House. Appli	Small House Appli.	IT & Telec	Consum. Equip.	Light Equip.	Elect& Elect Tools	Toys, leisure & sports	Medica Device	Monitor & control Instru.	Other
Plaine des										
Papayes	4.3	0	0	0	1.075	4.64	0.17	0	0	0
cottage	12.34	1.275	0.13	1.435	0.07	1.7	0.025	0	0	0
Riviere du										
rempart	17.02	0.325	0.17	0	3.385	0	0	0	0	0
Grand Bay	89.07	1.67	0.115	0	0	0.095	0	0	0	0
Roche Terre	3.05	0.74	0.215	0.09	0.36	0	0	0	0	0
Goodlands	0	2.565	0.455	0.15	0	0	0.105	0	0	0
Pereybere	0	3.12	0.61	0.82	0.05	0.425	0	0	0	
Trou aux Biches	2.105	0.455	0.325	0.19	0.06	0	0.02	0	0	0
vale	1.125	0	1.67	0.29	0.05	0	0.12	0	0	0
Pamplemousses	6.085	0.525	1.87	2.05	0.64	3.445	0	0	0	0
Roche Noires	18.885	3.085	0.085	0.705	8.305	0	0	0	0	0

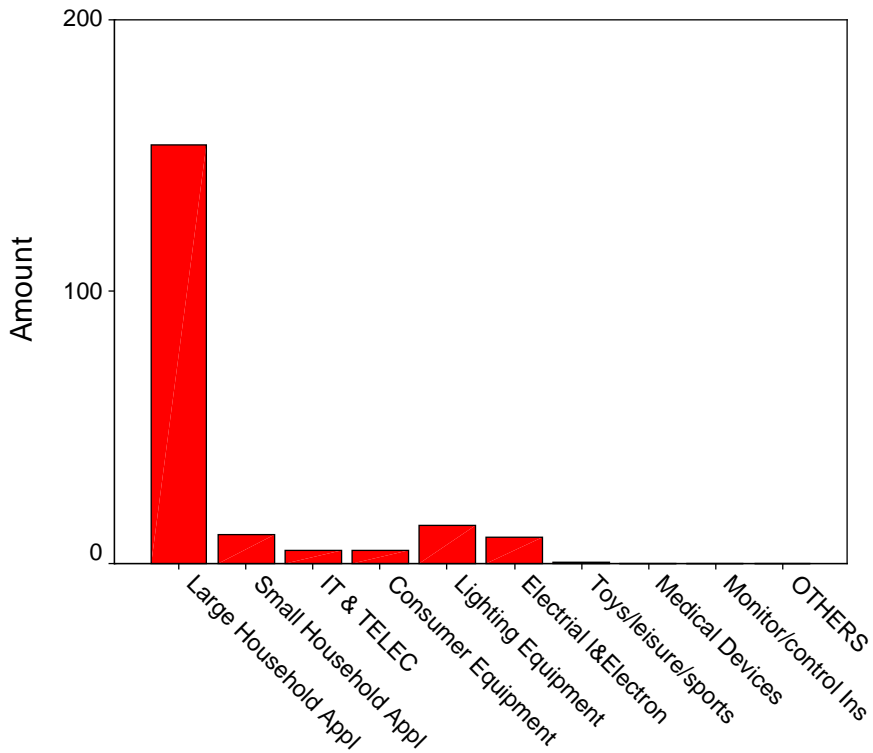
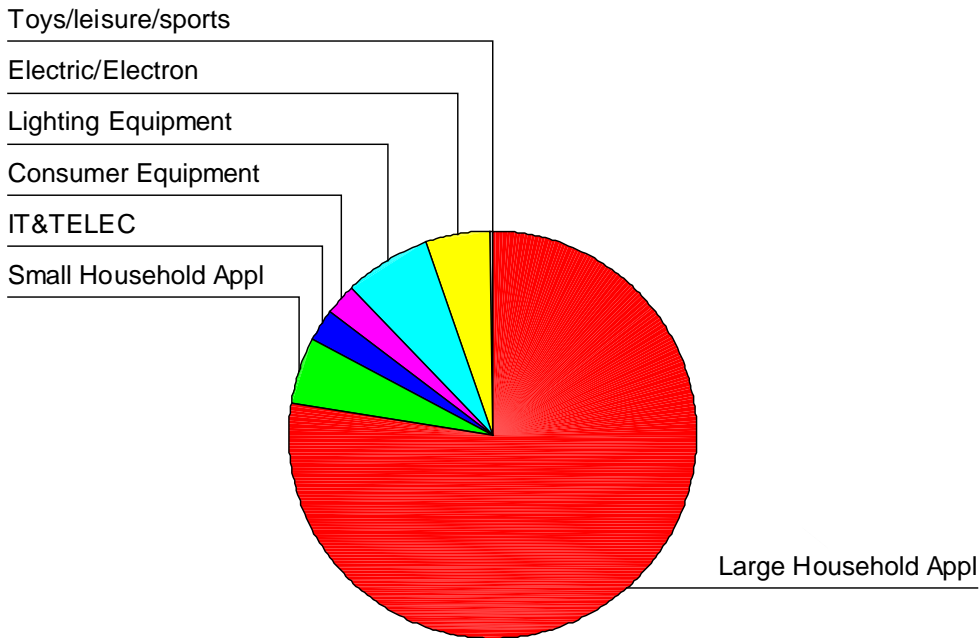
Region	Lorry Load(kg)	Sample Weight(kg)	E-waste(kg)
Plaine des Papayes	4660	1440	10.185
cottage	6320	2380	16.975
Riviere du rempart	8980	3580	20.9
Grand Bay	13920	4940	90.95
Roche Terre	4700	1380	4.455
Goodlands	17140	7000	3.275
Pereybere	11880	5220	5.025
Trou aux Biches	12420	3340	3.155
vale	12220	3520	3.255
Pamplemousses	12720	3920	14.615
Roche Noires	11940	3000	31.065

Distribution of E-waste At Poudre D'or Transfer Station (3)





Characterisation of E-waste

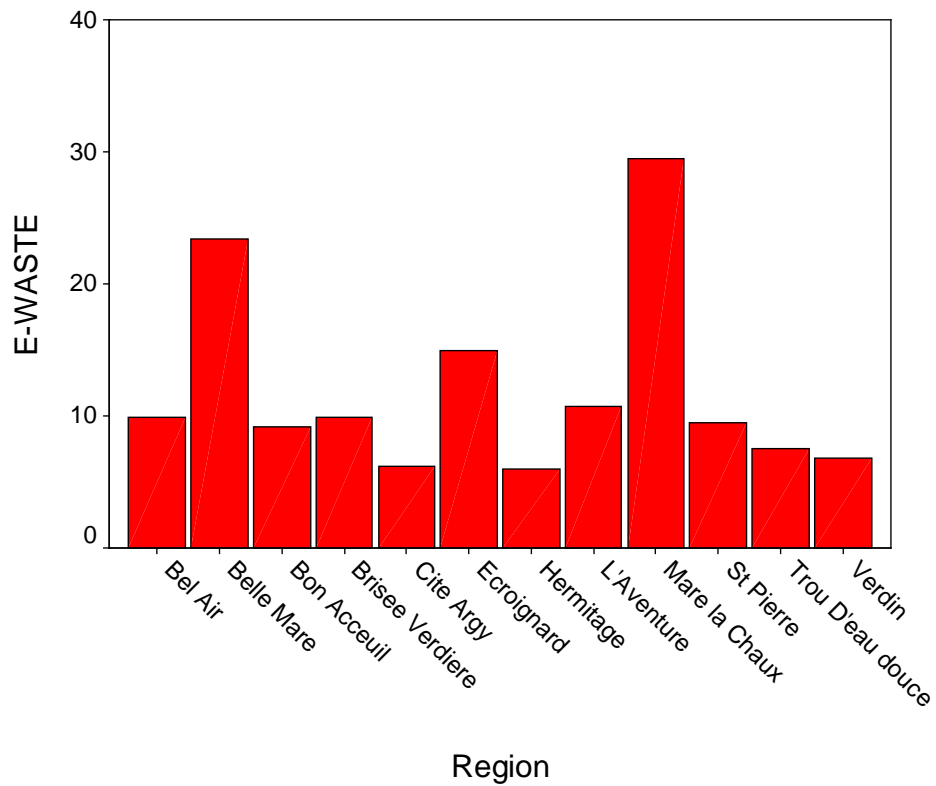
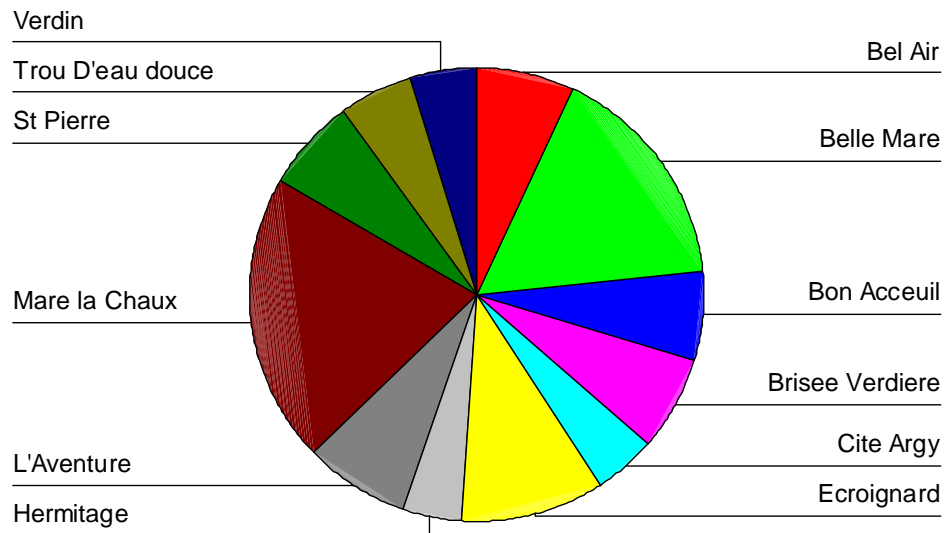


9.1.2 La Laura Transfer Station

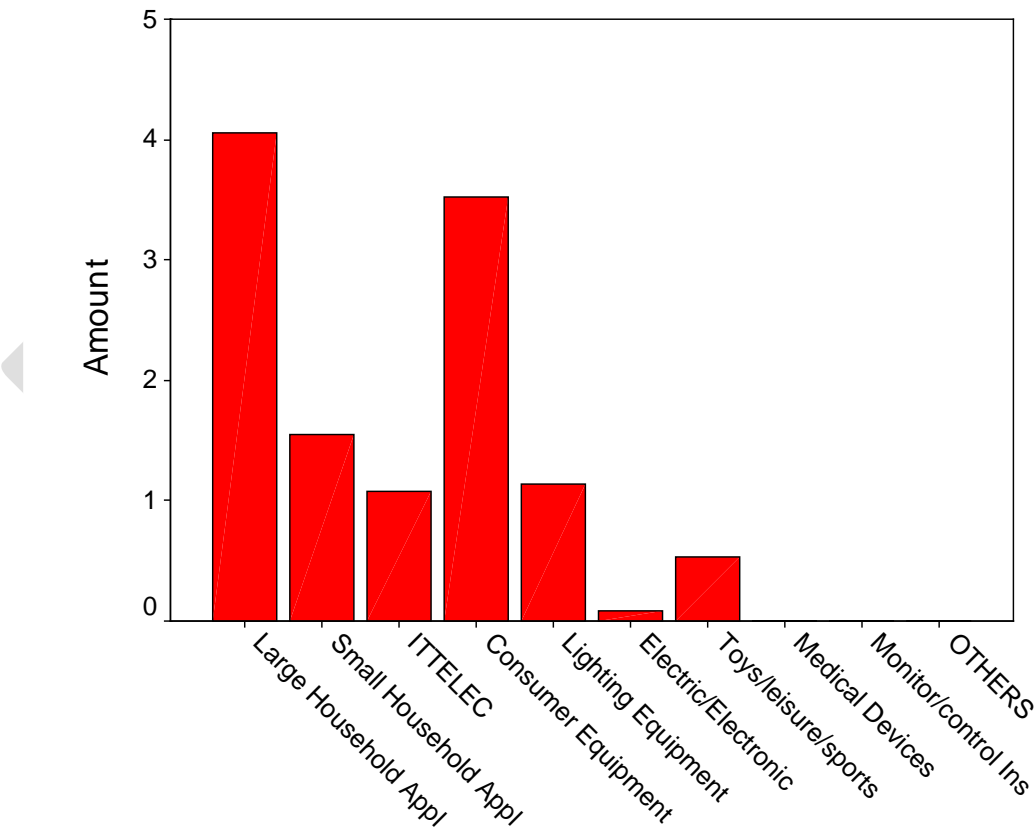
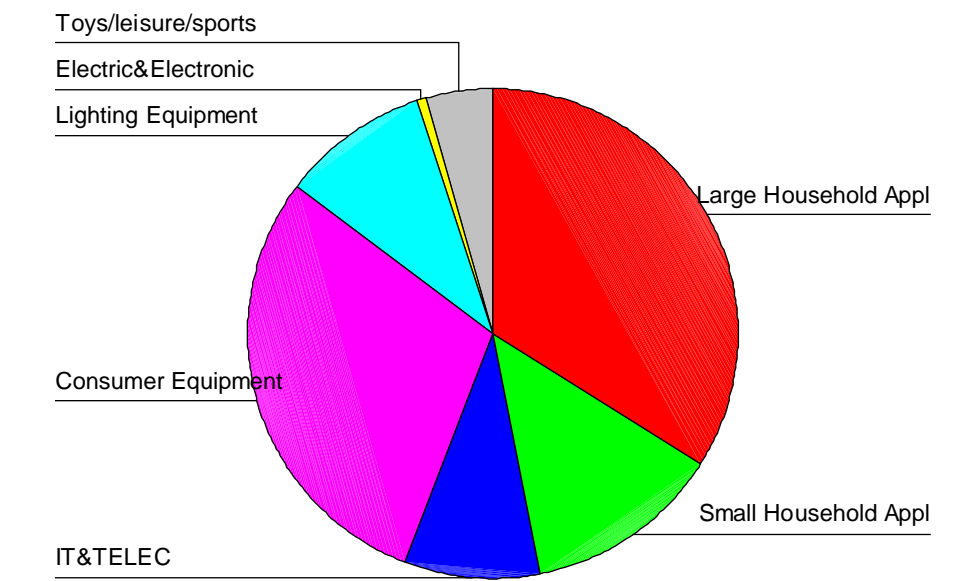
Region	Large House.Appli	Small House Appli.	IT & Telec	Consum. Equip.	Light Equip.	Elect& Elect Tools	Toys, leisure & sports	Medica Device	Monitor& control Instru.	Other
Cite Argy	4.19	0.475	0.03	0.545	0.895	0	0	0	0	0
Bel Air	2.32	1.8	0.155	3.07	0.17	0	2.38	0	0	0
Hermitage	2.72	1.205	0	1.435	0.535	0	0.1	0	0	0
Trou D'eau douce	2.085	1.165	0.01	0	3.485	0	0.755	0	0	0
St Pierre	0	1.16	0.13	5.19	1.895	0.285	0.805	0	0	0
Ecroignard	11.21	0.72	0.2	0.48	1.335	0	0.955	0	0	0
Mare la Chaux	3.59	2.77	1.875	18.775	2.21	0	0.29	0	0	0
Bon Accueil	3.945	2.005	2.025	0.08	0.29	0	0.8	0	0	0
Verdun	1.63	2.875	1.36	0.31	0.62	0	0.03	0	0	0
Belle Mare	7.65	2.525	2.02	9.235	1.26	0.44	0.275	0	0	0
L'Aventure	7.01	0.235	0.01	3.035	0.465	0	0	0	0	0
Brisee										
Verdiere	2.25	1.69	5.075	0.09	0.545	0.24	0	0	0	0

Region	Lorry Load(kg)	Sample Weight(kg)	E-waste(kg)
Cite Argy	7480	3120	6.135
Bel Air	12340	3680	9.895
Hermitage	7480	3100	5.995
Trou D'eau douce	8840	3580	7.5
St Pierre	6820	2360	9.465
Ecroignard	8280	3800	14.9
Mare la Chaux	7620	3060	29.51
Bon Accueil	10320	4580	9.145
Verdun	7400	3080	6.825
Belle Mare	9880	3980	23.405
L'Aventure	9320	3520	10.755
Brisee Verdiere	9080	4020	9.89

Distribution of E-waste At La Laura Transfer Station (3)



Characterisation of E-waste

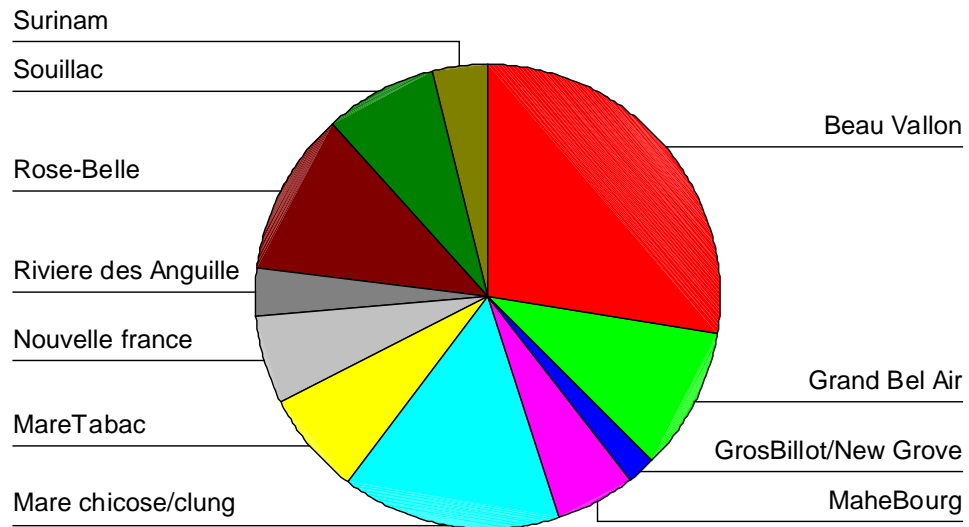


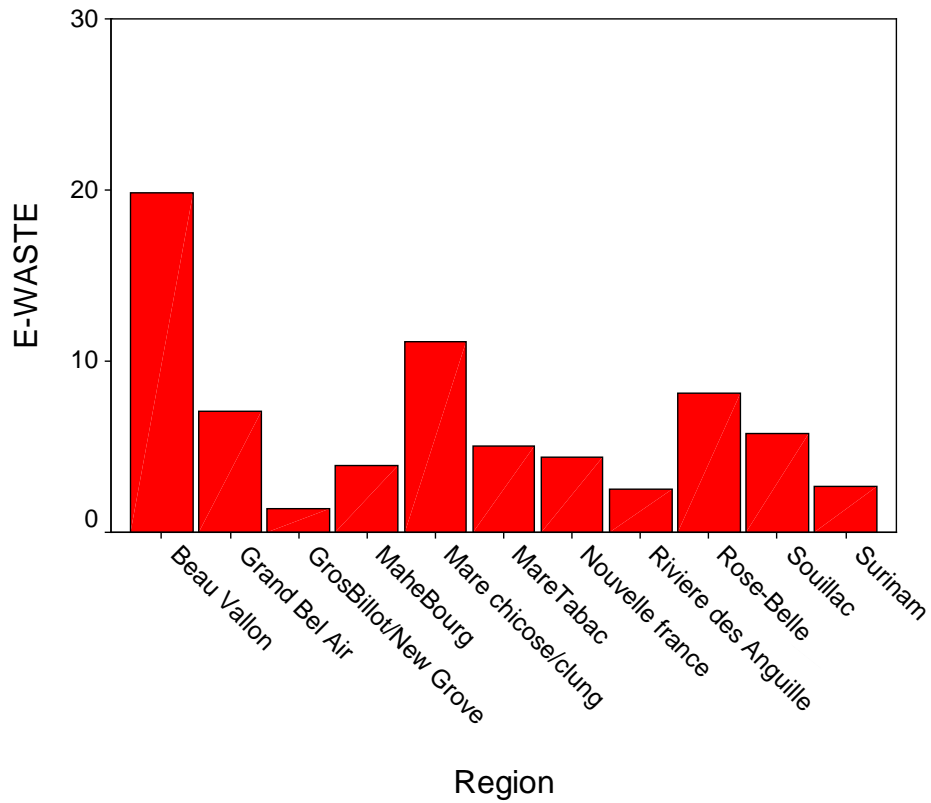
9.1.3 Mare-Chicose Transfer Station

Region	Large House.Appli	Small House Appli.	IT & Telec	Consum. Equip.	Light Equip.	Elect& Elect Tools	Toys, leisure & sports	Medica Device	Monitor& control Instru.	Other
Nouvelle										
france	2.5	0.53	0.68	0.16	0	0	0.52	0	0	0
Beau Vallon	0	0	0.05	1.56	0	2.85	15.39	0	0	
Surinam	0	0	0.885	1.295	0	0.27	0.25	0	0	0
grand Bel Air	0	0	1.015	0.81	1.045	3.445	0.79	0	0	0
Souillac	2.71	0.335	0.34	1.94	0.31	0	0.1	0	0	0
Rose-Belle	1.62	0.26	2.795	1.745	1.38	0	0.31	0	0	0
MaheBourg	1.15	0.1	0.125	2.055	0.19	0	0.285	0	0	0
Mare										
chicose/clung	3.74	3.35	0.08	3.04	0.655	0.11	0.155	0	0	0
Riviere des										
Anguilles	2.11	0.19	0.08	0.07	0.035	0	0	0	0	0
MareTabac	4.31	0.155	0.08	0.185	0.1	0	0.21	0	0	0
Gros										
Billot/New										
Grove	0	0.44	0.28	0.125	0	0	0.065	0.505	0	0

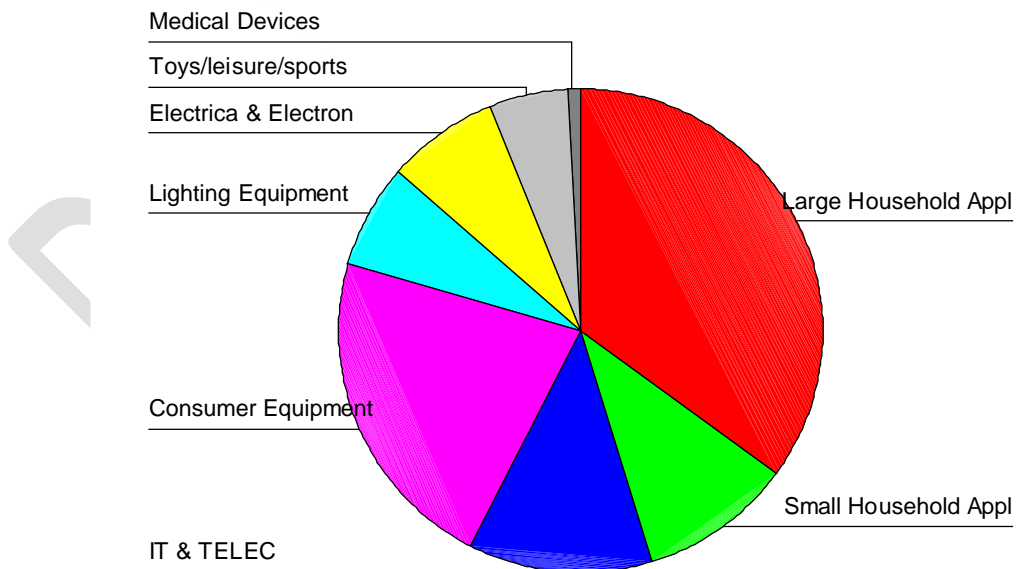
Region	Lorry Load(kg)	Sample Weight(kg)	E-waste(kg)
Nouvelle france	14740	5960	4.39
Beau Vallon	3780	880	19.85
Surinam	9080	3380	2.7
grand Bel Air	11740	2960	7.105
Souillac	9740	2800	5.735
Rose-Belle	14980	6120	8.11
MaheBourg	13320	4320	3.905
Mare chicose/clung	8080	2360	11.13
Riviere des Anguilles	9760	2820	2.485
MareTabac	13720	4880	5.04
Gros Billot/New Grove	10000	4260	1.415

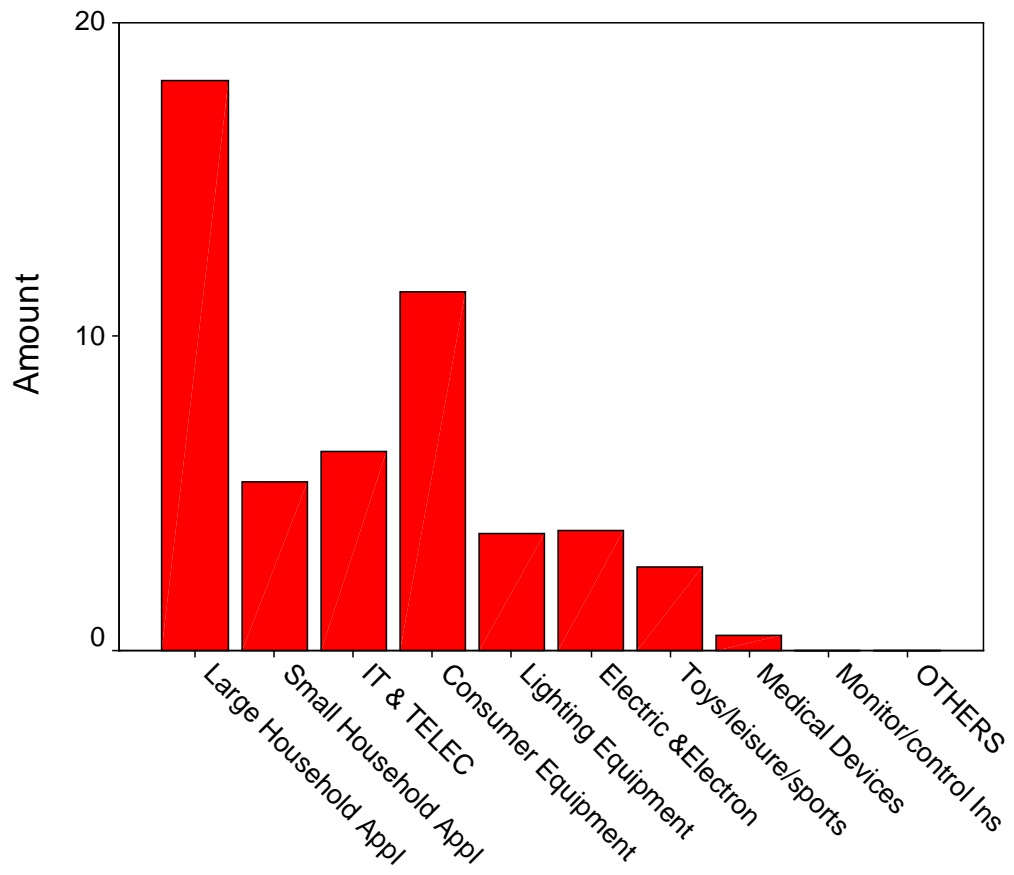
Distribution of E-waste At Mare-Chicose Transfer Station (3)





Characterisation of E-waste





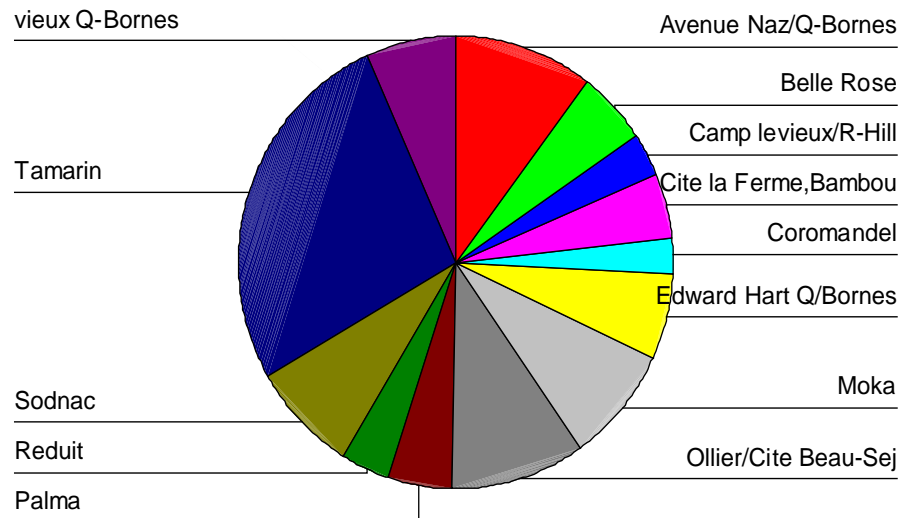
DO NOT COPY

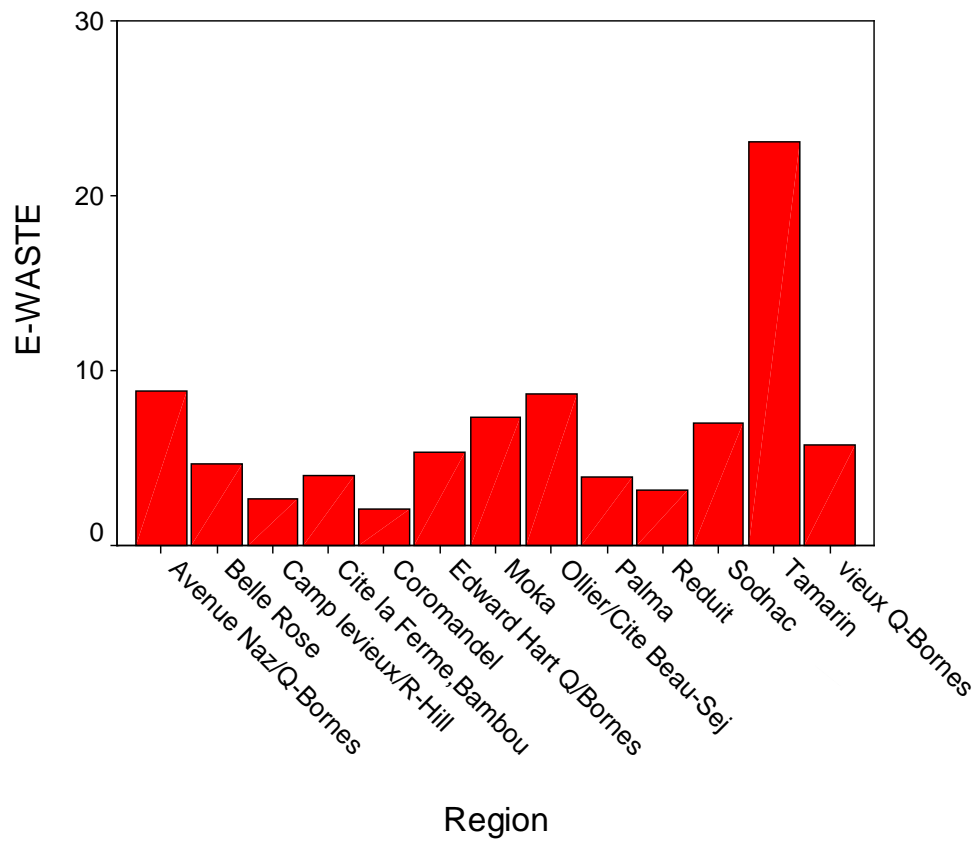
9.1.4 St Martin Transfer Station

Region	Large House.Appli	Small House Appli.	IT & Telec	Consum. Equip.	Light Equip.	Elect& Elect Tools	Toys, leisure & sports	Medica Device	Monitor& control Instru.	Other
vieux Q-Bornes	1.055	3.865	0.06	0.11	0.125	0.535	0	0	0	0
Ollier/Cite Beau-										
Sejour	4.095	2.02	0.89	0.49	0.995	0	0.2	0	0	0
Moka	4.815	1.415	0.665	0.3	0.115	0	0	0	0	0
Coromandel	0	1.375	0.27	0.1	0.005	0.105	0.23	0	0	0
Avenue Naz/Q-										
Bornes	2.71	0.955	0.195	4.42	0.575	0	0	0	0	0
Cite la										
Ferme,Bambous	1.035	0	0.12	2.145	0.445	0	0.265	0	0	0
Edward Hart										
Q/Bornes	0	0.815	0.245	0.825	3.46	0	0	0	0	0
Palma	0	1.095	0.495	1.705	0.245	0	0.355	0	0	0
Sodnac	0.4	2.03	1.18	0.11	0.845	1.375	1.09	0	0	0
Belle Rose	2.475	0.89	0.28	0.13	0.775	0	0.11	0	0	0
Reduit	2.105	0.575	0.115	0.28	0	0	0.06	0	0	0
Tamarin	7.63	3.035	0.275	3.22	0.18	0.2	8.575	0	0	0
Camp levieux/R-										
Hill	0.88	0.65	0.5	0.43	0.2	0.025	0	0	0	0

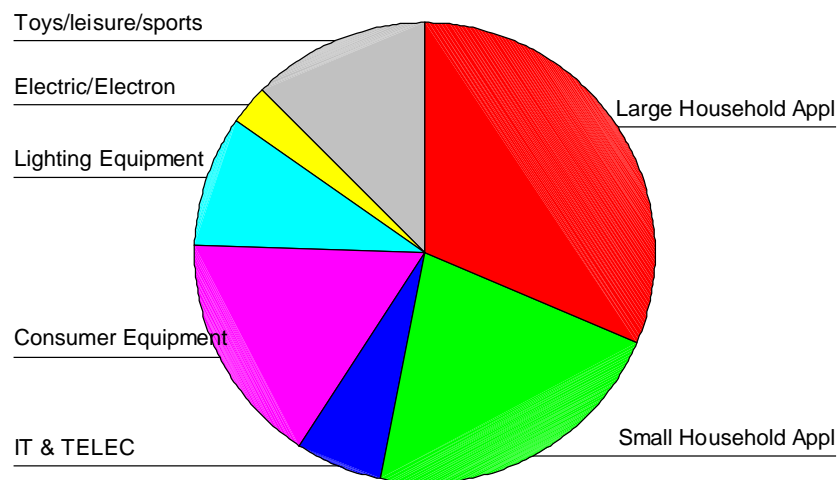
Region	Lorry Load(kg)	Sample Weight(kg)	E-waste(kg)
vieux Q-Bornes	7440	2480	5.75
Ollier/Cite Beau-Sejour	10780	4280	8.69
Moka	12060	3340	7.31
Coromandel	5780	2100	2.085
Avenue Naz/Q	7800	2860	
Bornes			8.855
Cite la Ferme,Bambous	9320	2440	4.01
Edward Hart Q/Bornes	6140	2060	5.345
Palma	11840	5640	3.895
Sodnac	10240	2740	7.03
Belle Rose	7540	2560	4.66
Reduit	12880	4080	3.135
Tamarin	11700	3800	23.115
Camp levieux/R-Hill	5060	1820	2.685

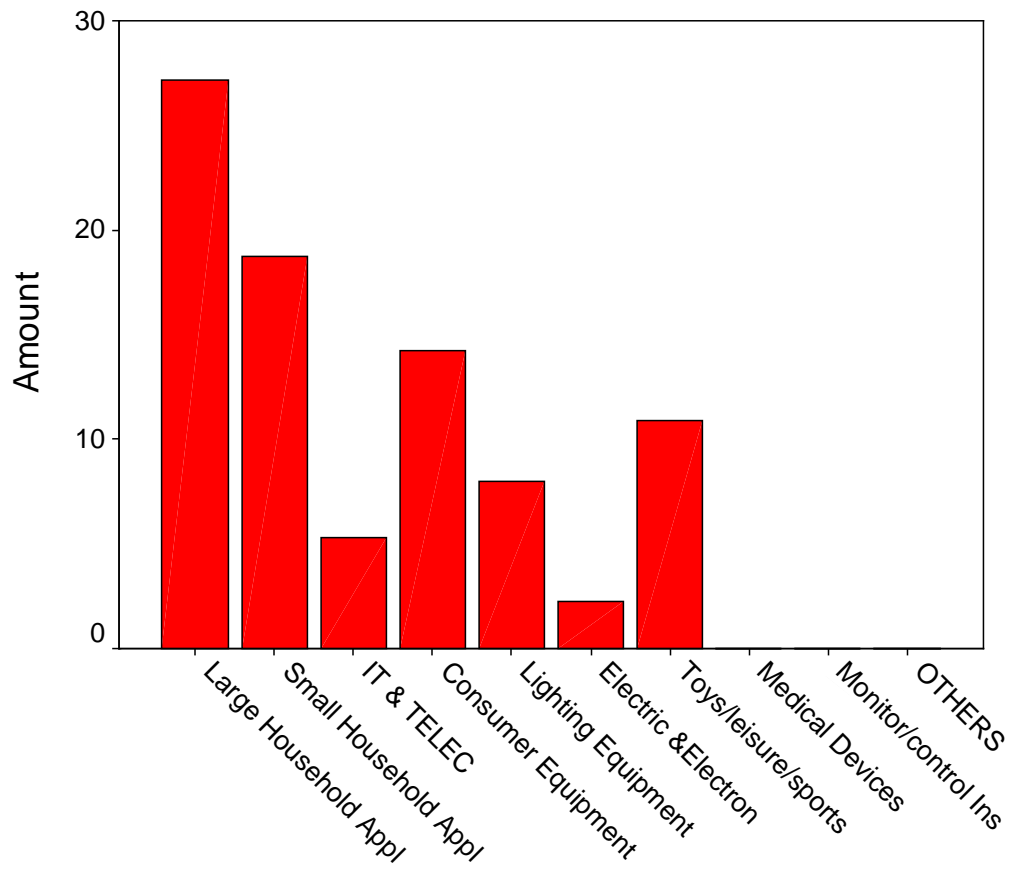
Distribution of E-waste At St Martin Transfer Station (3)





Characterisation of E-waste



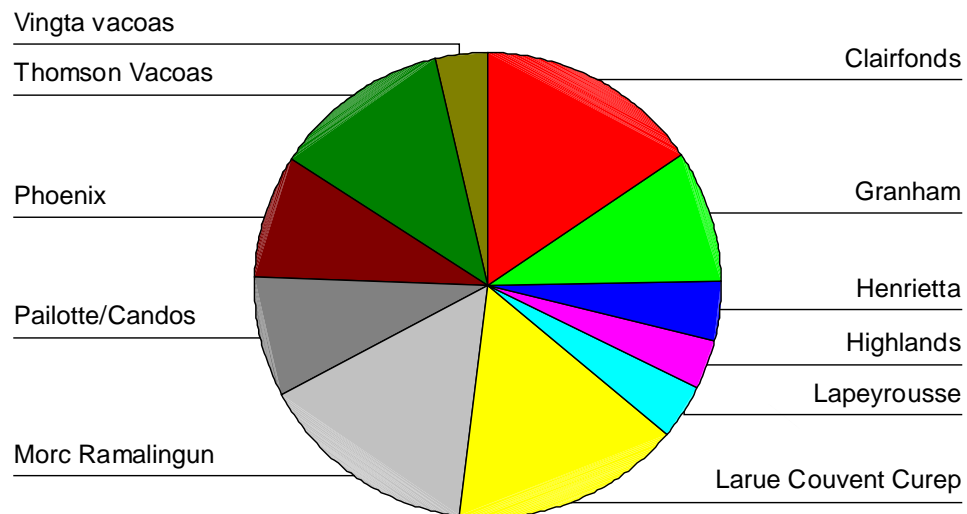


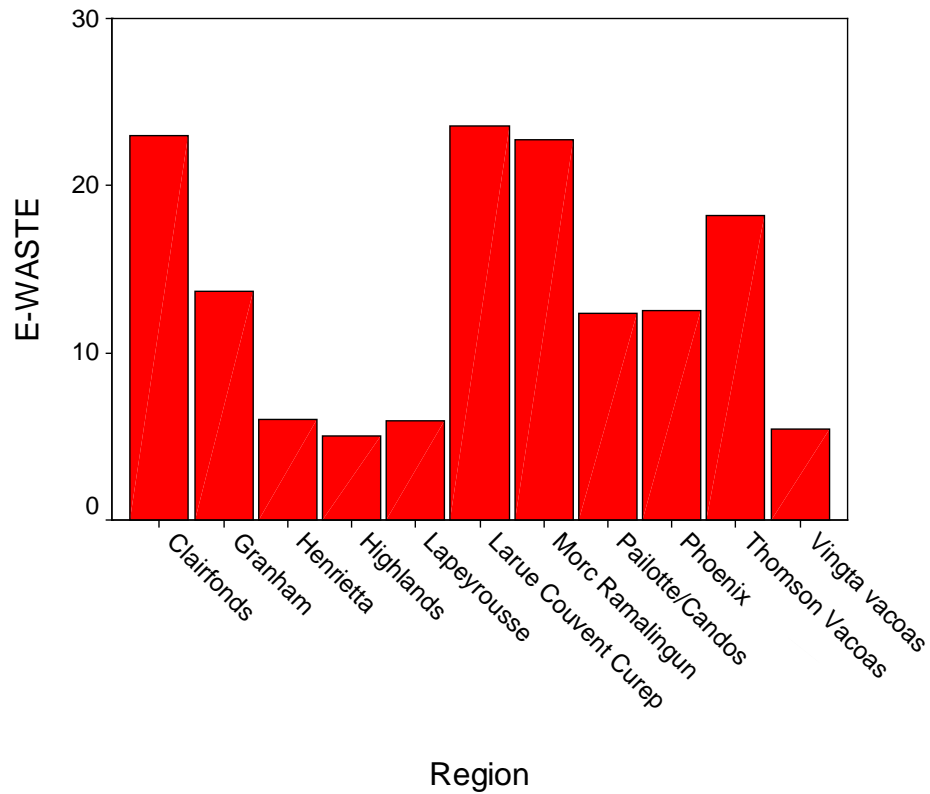
9.1.5 La Brasserie

Region	Large House.Appli	Small House Appli.	IT & Telec	Consum. Equip.	Light Equip.	Elect& Elect Tools	Toys, leisure & sports	Medica Device	Monitor& control Instru.	Other
Vingta vacoas	4.105	1.11	0.11	0.11	0.025	0	0.02	0	0	0
Henrietta	3.145	2.375	0.14	0.075	0.11	0	0.2	0	0	0
Lapeyrousse	3.11	2.155	0.32	0.255	0.055	0	0	0	0	0
Larue Couvent										
Curep	0	0.36	2.395	20.42	0.39	0	0.035	0	0	0
Granham	0	3.045	8.805	0.16	1.705	0	0	0	0	0
Clairfonds	7.89	3.585	2.305	9.085	0.1	0	0	0	0	0
Pailotte/Candos	3.825	3.12	0.31	2.74	1.4	0.485	0.46	0	0	0
Highlands	0	0.895	2.78	0.11	0.695	0.33	0.18	0	0	0
Phoenix	5.255	1.27	0.145	3.95	0.44	1.31	0.145	0	0	0
Thomson										
Vacoas	0	0.165	12.745	0.315	0.03	4.925	0	0	0	0
Morc										
Ramalingun	0	0.685	0.875	20.63	0.295	0	0.23	0	0	0

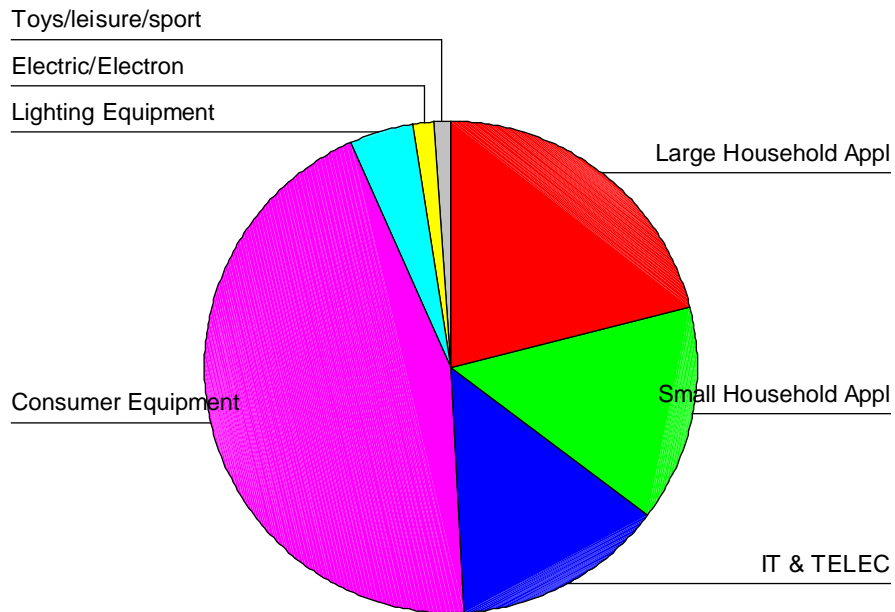
Region	Lorry Load(kg)	Sample Weight(kg)	E-waste(kg)
Vingta vacoas	7900	3120	5.48
Henrietta	8500	3120	6.045
Lapeyrousse	11360	3060	5.895
Larue Couvent Curep	9940	3360	23.6
Granham	7380	1980	13.715
Clairfonds	8500	3160	22.965
Pailotte/Candos	10680	4120	12.34
Highlands	8020	2720	4.99
Phoenix	8360	2920	12.515
Thomson Vacoas	8720	2180	18.18
Morc Ramalingun	9940	4520	22.715

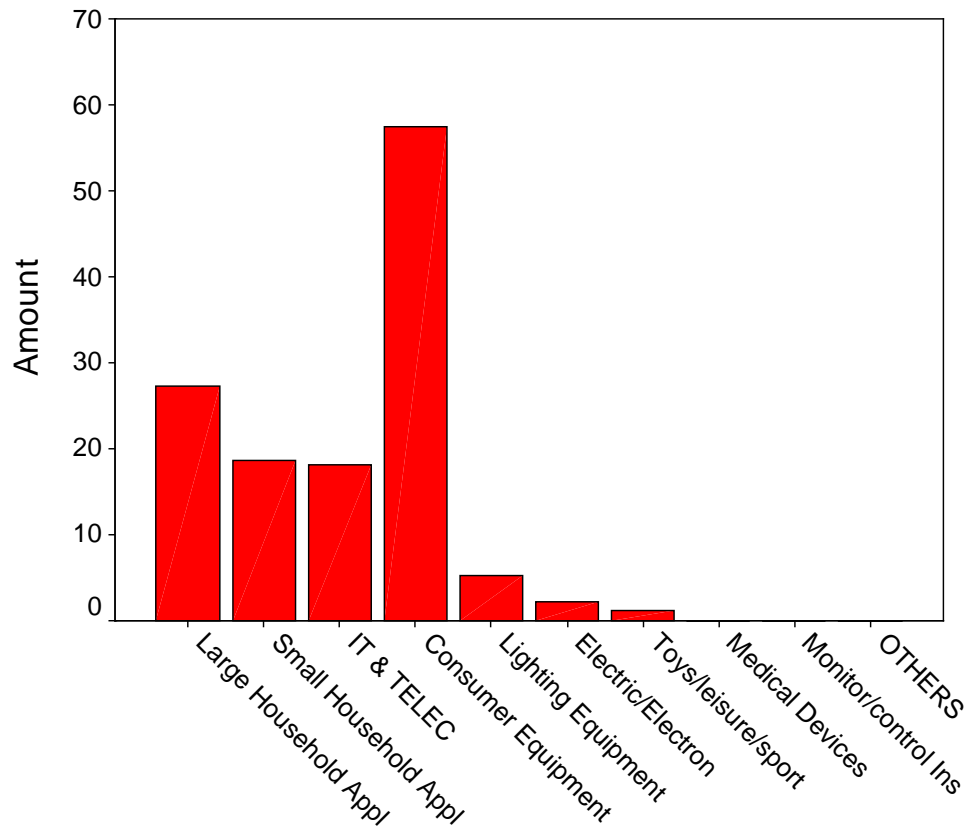
Distribution of E-waste At La Brasserie transfer Station (3)





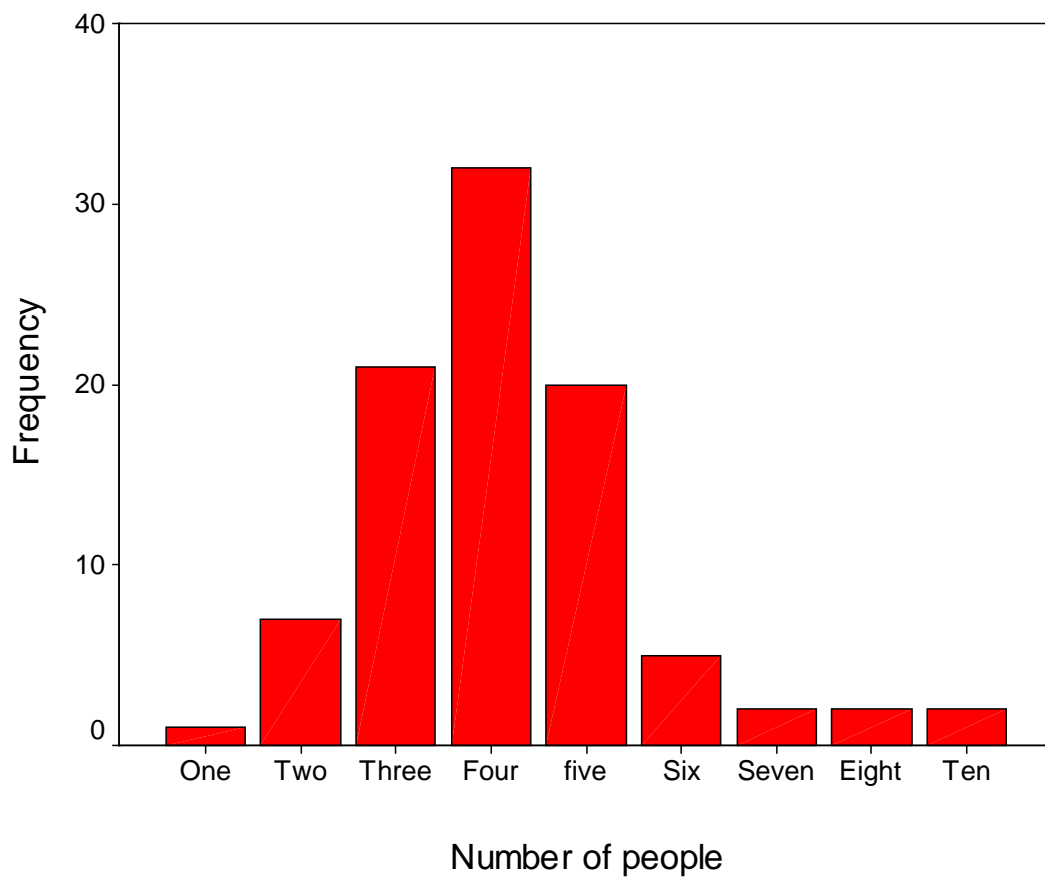
Characterisation of E-waste



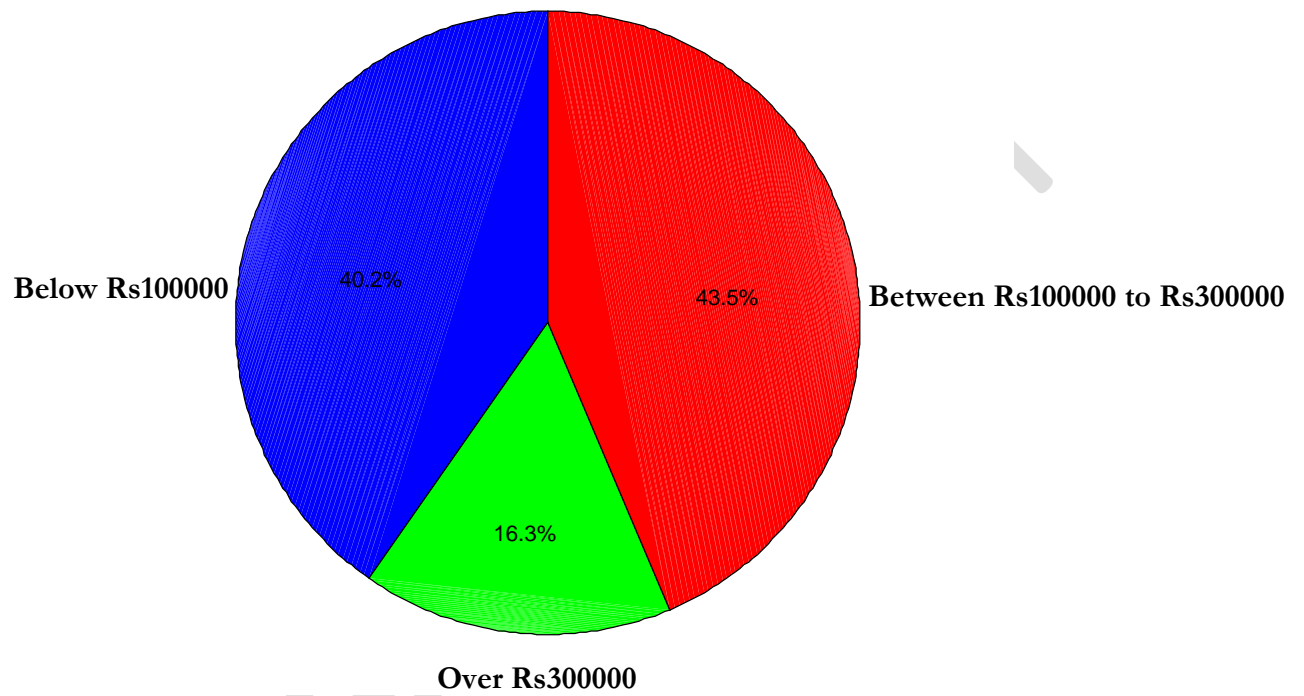


10 ANNEX FIVE

10.1 Number of people in the Household

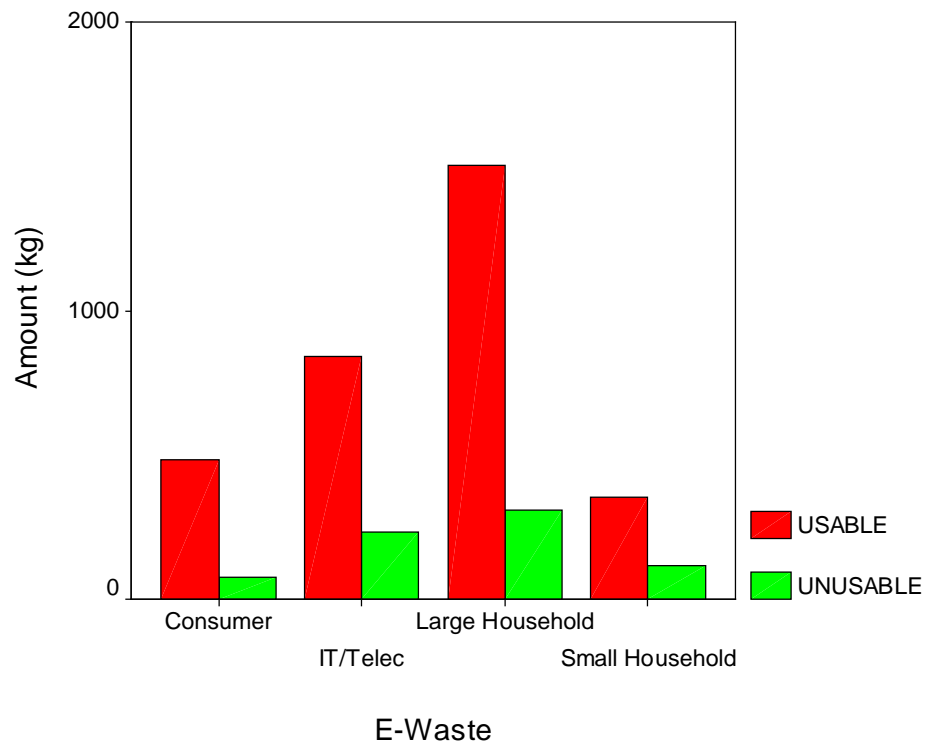


10.2 Income Group

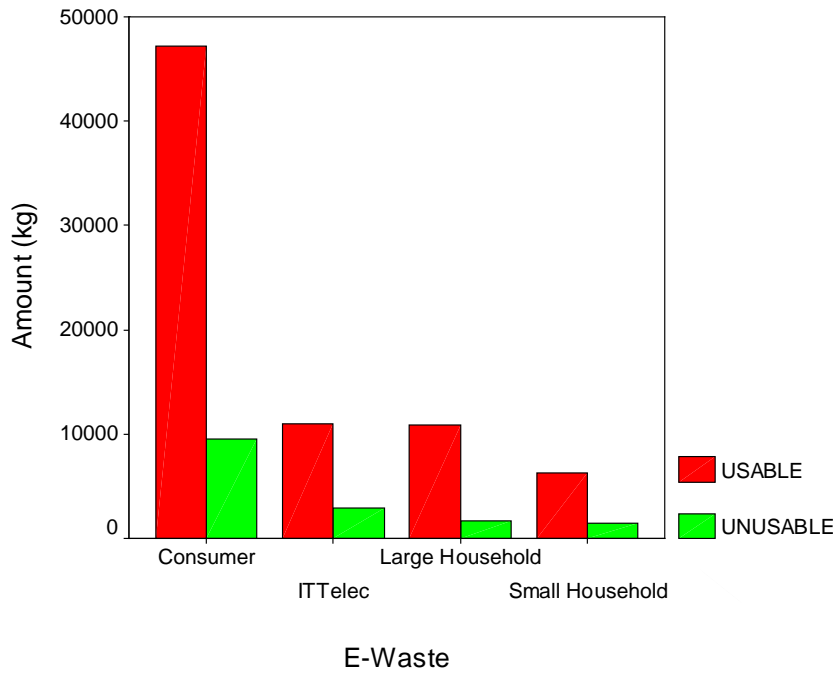


10.3 E-waste Characterization and Quantification at Household Level

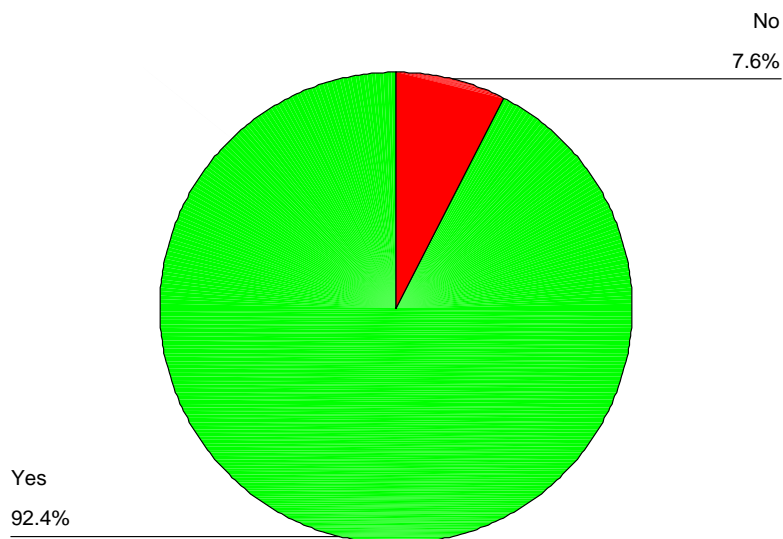
10.3.1 Minimum Criterion



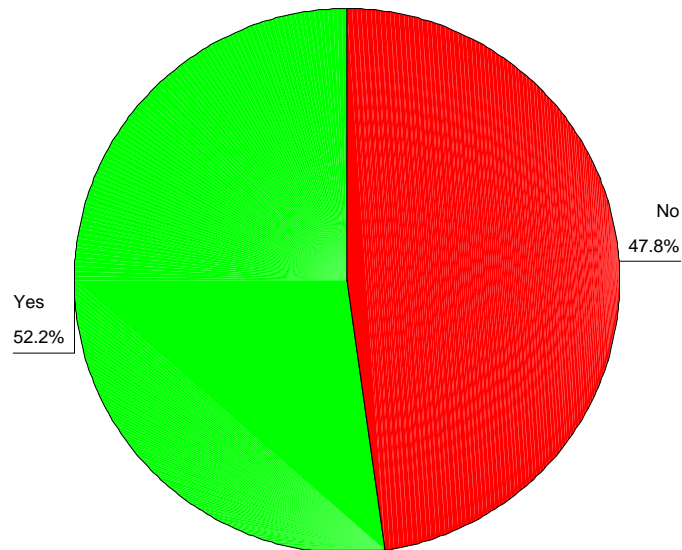
10.3.2 Maximum Criterion



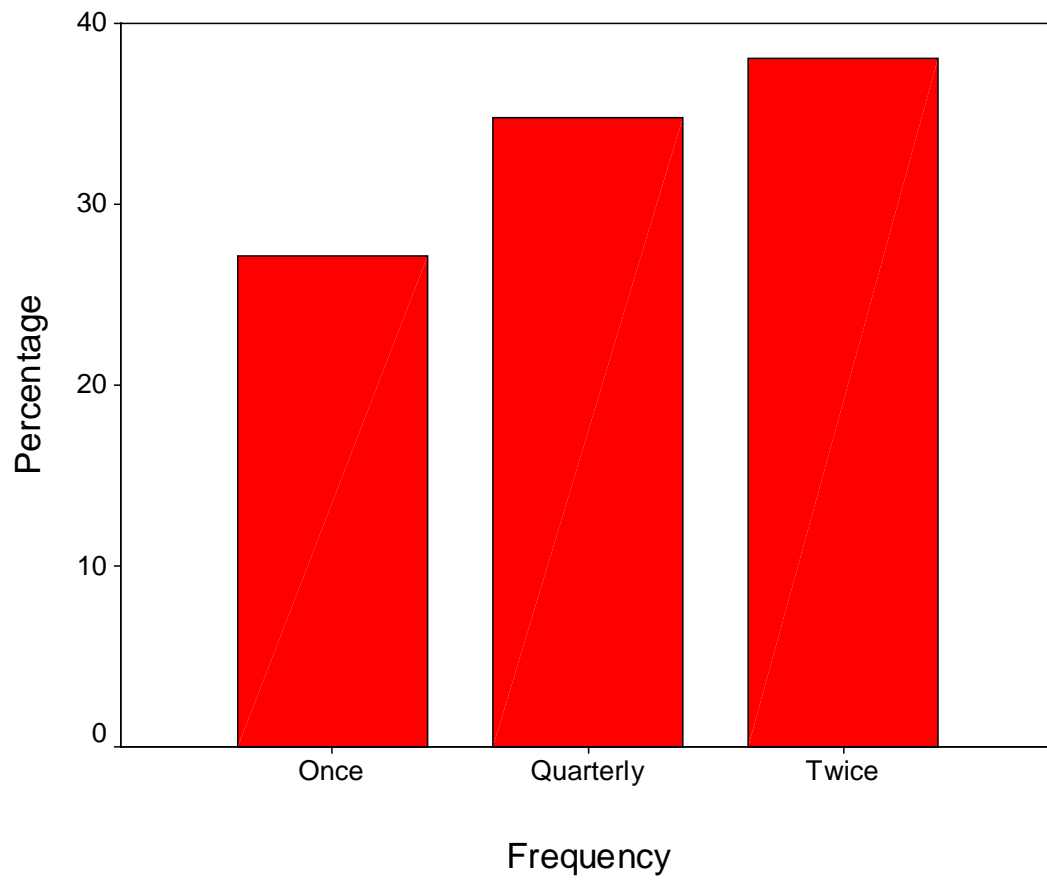
10.3.3 Recycling Program



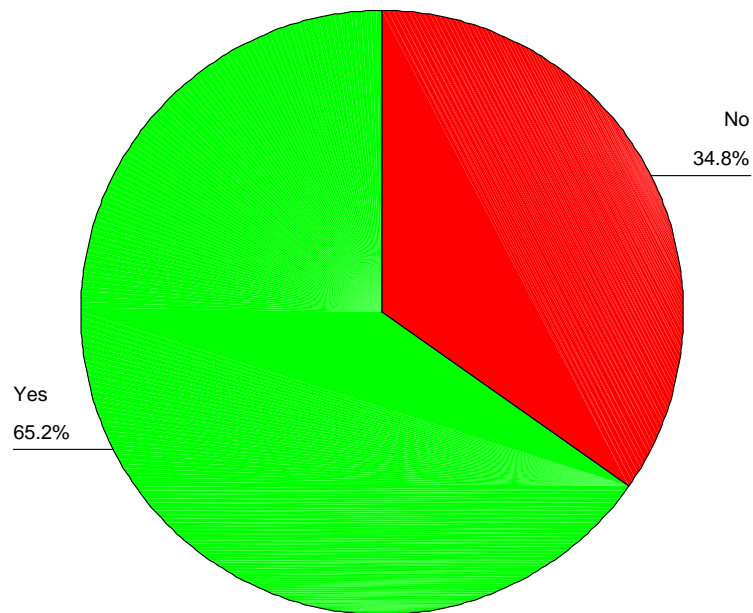
10.3.4 Cost associated to Disposal



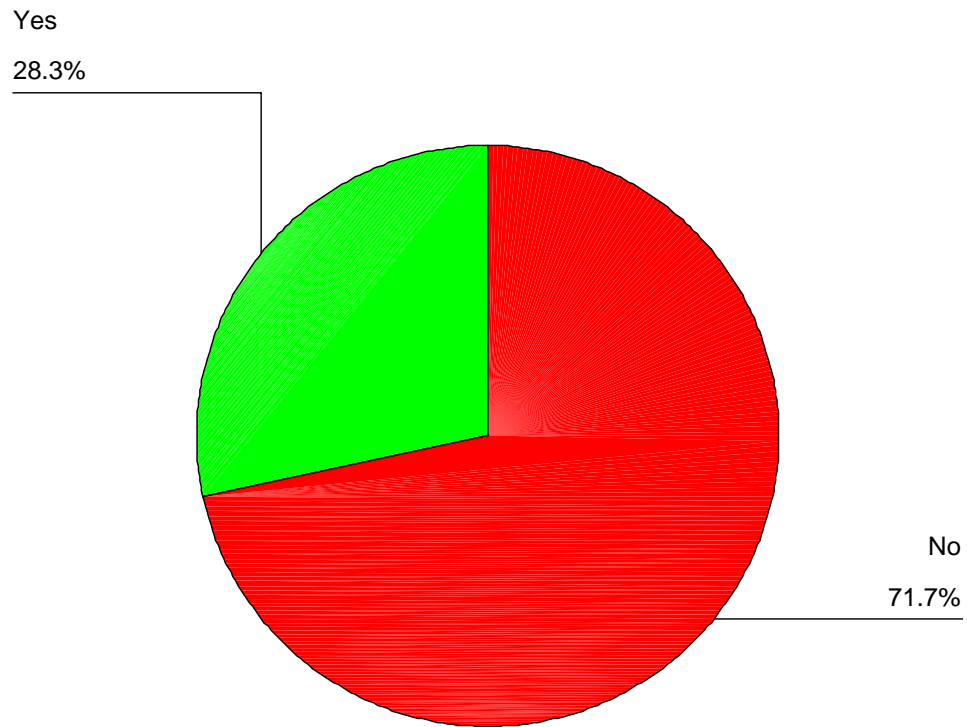
10.3.5 Frequency



10.3.6 Awareness



10.3.7 Threats

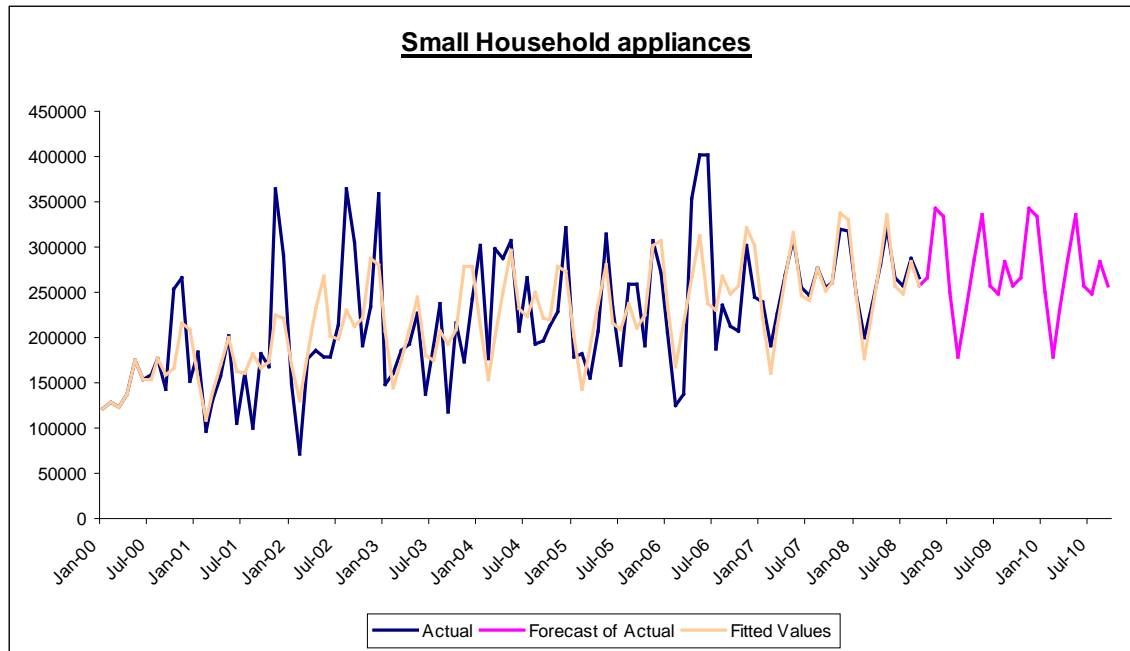


11 ANNEX SIX

11.1 Analysis of Importation Data

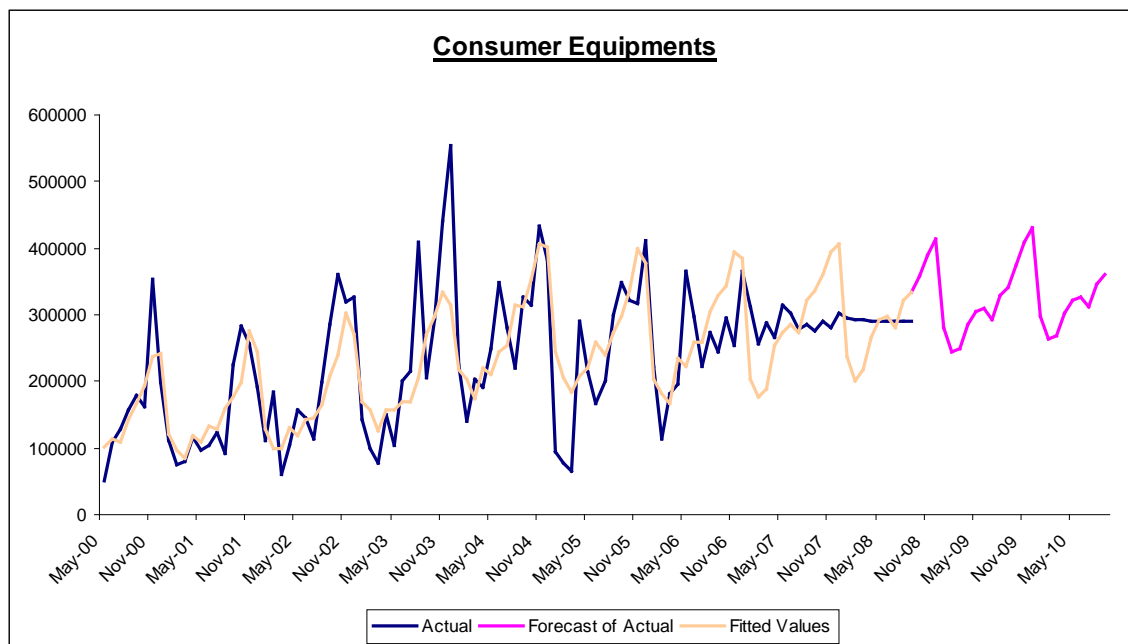
11.1.1 Small Household Appliances

Year	Monthly Importation of Small Household Appliances / kg										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
January	121261	183136	147860	147860	302222	178153	205699	238590	248472	249679	249703
February	128045	95967	70687	160939	177215	181481	125739	191475	199378	178637	178635
March	123304	129727	176790	185964	298441	154903	137277	227331	236682	230849	230820
April	136611	157209	185255	193434	287448	206964	354194	269962	281028	285872	285799
May	175797	201440	178830	227419	307560	313896	401750	308579	321185	335959	335919
June	153896	105464	179306	138388	207513	233607	401477	256011	266435	256601	256596
July	158445	159929	213795	190814	265695	169884	186750	246401	256399	248871	248886
August	177391	99658	364118	237346	192836	259808	235419	275985	287146	284149	284173
September	143071	181658	305201	117476	195987	258602	211741	255679	265984	257388	257402
October	254061	167654	190937	215942	212424	190938	207595	260699	266318	266390	-
November	266780	364176	234664	173670	228354	307056	301458	320369	343167	343235	-
December	150911	290990	358281	242588	322101	271226	244914	318478	334515	334567	-



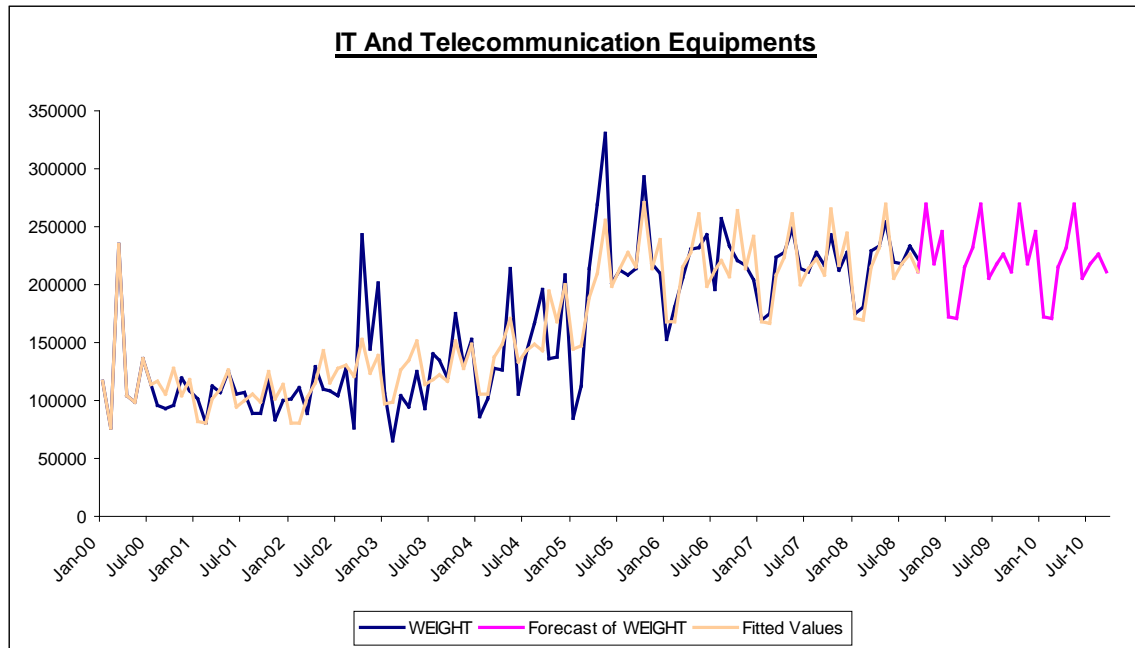
11.1.2 Consumer Equipments

Year	Monthly Importation of Consumer Equipments / Kg										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
January	-	111527	110300	143678	225476	94332	222032	203618	237917	280344	298242
February	-	74226	184192	98666	139720	78041	113560	176263	201824	244684	262582
March	-	79236	60745	78475	204273	66372	182170	187823	217088	249474	267372
April	-	115937	102894	151020	191675	290559	196481	253531	266805	284707	302605
May	51211	96924	156772	103504	249553	215710	365508	273795	292472	304071	321969
June	107680	105129	144326	201854	348428	166736	297171	286435	297708	308509	326407
July	128496	123697	114341	215949	280184	200722	222718	272251	279692	293858	311756
August	156621	91396	198044	408741	219801	299008	273226	321823	322572	328902	346800
September	178765	224661	284666	206201	326637	348958	244354	337195	334573	341713	359611
October	161549	282195	359852	292656	315703	321302	296363	359982	357261	375159	-
November	352968	256568	320261	440240	433739	316058	254233	393616	390036	407934	-
December	197333	191720	325815	553173	382655	412128	365297	406221	413643	431541	-



11.1.3 IT and Telecommunication Equipments

Monthly Importation of IT and Telecommunication Equipments / Kg											
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
January	117061	102059	101555	107040	86733	84692	152619	168615	171256	172389	172393
February	75856	80743	110936	65957	101066	112970	180228	166672	170038	170805	170806
March	234578	111959	89216	104074	127657	214011	205498	208607	215162	215681	215678
April	104287	106772	129451	95118	126341	269410	231207	224284	231706	231673	231663
May	98966	124751	110304	125435	214196	330841	231736	261318	269024	268946	268936
June	136378	105048	108511	92764	106144	200871	242832	200067	205174	205125	205122
July	113427	107632	104800	139634	142010	211907	195846	214178	218409	218373	218374
August	95155	89285	127749	134499	166535	208442	256328	222056	225901	225918	225922
September	92878	88993	76151	120124	195164	214258	233820	208415	211573	211587	211590
October	96050	117868	242622	174368	136396	292637	221291	265709	269164	269181	-
November	118805	82886	144180	131119	137605	217552	216376	216001	218348	218359	-
December	107771	100052	201785	153088	207777	210323	203951	244021	246152	246162	-



11.2 Wholesaler Survey Results: Lifespan of Electrical Appliances

SMALL HOUSEHOLD APPLIANCES /years										
Item	Wholesaler		Wholesaler		Wholesaler		Wholesaler		Wholesaler	
	1		2		3		4		5	
Vacuum/Carpet										
cleaner	-	-	3	5	1	3	3	7	2	4
Textile										
Appliances	-	-	2	8	-	-	-	-	-	-
Irons	2	3	1	5	1	1	5	9	2	4
Fryers	-	-	1	4	-	-	-	-	-	-
Grinder/Coffee										
machine	5	7	1	3	1	3	3	7	2	3
Electric Knives	-	-	-	-	-	-	-	-	-	-
Hair										
Appliances	-	-	1	3	-	-	3	7	2	3
Clocks,										
Watches	-	-	-	-	-	-	-	-	-	-
Kettle	1	2	1	5	1	2	3	7	-	-
Others	7	9	1	4	1	5	4	7	4	7

CONSUMER EQUIPEMENTS /years										
Item	Wholesaler		Wholesaler		Wholesaler		Wholesaler		Wholesaler	
	1		2		3		4		5	
Radio Sets	-	-	3	5	3	4	3	7	8	15
Television	7	15	6	12	6	12	5	9	7	10
Tapes	-	-	1	3	1	3	-	-	3	6
Video Camera	-	-	2	5	2	4	3	7	-	-
Video Recorder	-	-	3	5	3	-	3	7	-	-
Video Player	2	5	2	4	2	2	3	7	1	3
Hi-fi/Audio Devices	-	-	3	5	3	5	3	7	8	10
Musical										
Instruments	-	-	-	-	-	-	-	-	-	-
Electrical										
Switch,plugs,socket	-	-	-	-	-	-	-	-	-	-
Remote Controls	-	-	-	-	-	-	-	-	-	-
Batteries	-	-	-	-	-	-	-	7	-	-
Others	5	10	2	4	2	4	4	7	3	5

IT AND TELECOMMUNICATION EQUIPEMENT /years

Item	Wholesaler		Wholesaler		Wholesaler		Wholesaler		Wholesaler	
	1		2		3		4		5	
Computers	2	4	2	3	5	10	2	5	1	5
Printers	2	5	1	2	4	8	2	5	1	5
Computer Parts	2	6	2	-	2	10	1	5	1	5
Printer Parts	-	-	-	-	4	8	1	4	1	3
Handheld										
Computers	-	-	-	-	3	5	1	4	1	3
Scanners/Copying										
Equipment	-	-	-	-	4	7	1	5	1	5
Laptop	2	5	2	2	4	8	1	5	1	3
Electronic										
calculator	-	-	1	7	4	7	1	10	1	8
Electronic										
Typewriter	-	-	-	-	5	8	1	4	1	3
Fax/Telex	-	-	-	-	5	10	1	5	1	5
Telephones	-	-	-	-	5	10	1	5	1	8
Cellular Phones	1	3	1	3	3	6	1	3	1	3
Network Devices	-	-	-	-	3	7	1	3	1	3
CD,DVD,Mini Disc	-	-	-	-	-	-	-	-	-	-
Floppy Discs	1	3	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-

11.3 Forecast of E-waste

11.3.1 Small Household Appliances

Minimum Life Span

Amount Of E-waste/tonne								
Year	2001	2002	2003	2004	2005	2006	2007	2008
Vacuum/Carpet cleaner	71	157	264	367	494	594	669	-
Textile Appliances	-	964	1852	3243	4235	5701	6882	8606
Irons	32	55	75	201	357	521	607	-
Fryers	0.4	0.4	0.6	3.6	3.8	6.1	7.2	-
Grinder/Coffee mach.	79	185	289	435	574	696	801	-
Electric Knives	-	-	-	-	-	-	-	-
Hair Appliances	106	181	280	385	570	782	1020	-
Clocks,Watches,equipement for measuring time	-	-	-	-	-	-	-	-
Kettle	110	199	305	401	504	627	704	-
Total	398.4	1741	3066	5036	6738	10615	10690	-

Maximum Life Span

Amount Of E-waste/tonne								
Year	2004	2005	2006	2007	2008	2009	2010	2011
Vacuum/Carpet cleaner	-	-	-	71	157	264	367	494
Textile Appliances	-	-	-	-	964	1852	3243	4235
Irons	-	-	-	-	-	32	55	75
Fryers	0.4	0.4	0.6	3.6	3.8	6.1	7.2	-
Grinder/Coffee mach.				79	185	289	435	574
Electric Knives	-	-	-	-	-	-	-	-
Hair Appliances	-	-	-	106	181	280	385	570
Clocks,Watches,equipement for measuring time	-	-	-	-	-	-	-	-
Kettle	-	-	-	110	199	305	401	504
Total	0.4	0.4	0.6	370	1690	3028	4893	6452

11.3.2 Consumer equipments

Minimum Life Span

Amount Of E-waste/tonne								
Year	2001	2002	2003	2004	2005	2006	2007	2008
Radio Sets	-	-	103	320	634	887	1135	1182
Television	-	-	-	-	581	1209	2317	3574
Tapes	0.24	0.24	0.31	0.32	1.1	1.1	1.1	-
Video Camera	-	1.1	2.8	24	27	38	54	63
Video Recorder	-	-	5.3	8.4	16	20	28	31
Video Player	15	35	46	57	58	60	62	-
Hi-fi/Audio Devices			194	621	905	1082	1254	1435
Musical Instruments	-	-	-	-	-	-	-	-
Electrical Switch,plugs,socket	-	-	-	-	-	-	-	-
Remote Controls	-	-	-	-	-	-	-	-
Batteries	-	-	-	-	-	-	-	-
Total	15.2	36.3	351	1031	2202	3297	4851	6285

Maximum Life Span

Amount Of E-waste/tonne										
Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Radio Sets	-	-	-	-	-	-	-	-	-	103
Television	-	-	-	-	-	-	-	-	-	581
Tapes	0.24	0.24	0.31	0.32	1.1	1.1	1.1	-	-	-
Video Camera		1.1	2.8	24	27	38	54	63	-	-
Video Recorder		5.3	8.4	16	20	28	31	32	-	-
Video Player	-	-	-	-	15	35	46	57	58	60
Hi-fi/Audio Devices	-	-	-	-	194	621	905	1082	1254	1435
Musical Instruments	-	-	-	-	-	-	-	-	-	-
Electrical Switch,plugs,socket	-	-	-	-	-	-	-	-	-	-
Remote Controls	-	-	-	-	-	-	-	-	-	-
Batteries	-	-	-	-	-	-	-	-	-	-
Total	0.24	6.6	11.5	40.3	257	723	1037	1234	1292	2179

11.3.3 IT and Telecommunication Equipments

Minimum Life Span

Amount Of E-waste/tonne							
Year	2001	2002	2003	2004	2005	2006	2007
Computers	227	544	780	962	1211	1467	1610
Printers	35	101	178	253	388	513	669
Computer Parts	271	460	874	1221	1607	1917	2196
Printer Parts	-	0.35	0.38	0.47	0.73	0.82	7.9
Handheld Computers		0.001	0.006	0.21	0.21	0.22	0.22
Scanners/Copying E.	18	56	112	143	166	195	234
Laptop	2	3.6	7.9	17	34	68	120
Electronic calculator	30	69	106	142	180	224	288
Electronic Typewriter	0.34	0.40	0.46	0.52	0.64	0.81	0.81
Fax/Telex	13	31	59	76	88	105	117
Telephones	162	275	451	635	857	1181	1341
Cellular Phones	45	54	77	106	145	595	1067
Network Devices	0.76	7.0	7.2	8.7	10	20	23
CD,DVD,Mini Disc	-	-	-	-	-	-	-
Floppy Discs	0.02	0.02	3.4	10	23	27	28
Total	804	1601	2656	3575	4711	6314	7702

Maximum Life Span

Amount Of E-waste/tonne								
Year	2003	2004	2005	2006	2007	2008	2009	2010
Computers	-	-	-	-	-	-	-	227
Printers	-	-	-	-	-	35	101	178
Computer Parts	-	-	-	-	-	-	-	2196
Printer Parts	-	-	-	-	-	0.35	0.38	0.47
Handheld Computers	-	-	0.001	0.006	0.21	0.21	0.22	0.22
Scanners/Copying E.	-	-	-	-	18	56	112	143
Laptop	-	-	-	-	2	3.6	7.9	17
Electronic calculator	-	-	-	-	-	-	-	30
Electronic Typewriter	-	-	-	-	-	0.34	0.40	0.46
Fax/Telex	-	-	-	-	-	-	-	13
Telephones	-	-	-	-	-	-	-	162
Cellular Phones	-	-	-	45	54	77	106	145
Network Devices	-	-	-	-	0.76	7.0	7.2	8.7
CD,DVD,Mini Disc	-	-	-	-	-	-	-	-
Floppy Discs	0.02	0.02	3.4	10	23	27	28	-
Total	0.02	0.02	3.4	55	98	207	363	3121

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