

# Electronic Waste Management in Costa Rica 2016-2017





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# Summary



The technological evolution of recent years has brought a considerable increase in the availability of electrical and electronic equipment and, therefore, the flux of electronic waste resulting from their renovation increases at high speed. In this context, ensuring their appropriate disposal is a responsibility resting in the State, with the aim of preventing and avoiding environmental and public health problems. Accordingly, with the purpose of studying the topic and understanding the electrical and electronic waste management by the Costa Rican population, in the Telecommunications Services Access and Use Survey [*Encuesta de Acceso y Uso de los Servicios de Telecomunicaciones en Costa Rica*, in Spanish], for the years 2016 and 2017, a module was included containing questions on these matters. The survey is conducted by the Ministry of Science, Technology and Telecommunications, through the Office of the Vice-Minister of Telecommunications, and the main findings therefrom are summarized in this report from a descriptive information analysis. The results show that more than half of the participants have disposed of at least one electric or electronic device. Also, the socio-economic factors related to the devices disposed of and the disposal method are identified.

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# Introduction



The technological evolution of recent years has brought a considerable increase in the number of electric and electronic equipment available, including, among others, televisions, screens, mobile phones and computers. Undoubtedly, technology and the use of devices have revolutionized people's lives and are tools that facilitate daily tasks in multiple ways.

While they entail many benefits, the disposal of these devices has also shown a considerable increase. This process must be conducted responsibly, as poor management causes irreversible damage to the environment. This matter is so important that 53 countries have signed and are parties to the Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, usually known as the Basel Convention. It provides that the transport and disposal of products containing cadmium, mercury, lead, beryllium, among others, must be monitored by states to protect human health and the environment. Electric and electronic devices contain these substances, hence the importance of this study.

This document briefly sets forth the current regulation on electrical and electronic waste in Costa Rica, as well as the results from one of the modules included in the Telecommunications Services Access and Use Survey [*Encuesta de Acceso y Uso de los Servicios de Telecomunicaciones en Costa Rica*, in Spanish], for the years 2016 and 2017, as basis to succinctly approach this matter and provide an initial diagnosis of the situation at national level.

# Legal and public policy framework



Adequate electrical and electronic waste management poses a challenge and a responsibility for society. On the one hand, the State must ensure adequate management of these wastes to avoid public health and environmental problems, and on the other hand, the population must have a responsible involvement in the process.

Poor waste management can contaminate the atmosphere, soil, and water, thus the Executive Branch has taken concrete actions in recent years. Noteworthy is the inclusion of the following action in the National Telecommunications Development Plan 2009-2014, "Costa Rica in the Digital Road": *"a) To establish the conditions guaranteeing a comprehensive management of electronic and technological waste derived from the ICTs."* It was conceived under the responsibilities entrusted to the Governing Body of the Telecommunications Sector, in accordance with article 39 of Law 8660, "Strengthening and Modernization of Public Entities in the Telecommunications Sector Act", which establishes the responsibility of *"providing technical support to the governing body in the area of comprehensive waste management with regard to the definition, classification and design of waste management policies derived from telecommunications activities."*

Furthermore, the Plan included the concrete goal of issuing -during its first year of validity- a regulation providing the necessary rules for adequate waste management:

*"Goal 1: regulation for the comprehensive management of electronic and technological waste. (Authority: MINAET-Ministry of Health)."*<sup>1</sup>

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<sup>1</sup> MINAET stands for the former Ministry of Environment, Energy and Telecommunications.

The goal was achieved with the issuance of the “Regulation for the Comprehensive Management of Electronic Waste” under Executive Decree 35933-S, as published in *La Gaceta* official newspaper no. 83 of May 5, 2010. This regulation aims to reduce environmental contamination and health issues caused by inadequate electronic waste management. In addition, it sets the responsibility of producers and others actors in the value chain, including final consumers, and promotes the establishing of compliance units as electronic waste management tools.<sup>2</sup>

Furthermore, on July 13 of the same year, the “Comprehensive Waste Management Act”, Law 8839, was published in *La Gaceta* official newspaper no. 135. Said Act aims to regulate the comprehensive management of waste and the efficient use of resources, by planning and adopting regulatory, operating, financial, administrative, educational, environmental and health monitoring and assessment actions. Article 41 of the above Act introduces the special management waste notion, providing as follows:

*“The Ministry of Health must declare, through an executive decree, such special management waste that are required to be separated from the normal waste flow, which will be subject to differentiated management to prevent damage to health and the environment.*

*The Ministry of Health and the municipalities shall promote and facilitate the existence of the necessary infrastructure for the assessment, treatment and final disposal of special management waste.”*

Moreover, these actions are governed under the “National Comprehensive Waste Management Policy 2010-2021”, as enacted by the Ministry of Health. Additionally, there is a set of related regulations providing the rules that different agents are required to observe:

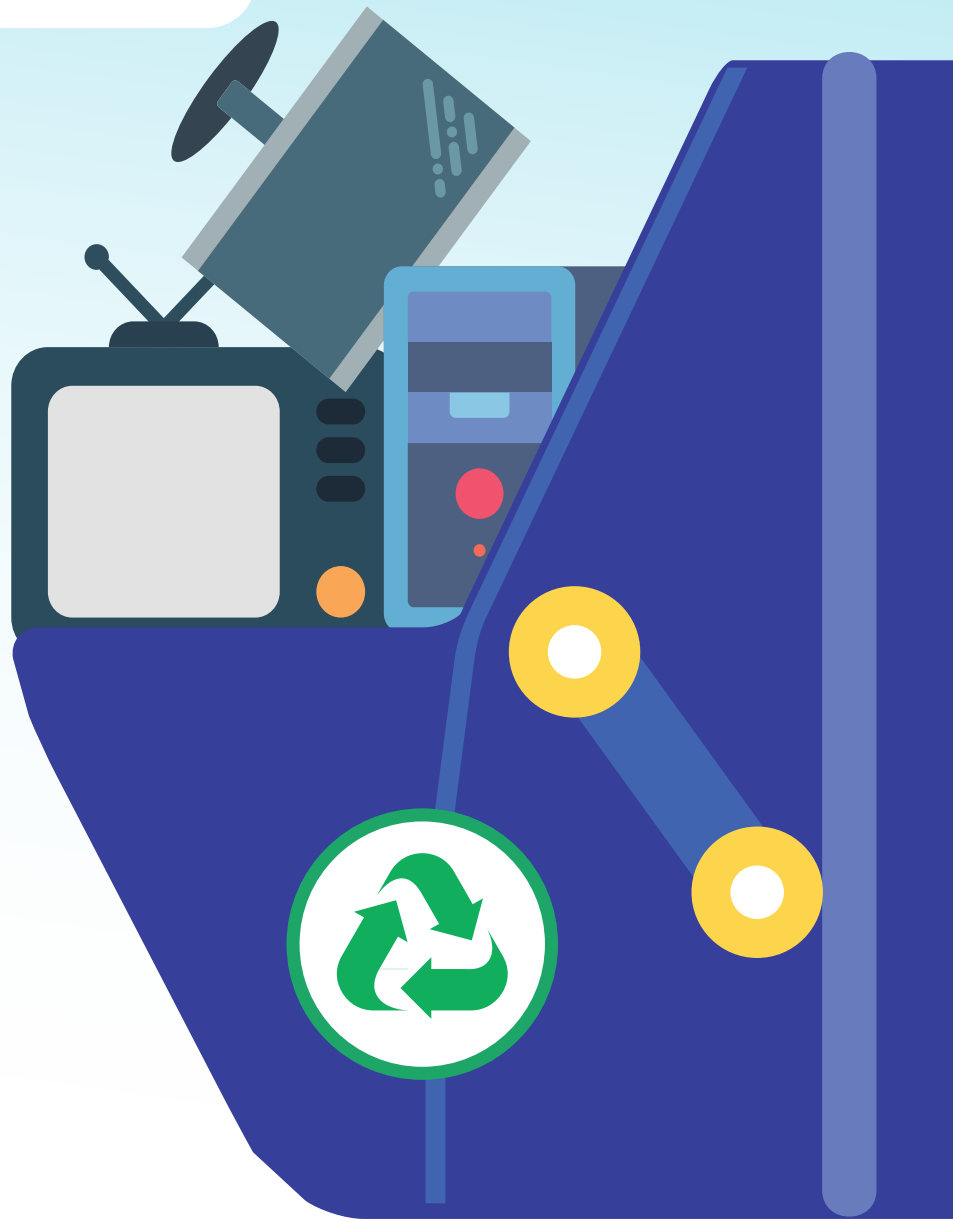
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<sup>2</sup>A compliance tool is a legal structure comprising one or more producers with the responsibility of establishing the mechanisms and actions that guarantee the comprehensive management of their respective waste and their sustainability.

- “General Regulation to the Law for Comprehensive Waste Management”, Executive Decree 37567, published on March 19, 2013, in Annex N° 52 of the *La Gaceta* official newspaper no. 55. The purpose of the foregoing Executive Decree is to regulate waste management at the national level, thus regulating -in general- Law 8839, "Comprehensive Waste Management Act", to ensure the articulated work in comprehensive waste management to prevent health risks, protect and promote environmental quality, the health and welfare of the population.
- “Regulation for the Declaration of Special Management Waste”, Executive Decree 38272-S, published on March 24, 2014, in the *La Gaceta* official newspaper no. 58. Its objectives are: to establish general criteria and the general procedure for the management of waste declared as special management waste; to establish the different levels of responsibility and to propose forms of organization and participation in the management of special management waste by producers, importers, distributors, traders, sellers, and managers, as well as by municipalities; and to promote, through the Compliance Plans and the Municipal Plans for the Comprehensive Management of Solid Waste, the reduction of special management waste dispatched to treatment and final disposal sites.
- Declaration of public and national interest of the “Technical Guide for the Comprehensive Management of Electrical and Electronic Waste”, published on December 15, 2016, in the *La Gaceta* official newspaper no. 241. Therein, the guidelines to be followed by Compliance Units and Managers authorized by the Ministry of Health are established.

These documents present the existing public policy and legal framework, which have enacted aiming to protect human health and the environment through an adequate treatment of electronic waste.

# Methodology



The Ministry of Science, Technology and Telecommunications (MICITT), through the Vice-Ministry of Telecommunications, conducts an annual Telecommunications Services Access and Use Survey (EAU, in Spanish). During 2016 and 2017 a module on electronic waste was incorporated. The analysis in this study is based on it. The methodology used is described below.

It is a housing-type survey conducted for the Vice-Ministry of Telecommunications by the Statistical Services Unit (USES) of the University of Costa Rica (UCR).

#### Study population

All residents of Costa Rica between the ages of 18 and 65, residing in private homes as of September of each year.

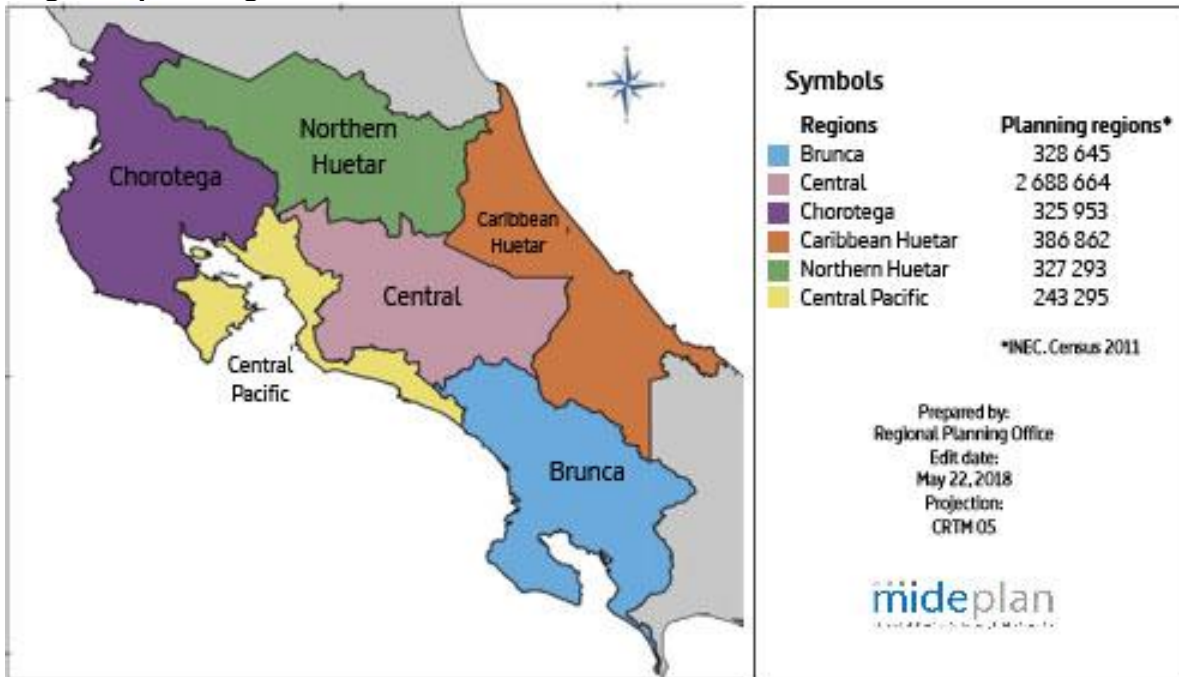
#### Informing unit

All residents of Costa Rica between the ages of 18 and 65. The household member with the closest birthday was selected as informant.

#### Sample design

The design used was stratified, multi-stage, with probability proportional to size (PPS), using as size measure the total number of homes. The regions used by the Ministry of National Planning and Economic Policy (MIDEPLAN) were defined as strata: Central Region, Chorotega Region, Pacific Central Region, Brunca Region, Huetar Caribbean Region and Huetar North Region. The sample design allows for inferences to be made at national level and by stratum (planning region).

**Map 1**  
**Regional planning division of Costa Rica**



Source: MIDEPLAN. Regional planning area, 2018

### Sample size

The sample of the 2016 survey consists of 2410 interviews. The distribution of surveys by stratum is 660 in the Central Region and 350 in each of the remaining regions (Chorotega Region, Central Pacific Region, Brunca Region, Huetar Caribbean Region and Huetar North Region).

For 2017, the sample consists of 3500 interviews; 1000 in the Central Region and 500 in each one of the remaining regions.

### Selecting informants

In the first stage, homes are selected from within each Primary Sampling Unit (UPM, in Spanish).<sup>3</sup> The northernmost point of each area is taken as reference, and a clockwise route is followed until 20 homes are contacted. In the second stage, the household member with the closest birthday is selected.

### Recruiting and selecting interviewers and supervisors

Staff selection was conducted according to field-work experience in complex surveys and personal interviews. All staff selected had worked in surveys at national level by entities such as the National Institute of Statistics and Census (INEC), the Institute of Research in Economic Sciences (IICE) of the UCR, the USES, among others; thus, the staff has vast experience in administering in-person interviews with complex questionnaires.

### Interviewer and supervisor training

The training consisted of a work session with field work staff, officers of the Economic Analysis and Telecommunications Markets Department of MICITT and the USES. In the activity the study and its objectives were thoroughly explained. An exhaustive review of the questionnaire was conducted, and the terminology to be used in the interview was explained. A practice about administering the questionnaire was conducted with the interviewers. Three work groups were formed, each one comprising one driver, one supervisor, and three interviewers.

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<sup>3</sup>Primary Sampling Units are groupings of Minimal Geo-Statistical Units (UGM, in Spanish). The latter are geographic fragmentations of districts.

# Results



The results for 2016 and 2017 are detailed below. The actions taken by respondents to dispose of electronic devices are presented, including televisions or monitors; computers; UPS (computer batteries); mobile phones; wireless routers or modems; and radios.

The topic is of great importance due to the constant technological innovation in recent years, which has made it easier for users to purchase and renew electronic equipment in general.

Respondents were asked if they had disposed of a device and how they did it. In 2016, 64% disposed of at least one electronic device; in 2017, the percentage was 62%.

Table 1 shows that for all regions, age groups, level of schooling, and income level, over half of respondents disposed of at least one electronic device in the past two years.

The percentage of those who have not disposed of any electronic device is higher in the Brunca, Huetar Caribbean and Huetar North Region, as well as in persons aged 55 or over.

The percentage of people who have disposed of at least one product increases as level of schooling increases. A similar pattern is observed in terms of income level; as income level increases, so does the percentage of people who have disposed of at least one electronic device. This ratio is observed up to income between 1 million and less than 1.5 million colones.<sup>4</sup> For incomes greater than the latter, the percentage of people who have disposed of electronics shows a decreasing trend.

In order to verify the relationship between each of the socio-demographic variables and the disposal of electronic devices or lack thereof, the Chi-square test was performed; based on this test, it can be affirmed that a dependence exists between the variables.

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<sup>4</sup> The Costa Rican Colon is the currency of Costa Rica. According to the Central Bank of Costa Rica (BCCR), as of August 29, 2018, the selling exchange rate is 573.18 colones per US dollar (USD).

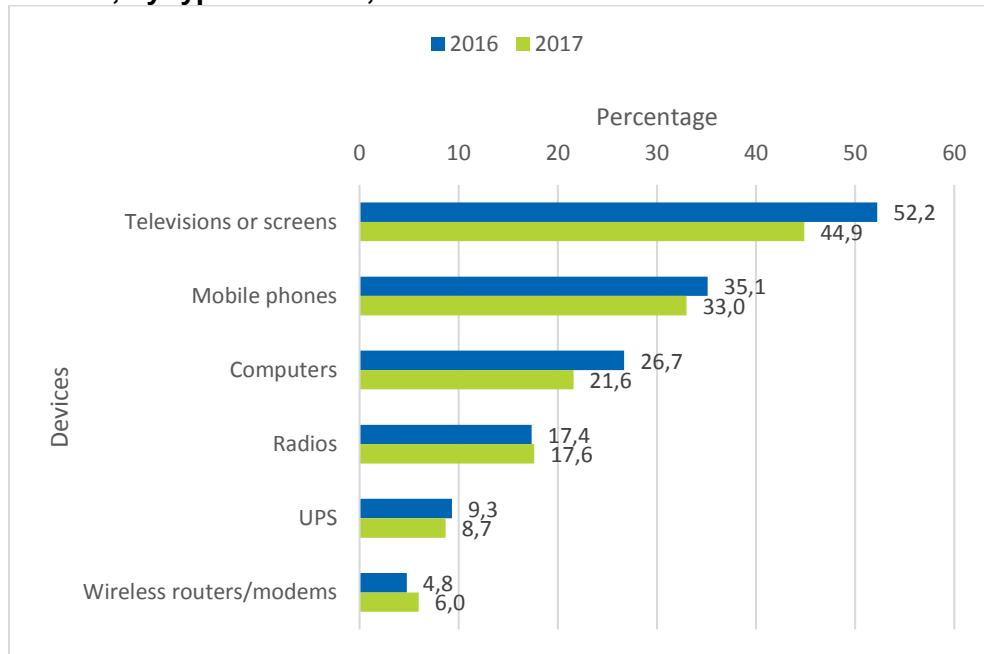
**Table 1.**  
**Proportion of people who have disposed of at least one electronic or electrical device per year by planning region, 2016 and 2017**

	2016			2017			
	Has not disposed of any device	Has disposed of at least one device	Total	Has not disposed of any device	Has disposed of at least one device	Total	
<b>Total</b>	<b>35.6</b>	<b>64.4</b>	<b>100.0</b>	<b>37.7</b>	<b>62.3</b>	<b>100.0</b>	
<b>Region</b>	Central	29.8	70.2	100.0	34.5	65.5	100.0
	Chorotega	32.9	67.1	100.0	42.5	57.5	100.0
	Central Pacific	34.9	65.1	100.0	40.1	59.9	100.0
	Brunca	39.0	61.0	100.0	35.0	65.0	100.0
	Caribbean Huetar	41.6	58.4	100.0	44.9	55.1	100.0
	Northern Huetar	40.6	59.4	100.0	50.3	49.7	100.0
<b>Age groups</b>	18 to 24	33.5	66.5	100.0	36.2	63.8	100.0
	25 to 34	33.1	66.9	100.0	38.7	61.3	100.0
	35 to 44	33.5	66.5	100.0	37.7	62.3	100.0
	45 to 54	33.2	66.8	100.0	33.3	66.7	100.0
	55 or over	40.9	59.1	100.0	42.6	57.4	100.0
<b>Level of schooling</b>	None	50.0	50.0	100.0	50.0	50.0	100.0
	Elementary School	42.4	57.6	100.0	42.0	58.0	100.0
	High School	31.1	68.9	100.0	38.2	61.8	100.0
	University	26.4	73.6	100.0	30.7	69.3	100.0
	DK/NA	45.5	54.5	100.0	28.6	71.4	100.0
<b>Income</b>	Less than 250,000 colones per month	43.4	56.6	100.0	46.1	53.9	100.0
	From 250,000 to less than 500,000	31.3	68.7	100.0	36.9	63.1	100.0
	From 500,000 to less than 750,000	27.4	72.6	100.0	33.2	66.8	100.0
	From 750,000 to less than 1 million	27.7	72.3	100.0	24.1	75.9	100.0
	From 1 million to less than 1.5 million	20.7	79.3	100.0	24.3	75.7	100.0
	From 1.5 million to less than 2 millions	28.6	71.4	100.0	16.5	83.5	100.0
	Over 2 millions	40.0	60.0	100.0	18.2	81.8	100.0
	DK/NA	40.6	59.4	100.0	48.7	51.3	100.0

Source: MICITT. Telecommunications Services Access and Use Survey 2016 y 2017

In terms of the devices disposed of, Chart 1 shows that the television/screen is the device most often disposed of by respondents, followed by cell phones, computers and radios. The percentage in both years behaves quite similarly. A slight decrease is observed in the percentage of disposal of the majority of devices between 2016 and 2017.

**Chart 1**  
**Percentage of respondents who have disposed of electronic or electrical devices, by type of device, 2016 and 2017**



Source: MICITT. Telecommunications Services Access and Use Survey 2016 y 2017

Table 2 shows that the Central Region has the highest percentages of disposal. The percentage of people who have disposed of televisions or screens is lower in the Huetar Caribbean and Huetar North regions; the difference is most evident in 2017. The ratio of people who dispose of UPS is much lower in the Chorotega Region.

The disposal of mobile phones is observed to be similar across regions; for 2016, the proportion of people who have disposed of one of these devices is higher in the Central Pacific and Brunca regions. For 2017, the highest percentages are those of the Huetar Caribbean and Brunca regions, the latter appearing in both years.

**Table 2.**  
**Distribution of respondents who have disposed of at least one electronic or electrical device, per region and year by device, 2016 and 2017**

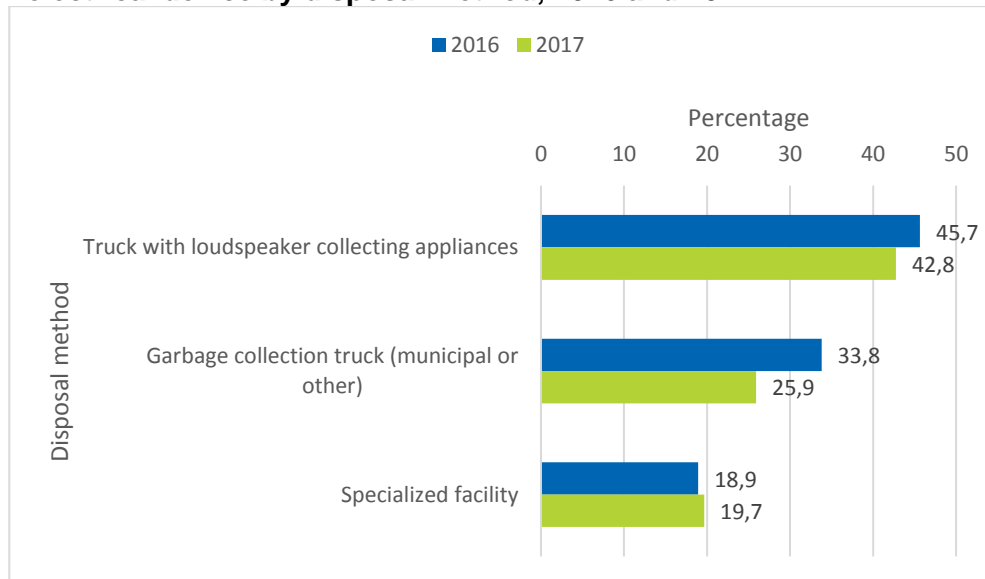
2016	Central	Chorotega	Central Pacific	Brunca	Caribbean Huetar	Northern Huetar
Televisions or screens	55.6	51.4	52.1	45.2	42.3	44.8
Computers	33.4	18.6	18.0	16.4	8.8	17.7
UPS (batteries for computers)	18.6	1.6	5.7	5.6	6.0	3.6
Mobile phones	34.4	36.6	46.8	38.4	28.8	35.8
Wireless routers/modems	6.0	2.7	0.0	2.3	5.6	2.1
Radios	17.1	15.3	20.0	24.3	14.4	16.6
2017	Central	Chorotega	Central Pacific	Brunca	Caribbean Huetar	Northern Huetar
Televisions or screens	47.3	45.5	45.5	46.2	36.3	34.2
Computers	27.2	15.6	10.9	11.3	13.2	13.0
UPS (batteries for computers)	10.9	1.4	3.8	4.5	9.2	5.8
Mobile phones	32.5	29.3	34.1	38.7	38.9	27.1
Wireless routers/modems	8.0	2.2	3.3	1.9	4.3	2.4
Radios	20.5	15.2	12.3	15.0	12.3	10.9

Source: MICITT. Telecommunications Services Access and Use Survey 2016 y 2017

Traditionally, Costa Rica has multiple means for waste collection. The EAU inquired on the three-primary means: garbage collection truck (municipal or other), loudspeaker truck that collects appliances, and specialized facility (Compliance Units).

According to survey results (Chart 2), the majority of respondents who have disposed of at least one electronic device have done so by delivering it to trucks with loudspeakers; in both periods, more than 40% used this method. In second place is the garbage collection truck. Lastly, the smallest proportion of respondents went to a specialized facility. This result is alarming, as the regulations and guidelines issued by the Ministry of Health do not contain a tool that allows this type of collection. Electronic devices can be collected by the companies that sell them, and then transferred to a compliance unit, or they can be collected in collection events endorsed by a Compliance Unit that will oversee the treatment of the recovered waste.

**Chart 2**  
**Distribution of respondents who have disposed of at least one electronic or electrical device by disposal method, 2016 and 2017**



Source: MICITT. Telecommunications Services Access and Use Survey 2016 y 2017

The analysis of disposal method by device also shows the previous pattern. For the majority of electronic devices, the disposal method most widely used by the respondents is the truck with loudspeakers, followed by the garbage collection truck and lastly the specialized facility. However, for the disposal of UPS and wireless routers/modems, a higher degree of specialized facilities' use is observed in 2017, almost 3 of every 10 respondents chose these. It should be noted that in most cases mobile phones are disposed of through a garbage collection truck (Table 3).

**Table 3.**  
**Percentage distribution of electronic and electrical devices disposed of, by disposal method, 2016 and 2017**

2016	Garbage collection truck	Truck with loudspeaker collecting appliances	Specialized facility	Other	DK/NA	Total
Televisions or screens	24.1	45.4	12.8	0.0	17.7	100.0
Computers	19.5	46.3	15.8	0.0	18.4	100.0
UPS (batteries for computers)	25.0	44.4	22.2	0.0	8.3	100.0
Mobile phones	38.9	22.3	19.4	0.0	19.4	100.0
Wireless routers/modems	29.9	37.9	21.8	0.0	10.3	100.0
Radios	37.0	41.1	10.3	0.0	11.7	100.0
2017	Garbage collection truck	Truck with loudspeaker collecting appliances	Specialized facility	Other	DK/NA	Total
Televisions/screens	16.7	49.1	13.9	1.1	19.3	100.0
Computers	18.6	45.1	21.1	0.7	14.5	100.0
UPS (batteries for computers)	20.7	34.6	29.3	0.8	14.6	100.0
Mobile phones	28.4	24.5	19.9	2.5	24.7	100.0
Wireless routers/modems	15.3	34.4	28.2	1.6	20.5	100.0
Radios	20.8	50.8	13.3	1.1	14.0	100.0

Source: MICITT. Telecommunications Services Access and Use Survey 2016 y 2017

The analysis of the distribution by disposal method shows that in both years, of the total number of respondents who used the garbage collection truck and specialized facility, the majority disposed of mobile phones and televisions/screens. In the case of those who used the truck with loudspeakers, the device most widely disposed of was television/screen. (Table 4).

**Table 4.**  
**Percentage distribution of the disposal method used according to the device, 2016 and 2017**

2016	Garbage collection truck	Truck with loudspeaker collecting appliances	Specialized facility	DK/NA
Televisions or screens	28.6	43.1	27.0	38.3
Computers	13.0	21.3	17.9	20.1
UPS (batteries for computers)	5.2	7.8	7.6	3.7
Mobile phones	33.8	13.3	33.3	27.1
Wireless routers/modems	3.7	2.7	5.1	2.2
Radios	15.8	11.8	9.1	8.6
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
2017	Garbage collection truck	Truck with loudspeaker collecting appliances	Specialized facility	DK/NA
Televisions or screens	27.5	40.9	26.0	38.2
Computers	14.8	18.1	19.0	13.9
UPS (batteries for computers)	6.5	5.6	10.6	5.6
Mobile phones	34.3	15.0	27.4	36.1
Wireless routers/modems	3.4	3.7	7.1	5.5
Radios	13.5	16.6	9.9	0.8
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: MICITT. Telecommunications Services Access and Use Survey 2016 y 2017

As shown in Table 5, in 2016 and 2017 it is observed that, although the majority of people report using the loudspeaker truck for the disposal of electronic waste, in the Central Pacific Region the most commonly used method is the municipal garbage truck or other. It is worth noting that for 2016, in the Brunca Region the percentage of people claiming to use a specialized facility (25.5%) exceeds the percentage of the total people who use this method (18.9%). This is also observed in people aged between 35 and 44, as well as in people with university education. In these cases, while the most widely used method is the truck with loudspeakers, an increase is observed in the use of the specialized facility, which exceeds the percentage of total people who use this method: 18.9% in 2016 and 19.7% in 2017.

**Table 5.**  
**Distribution of respondents who have disposed of at least one electronic or electrical device by year and disposal method, according to socio-demographics variables, 2016 and 2017**

Region	2016			2017		
	Garbage collection truck (municipal or other)	Truck with loudspeaker collecting appliances	Specialized facility	Garbage collection truck (municipal or other)	Truck with loudspeaker collecting appliances	Specialized facility
Total	33.8	45.6	18.9	25.9	42.7	19.7
Central	30.9	49.9	20.2	22.8	46.7	22.0
Chorotega	26.0	49.2	14.2	34.0	38.4	13.0
Central Pacific	55.4	25.1	9.8	39.4	38.9	13.9
Brunca	35.1	32.9	25.5	25.9	34.2	17.5
Caribbean						
Huetar	41.2	50.5	12.1	29.7	28.7	15.4
Northern Huetar	41.4	27.5	21.0	30.0	40.0	17.3
18 to 24	36.6	45.9	17.8	26.7	45.5	19.3
25 to 34	39.3	45.3	18.7	28.1	35.2	22.5
35 to 44	28.5	45.3	28.6	28.1	33.0	27.2
45 to 54	30.5	49.4	17.9	24.7	43.7	25.1
55 or over	29.7	43.4	15.0	22.1	46.8	10.7
None	48.5	24.1	4.2	27.4	21.3	2.7
Elementary School	34.7	48.5	11.8	26.9	47.0	12.9
High School	35.6	45.6	18.8	27.8	41.6	17.2
University	28.5	44.4	26.2	21.1	40.9	32.5
DK/NA	74.1	35.0	100.0	96.4	100.0	58.2

Source: MICITT. Telecommunications Services Access and Use Survey 2016 y 2017

# Conclusions



The disposal of electronic devices is common in the population of Costa Rica. According to data from 2016 and 2017, 6 of every 10 people have disposed of at least one device, among which are televisions/screens, computers, UPS (computer batteries), mobile phones, wireless routers/modems, and radios.

The study reveals that the actions of disposing of an electrical or electronic device depends to a large extent on the planning region in which people reside, as well as their age group, level of schooling, and income level. The population residing in the Central Region is the one that disposes of electrical or electronic devices the most. Furthermore, it is observed that the higher the level of schooling, the higher the proportion of people who dispose of these devices, and as the income level rises so does this percentage.

The devices most commonly disposed of are televisions or screens, as well as mobile phones, where the main disposal method used is the truck with loudspeakers, followed by the garbage collection truck and lastly the specialized facility. The use of these facilities is observed most frequently in people between the ages of 35 and 44, as well as in people with university education.

The study is revealing, and its results provide a nationwide diagnosis of electrical and electronic waste management, which will serve as input to generate policies for the adequate disposal of these devices.

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