Current Situation, Perception And Proposal Regarding The Management Of Waste Of Electrical And Electronic Devices In The City Of Lima. 2020

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Abstract: In the present investigation titled "Current Situation, Perception and Proposal Regarding the Management of Waste Electrical and Electronic Equipment in the City of Lima. 2020 ", its objective is to describe the current situation, the perception of the campaigns and reach a proposal for measures aimed at reducing the gap between the generation and collection of WEEE in the city of Lima. The research is descriptive and has a non-experimental cross-sectional design. As conclusions we have that: there are in the city of Lima and Callao, 93 collection centers, the vast majority of which collect cell phones and accessories, 18.5% of those surveyed affirm that they know the regulations, there is little statistical data on WEEE in the different districts of the city of Lima, the levels of effectiveness of the awareness campaigns, this is very low (2.9% approach the collection centers). Finally we propose measures to reduce the gap between the levels of generation and collection of WEEE.

Index Terms: Waste electrical and electronic equipment, WEEE management, WEEE process, WEEE regulations

1 INTRODUCCIÓN:

We live in times in which technological development seeks to facilitate our lives in all areas of human activity, from housework, work and entertainment and personal development, as well as being connected and communicated in real time is now necessary. and vital to many life situations. As consumers of technology, we must also become aware of the technological waste that we generate and many times store in our homes, without being aware of the dangers to which we are exposed due to the type of chemical, radioactive or material component from which they are made. various devices with which we live and manipulate on a daily basis, generating a type of silent pollution that is not discussed or is not known, what it generates as a dimension of a potential and current problem in the world in which we live. Although technological development nowadays makes it easier for us to develop our activities in every area of human activity, it is also true to ask ourselves, what do we do when our smartphone or tablet or computer ends its useful life cycle, where do we go? Are these, equipment that we discard going to stop? Are they recyclable? How long can we store them without representing a danger to our health or the health of any family member, especially children? Do we have any technological landfill in our city? How is the treatment of them in our city ?, etc., as we see there are several questions that we need to answer in order to know how we can improve on this issue and what proposals we can make for the management of this technological waste. According to the WEEE directive of the European Union: All electrical or electronic equipment that becomes waste; This term includes all those components, sub-assemblies and consumables that are part of the product at the time it is discarded.[1]. All waste electrical and electronic equipment goes through recycling, reuse, donation and reduction.[2].The substances contained in WEEE are many and vary according to each type of device. WEEE is mainly composed of precious metals (such as gold, silver, platinum), basic metals (copper, aluminum, nickel, Zinc, Iron), heavy metals (Mercury, lead, cadmium, arsenic, beryllium) and other materials such as plastics and glass. Since WEEE is composed of many valuable materials such as gold, silver, platinum, copper, it is feasible to work on the recovery of these wastes and it is necessary to implement measures to properly dispose of the compounds that are potentially dangerous.[3]. Among some characteristics of WEEE, we can warn, referring to the same classification, that the use of these devices is massive and diverse, because they cover a large amount of waste from different types of device. This is why the use of EEE and the consequent generation of waste has its origin in the domestic, business, state, industrial, medicinal, etc. This generation increases exponentially, since technology has become an indispensable instrument in the daily life of the human being to perform in the different areas of life. After articulating these characteristics, it can be deduced that the subject of study is complex, marked by diversity, which leads us to inquire what an appropriate legal approach would be, taking into account our current regulations, in order to analyze whether it is sufficient or if the sanction of a special law is necessary.[4]. There has been in Peru from 2009 to date a set of standards, regulations and policies that aim at the management of solid waste in general and as of 2012 the first standards for the management of waste from electrical and electronic equipment are specified (DS 001-2012-MINAM and later RM 200-2015-MINAM).[5] We also have that in 2019, the most used electronic devices are: 96% of people still use TV of any kind, 86% use any mobile phone, 58% of people use smartphones, laptops and personal computer, 14 % use tablets, 3% use devices to connect to streaming content, 1% use special reading devices and other technological equipment.[6]. Little by little, consumers are incorporating smart devices to carry out a specific activity, which allows them to improve their lifestyle and engage in the new habits that are being created. It should be noted that sooner or later, these devices will be the main sources of information that will provide strategists with the new habits and behaviors of consumers.[7]

2 MATERIALS & METHODS:

The research work developed is descriptive. It is descriptive because it describes the current situation of the management of electrical and electronic waste in the city of Lima and collects the perception of its citizens on the subject. The population is made up of citizens between the ages of 18 and 65 who have the ability to acquire and use electronic devices |Qand who live or work in the districts mentioned in the scope of the investigation. Since the population is infinite, - greater than 100,000 inhabitants - the size of the sample is estimated at 342 people, for this purpose the questionnaire was prepared and given the current pandemic situation due to COVID-19, the instrument was developed, using the Google Form toolThe projected techniques to be used in this research are surveys and documentary analysis, for this, a set of questions will be developed to measure the perception about the management of waste electrical and electronic equipment in the city of Lima and cards will also be applied registry to collect the data of interest associated with the object of study.

2.1 Process

Once the field work has been concluded, carried out in person by asking the selected people and reviewing statistical information collected through the internet as well as in person when required, a database will be built and then statistical analyzes are carried out on the package SPSS version 26. by doing the following:

a. Obtaining frequencies and percentages in qualitative variables.

b. Construction of tables for each perception according to reference groups.

c. Elaboration of graphs for each perception studied for the presentation of results.

3 RESULTS AND DISCUSSION:

Q1.- What is the current situation regarding the treatment in the management of waste electrical and electronic equipment in the city of Lima, 2020?

In Peru, due to the economic strength we are experiencing, there has been an important growth in the consumption of electronic equipment, especially those that connect us to the internet, and it is in this global context that we live today, due to the effects of the pandemic COVID-19 worldwide, has made life easier by being connected with our families, with our friends, with work, with online purchases, with digital entertainment, therefore, cell phones and smartphones, computers and / or laptops and televisions, which in themselves represent a better quality of life for the average Peruvian, also represent in the near future the largest volume of electronic waste and therefore the importance of knowing how to handle this equipment when it loses its useful life and they become waste, many keep their cell phones and / or smartphones, keep their laptops without use at home, is this appropriate? We should vote for it as they say in the garbage of our houses? in standards that allow the proper handling of these electronic waste in Peru? Are there any storage places for this equipment in our city? Where does this e-waste finally end up in our city? Currently there are 6 WEEE operating companies in Peru duly registered in DIGESA, which process about 2 thousand tons of WEEE per year. Of the total collection centers of RAEEs in the different districts of Lima we observe that 60 centers (64%) only receive cell phones and cell phone accessories, 9 of these centers (equivalent to 10%) collect the 10 types of waste according to the classification European RAEEs throughout Lima, with 55% of them in the districts of Surco and San Isidro. Of the total number of districts, Santiago de Surco is where there are more collection centers of RAEEs, 15 (in total only in that district equivalent to 16% of the total collection centers RAEEs in Lima, followed by San Isidro with 11 collection centers RAEEs equivalent to 11.8% of all RAEEs centers.

CODIGO	TIPOS DE CENTROS RAEEs	CANTIDAD
1	Celulares, equipos de audio, cámaras digitales, televisores, reproductores mp3/mp4 y equipos de cómputo	9
2	Televisores, equipos de cómputo, celulares y sus accesorios, tablet y pequeños electrodomésticos	7
3	Impresoras, multifuncionales, etiquetadoras, maquinas de coser, rotuladoras y suministro	1
4	Celulares y accesorios	60
5	Todos los tipos de RAEE	9
6	Pequeños electrodomésticos, equipos de informática y telecomunicaciones y aparatos electrónicos de consumo	4
7	4 Tipos de RAEEs	3
	TOTAL CENTROS RAEEs LIMA	93

Fig. 1: Number of Collection Centers by type of WEEE in Lima

There is information that we have analyzed and we observe that there is no direct relationship between the number of RAEEs collection centers and the area in km2 per district, nor with the number of inhabitants per district.

Fig 2: Relationship between WEEE centers and extension in km2 per district in Lima

In this dispersion figure between the number of RAEEs collection centers and the territorial extension in km2 per district, we can see that there is no direct relationship between both variables, on the contrary, an inverse relationship is manifested.

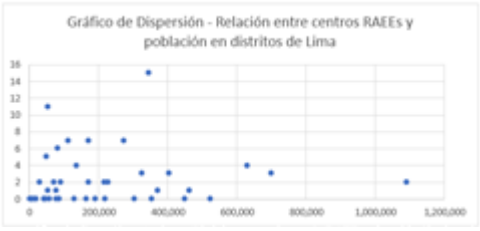

Fig 3: Relationship between WEEE centers and population by district in Lima

In this dispersion figure between the number of RAEEs collection centers and the population of each district of Metropolitan Lima, we can see that there is no direct relationship between both variables, on the contrary, an inverse relationship is also manifested.

Q2.- What is the level of knowledge of the regulations about the management of waste electrical and electronic equipment in the population of the city of Lima, 2020?

Faced with the existing regulations on the management of electrical and electronic equipment waste in force in our country, the following result is shown.

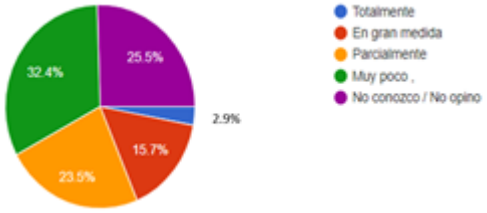

Fig 4: Knowledge of the regulation in the management of WEEE

When people are asked about the regulations on the management of waste electrical and electronic equipment in force in our country, 55.9% do not know or know very little about the subject, 23.5% know partially and 18.6% say they know on the RAEEs standards, which is why greater awareness in the population about the standards in the management of electronic waste has to be generated.

Q3.- What are the levels of waste of electrical and electronic equipment in the districts of the city of Lima, 2020?

At this point we must mention that there is no greater amount of data on generation and collection of WEEE in the districts of Metropolitan Lima.It should be noted that the useful life of the various WEEE does not exceed 15 years, in the case of refrigerators, refrigerators and cathode ray tube televisions. Liquid Crystal Display (LCD) and Light Emitting Diode (LED) televisions last no more than 10 years. Computers, seven years, while cell phones, two years, according to estimates by the organization IPES - Promotion of Sustainable DevelopmentAt the level of the city of Lima, the TECNORECICLA LIMA program is being developed, a campaign that began in 2016 and collected more than 15 tons of disused electrical and electronic equipment that year. For this year 2020, the Municipality of Lima expects to collect 10 tons of disused electrical and electronic equipment until the month of December, a campaign that is projected to be extended to the 43 districts of Lima. Faced with the question asked in the survey, if you were to dispose of electrical and electronic equipment, do you have an idea how many kilos you would throw away on electrical and electronic equipment?

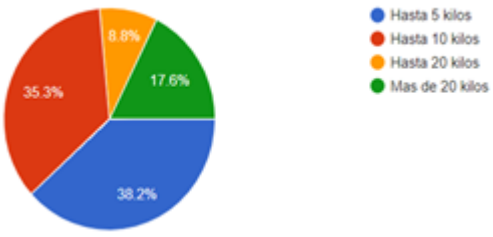

Fig 5: Amount in Kg. WEEE for dsposal

Based on the respondents, the graph tells us that a significant percentage of 73.5% would discard waste of electrical and electronic equipment up to 10 kilos, 8.8% would discard up to 20 kilos and 17.6% would dispose of electronic equipment more than 20 kilos, making an estimate of this information, around 1,100 kilos would be collected, equivalent to 1.1 tons. These data collected are consistent with the data presented by the World Association for Electronic Waste Statistics (GESP), founded in 2017 by the International Telecommunication Union (ITU), the United Nations University (UNU) and the International Waste Association Solids (SWA), which show that Peru generates between 6 to 10 kg of waste electrical and electronic equipment per capita by 2019.

Q4.-What is the level of perception of the effectiveness of environmental care campaigns and programs due to the contamination of electrical and electronic equipment waste in the city of Lima, 2020?

To obtain more information we ask the following questions: Do you have knowledge of the execution of environmental care campaigns due to WEEE contamination?

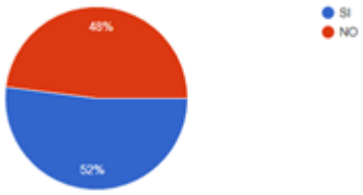

Fig 6: Knowledge about WEEE campaigns

52% of the respondents stated that they did not know about campaigns or programs for the collection of waste electrical and electronic equipment, while 48% of the population indicated that they knew that these programs had been carried out. Faced with the question of what action it takes when an electrical or electronic device when it presents failures, we obtained the following result:

Fig 7: Action to be taken when an electrical or electronic device fails

As a result, we observe that 66.7% send it to repair, 14.3% give it to other people, 12.4% have it stored at home, however, 3.8% send it to the trash and finally, it is striking that only 2.9% is carried by a WEEE collection center. When asking if there is a WEEE collection center close to your place of residence that allows recycling and / or disposal, the following result was obtained:

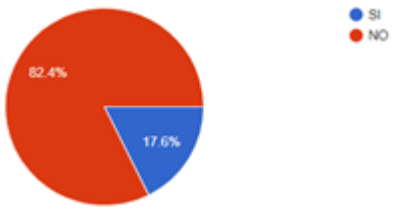

Fig 8: Closeness of WEEE collection centers to your home

As for whether there is a collection center for waste electrical and electronic equipment near their homes, 82.4% of those surveyed answered no, while 17.6% answered yes. Finally, we ask if you have been able to know of any awareness campaign about the management of WEEE? and we obtained as a result:

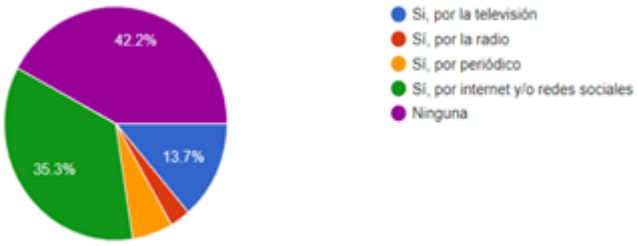

Fig 9: Knowledge of the awareness campaign of WEEE management

57.8% of the interviewees mention that if they have learned about awareness campaigns on the handling of electrical and electronic equipment waste through some means of communication, finding out on the internet or social networks prevailing with 35.3%, while that 42.2% mention not having knowledge of any awareness campaign on the subject.

Q5.- What proposal can be made about the management of waste electrical and electronic equipment in the city of Lima, 2020?

Measures are proposed in several aspects, starting with the commercial centers and distributors of electrical and electronic equipment (EEE), they must be obliged to inform and deliver a printed brochure to the client on the handling of WEEE and its free reception, also in an after-sales form track the estimated time that customers acquired EEE and send electronic reminders about the handling of WEEE, for this the customer must register their email, equipment and date of acquisition, thus complying with the principle of extended producer responsibility (REP). According to the results of our survey, 72% of the interviewees agree that a collector specialized in WEEE passes by their home and for this type of initiative it is proposed that local governments carry out every two months or 3 months periods of collection of WEEE directly from Each household, within its jurisdiction, after a dissemination campaign through social networks, the institution's website, establishing special hours and using specially equipped trucks or vehicles to handle this WEEE, as they do with the service of garbage collection, this will allow to reduce the WEEE collection gap and to generate a culture habit towards recycling WEEE in a formal way, this because although the collection campaigns and collection points allow collecting, above all, medium and small dimension, it is difficult to carry larger equipment for the citizen, this is possible only if they have mobility. The support of the state is necessary in providing an additional budget to the municipalities to fulfill this function. It is also proposed to encourage through tax benefits (discounts) that companies meet goals in the management of electronic recycling and thus arouse greater interest for more companies to invest in this area, this issue would also help to cover the gap between generation and formal collection of WEEE, it would also go hand in hand with a greater infrastructure in terms of implementing a greater number of security landfills to adequately serve a greater volume of dangerous components of WEEE. (Remember that Lima currently has 2 security fillings). This measure would also reduce the informal recycling of WEEE. The State should provide the entity with a larger budget so that it can carry out its supervisory work, through the hiring of more personnel and the respective training in the management of WEEE, although there are only six WEEE operators , there is a high level of compliance in terms of not providing information on WEEE to producers (manufacturers, marketers and distributors) as actors in this process.

3.1 Discussion

The present research proposed to describe the current situation of WEEE management in the city of Lima, how the population perceives the WEEE issue and to reach a proposal based on the data collected and knowledge of the WEEE management process. Regarding the research carried out by Lozano (2018), it concludes that through the regulations for the management of State assets, the Peruvian Navy has carried out a process of sale by auction of obsolete and damaged objects whose repair is costly, it has also carried out within the framework of current regulations, donation of equipment due to WEEE, generating in both cases, the release of its storage space to 100%, thus contributing to reduce the negative impact on the environment, enabling a second use of said EEE [8], in this sense the procedures followed are in accordance with the current regulations according to directive N ° 003-2013 / SBN indicated in our investigation and its purpose is to properly manage the movable property that is in the quality of WEEE, to in order to prevent negative impacts on the environment and at the same time protect the health of the population and its objective is to regulate the procedure for lowering the goods s state furniture that is in quality of WEEE. In the research carried out by Román and Torres (2015) they conclude that there is a low level of environmental culture in the population of Loja, generating inadequate storage of WEEE in homes and institutions, preventing them from being recycled and processed in a way On the other hand, they propose the design of a plant for the treatment of WEEE in the city of Loja since they do not have security landfills for hazardous waste and WEEE waste [2], however it should be noted that it reinforces the results of our research in the fact that a large sector is unaware of the management of WEEE and its regulations. Likewise, in the research carried out by Peñaloza, Narvaez and Solanes (2014) about the management of WEEE and its problems in Argentina, it concludes that the use of technologies represents an important and necessary aspect for today's society, but that nevertheless they still exist gaps to be able to attend to the large amount of WEEE that has been accumulating in our

countries, without there being a true dimension of the problem that will cause the population and that the State does not adequately regulate the management of WEEE, leaving it at the mercy of informal treatment and its consequent negative effect on the environment and public health [4]. These conclusions go in the same direction with the analysis carried out in our investigation about the non-application of the regulations, especially regarding the little control and almost no penalties for the mishandling of WEEE, a function that falls to the Evaluation and Control Agency Environmental (OEFA) in our country and it is not fully complied with, goes hand in hand with the results of the little knowledge that our population has about the regulations in force in our country, where 56% do not know or know very little about of the subject and 24% know partially, so these results generate complementary measures to the existing ones for the proper management of WEEE.

4 CONCLUSION:

Regarding the levels of effectiveness of the awareness campaigns, this is very low, only 2.9% approach the collection centers, and the gaps between the generation and collection of WEEE is very high, only the 0.01 kg / per capita of an approximate 6.3 kg / per capita. Although the population knows about WEEE campaigns, they still have little awareness about the danger posed by storing or giving away or informally selling disused or faulty electronic equipment, 30.5% do so before trying to repair it. It is estimated in Peru, a generation 195 thousand Tns. of WEEE and a collection of only 2 thousand Tns. by year.

ACKNOWLEDGEMENTS

The authors wish to thank those who participated in answering the questions posed for this research and those who provided us with their comments on the subject.

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