Ict and Waste

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Abstract:- **Today's world is flooded by ICTs which are Information and Communication Technologies. They are now part of the landscape, we are so used to them and they provide so many services in terms of saving time, money, energy while providing our life much easier and more pleasant than anyone in their right mind would want to do without at the risk of cutting themselves off from the world altogether. ICTs therefore play a role of great importance, they are now part of our daily lives, and we have them at our fingertips almost every day. They have become elements of communication, work, and business.**

They take different forms, the mobile phone as well as the tablet, for example, caught our attention in the context of writing this article. All these utensils are certainly very precious but it is advisable to take care not to use them to excess because behind all that they allow of usefulness, many studies reveal a pernicious side of these ICTs, namely their negative impact on the environment in that they contribute to the pollution of the Earth by the considerable number of these tools which very quickly become waste, which, moreover, are difficult to degrade, causing pollution of the earth, seas and oceans, thus jeopardizing the survival of many ecosystems. If we are careful, in the next few years, the pollution induced by ICT waste risks posing a major problem for humanity that will be difficult to solve. Hence the responsibility in the use of these ICTs in order to increase their lifespan as much as possible or to offer them a second life by promoting their recovery and reuse by third parties. Also, do not give in to the tendency of buying fever, which would like us to buy the most recent and fashionable ICTs, or by making sure not to fall into the trap of ICT designers who make sure, from the creation of these tools, to reduce their lifespan by implementing various techniques such as planned obsolescence or the numerous updates which weigh down the machines and make them less attractive, more difficult to handle.

Adopting responsible behavior when buying and using ICTs could contribute to a very significant reduction in their negative impact on the environment in terms of waste production. to reduce their lifespan by implementing various techniques such as planned obsolescence or the many updates that weigh down the machines and make them less attractive and more difficult to handle. Adopting responsible behavior when buying and using ICTs could contribute to a very significant reduction in their negative impact on the environment in terms of waste production. to reduce their lifespan by implementing various techniques such as planned obsolescence or the many updates that weigh down the machines and make them less attractive and more difficult to handle. Adopting responsible behavior when buying and using ICTs could contribute to a very significant reduction in their negative impact on the environment in terms of waste production.

Keywords:- *ICT, mobile phone, pollution, tablet, waste, WEEE.*

I.   INTRODUCTION

ICTs have flooded the world and are now part of the landscape, they facilitate almost all aspects of human life: we use them to communicate, to get information, to earn money, to save money, etc. The services enabled by ICT are legion and multiple. But despite all that they can present of benefit, the ICT reveal, more and more, a pernicious side in several fields of which that of the environment. Indeed, it has been proven that ICTs have a negative impact on the ecology through the quantity of electronic waste that they discharge into nature, thereby constituting large-scale pollution that is very harmful to human health but also to many of species on earth. As these ICTs are numerous, we have chosen to analyze only two of them in the context of this article.

We therefore asked ourselves to be able to know the quantity of these articles produced in the world and the waste they induce and this in order to bring humans to adopt a much responsible behavior in their way of managing and using ICT.

The theory on which we based ourselves is that of appropriation because it is the users who, by appropriating ICTs, end up misusing them by transforming them, sometimes into objects of prestige, always seeking to owning the most fashionable device, renewing their equipment even if it still works very well, not being fully aware that their behavior is capable of inducing considerable damage in terms of accumulations of hardly degradable waste.

II. METHOD

In this article, the method which is exploited is the systemic one. Indeed, between the ICTs that are produced and the waste from which they result, there is a whole complex system that regulates all of this. The movement taking place is from the environment towards ICTs and from ICTs towards the environment. It is the environment which provides all the elements which are used for the manufacture of these technologies but after use of the latter, it is still in the environment that the waste of these NICT are poured in the form of waste produced with difficulty degradable which contribute to the pollution of the earth, the environment.

III. ICT

A. ICT or NICT

Since the advent of information and communication technologies, two acronyms are used on a daily basis, they are either ICT or NICT. What is the difference between these two acronyms and which of the two do we choose to use in this work? "The acronym NICT is a source of confusion because it is not the subject of any official definition by the international institutions responsible for this field, whereas the term ICT (or ICT in English) is defined there as being the integration of technologies of telecommunications, computing and multimedia. »[1]

"The term NICT (new information and communication technologies) was often used in French-language literature during the 1990s and early 2000s to characterize certain so-called "new" technologies. But the definitions provided are generally vague or equivalent to those of ICT. The qualification of "new" is ambiguous, because the scope of so-called new technologies is not specified and varies from one source to another. Due to the rapid evolution of technologies and the market, innovations declared "new" find themselves obsolete a decade later. Sometimes it is a matter of distinguishing between Internet-based technologies as opposed to traditional telecommunications. Sometimes it is a question of distinguishing between web 2 platforms. 0 as opposed to early Internet technologies which are now three decades old and quite obsolete. Sometimes, it is a question of characterizing the services resulting from the convergence of telecommunications and multimedia using high-speed access because applications using only low-speed access can hardly be qualified as "new". Sometimes NICTs also include mobile telephony, but can the first mobile technologies that are more than three decades old be called "new"? » it is a question of characterizing the services resulting from the convergence of telecommunications and multimedia using high-speed access because applications using only low-speed access can hardly be qualified as "new". Sometimes NICTs also include mobile telephony, but can the first mobile technologies that are more than three decades old be called "new"? » it is a question of

characterizing the services resulting from the convergence of telecommunications and multimedia using high-speed access because applications using only low-speed access can hardly be qualified as "new". Sometimes NICTs also include mobile telephony, but can the first mobile technologies that are more than three decades old be called "new"? »[2]

ICT refers to all those technologies that we have known for many years now and that contribute to facilitating access to information. These include radio, television, telephone, etc. But the NICTs, although also alluding always to these same technologies, present a certain difference with the ICTs in that they transit, to inform and communicate, this time by the Internet, this flagship media of the time. Present, which in itself is able to include all the other media at the same time, and the latter can pass through it to guarantee the circulation of information, this is what makes it possible to say of these technologies that they are new.

Note also the fact that the novelty may differ depending on where there is a great penetration of these technologies or not. Indeed, if in a number of industrialized countries, these technologies are now part of the decor that is no longer surprising, in many other places on the earth, they are still considered to be new because people do not still haven't gotten used to it, it's still a luxury to own a mobile phone, to use a computer or a tablet, to make purchases online. This disparity in the accessibility to these NICT, according to the countries, the continents, gave birth to the concept of "digital divide"

We opt, in view of these various explanations to use, throughout the drafting of this article for the acronym "ICT" since for the case of the mobile phone as well as the tablet, they are already part of the daily life of men since very long years.

B. Kinds of ICT

There is a whole panoply of ICTs but as far as we are concerned, we choose to exploit only two of them. These are the mobile phone as well as the tablet.

1) Mobile phone

➢ Definition
"A cell phone (or mobile phone) is a device allowing communication by terminal without being connected by cable to a telephone exchange. »[3]Sounds are transmitted by electromagnetic waves in a specific network. It is therefore possible to communicate by telephone from any place where a relay antenna picks up the emissions of the device used.

"The mobile phone is currently the most widely used expression and communication technology in the world: in

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[1]Information and communication technologies, available at the URL address: https://fr.wikipedia.org › wiki › Technologies_de_l'infor.., consulted online on 13/05/2022.
[2]*Ibidem.*

[3]Definition of Mobile Phone (Cell Phone), available at the URL address: https://www.dicodunet.com › Economy Definitions, accessed online on 06/15/2021.

2012, three quarters of the planet's inhabitants were equipped with one. »[4]

There are many accessories intimately linked to the use of the mobile phone, these include: covers, interchangeable shells, decorative cords, headsets, hands-free kits, anti-breakage, pouch, charger, cable, power, battery, etc.

To date, the world of mobile phones has undergone rapid evolution and development. We find there:
- the smartphone or smart phone, which refers to a mobile phone with advanced features similar to those of a computer: internet browsing, playing videos, music, video games, email, videoconferencing, light office automation, etc.
- phalettes are large-screen smartphones (between 5 and 6.9 inches diagonally) occupying an increasingly large share of the market. There is a technological one-upmanship with the introduction of biometric readers (fingerprints, facial recognition), contactless payment systems, Ultra HD phyto-video sensors and even 3D cameras.

➢ *Servicescell phone*
With the mobile phone, you can read and write emails; surf the Internet; to play; photograph and record videos; listen to music; watching TV, surfing the Internet, etc.

The mobile phone is also set to evolve towards payment systems by becoming a kind of electronic purse.

Here are some services enabled by the mobile phone:
-i-mode: this is the protocol for connecting mobile phones to the Internet.
-MMS (multimedia messaging services): multimedia messaging service for mobile phones
-GPRS (General Pacet Radio Service): this is the standard derived from GSM allowing a higher data rate. It is often referred to as 2.5G.
-GSM (Global System for Mobile Communication): second generation digital standard (2G).
-SMS (Short Message Service): messaging service for mobile phones, allowing the sending of written messages of up to 160 characters.

2) The tablets

➢ Definition
"A touchscreen tablet, electronic tablet, digital tablet, or simply tablet, is a personal assistant or an ultra-thin portable computer which comes in the form of a touch screen without a keyboard and which offers approximately the same functionalities as a personal computer. »[5]

➢ *Roles of tablets*
Tablets are among the technologies that have revolutionized the world and brought about profound changes in many areas, including education. For young children, these tablets are able to promote the understanding of subjects. "The use of computerized technologies in school learning and in particular for reading is currently the subject of numerous studies. »[6]"Since 2010, touch tablets and their applications have been widely used as a learning medium for young children"[7].

These tablets demonstrate their effectiveness especially with children with certain forms of impairment. Indeed, "Studies on the use of the touch pad in young children have mainly focused on improving communication skills in children with special educational needs in specialized classes. »[8]

This is the case, for example, of people with a visual or hearing impairment.

IV. WASTE

A. Concept analysis
Overall, we define waste as something that we have already used, that we no longer need and that we throw in the trash. Waste is an object at the end of its life or a substance that has undergone physical or chemical alteration, which then no longer has any use or is intended for disposal. The word "waste" comes from the old French déchiet or déchié.

Waste can also be defined as "the quantity lost in the use of a product, what remains after its use.

A waste corresponding to any material, substance or product that has been discarded or abandoned because it no longer has a specific use.

Moreover, "a waste is a waste for the one who gets rid of it, but is no longer waste for the one who finds a use for it (until recently, to be convinced of this, it sufficed to observe the waste pickers who were busy around the bulky items before the passage of the dumpster). »[9]

One could also say that waste can be defined as "any residue from a production, transformation or use process, any substance, material, product, or more generally any movable

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[4]L. ALLARD., L. CRETON., R. ODIN., *Mobile telephony and creation*, Paris, ed. ARMAND COLIN, 2014.
[5]Touch tablets, available at URL:https://fr.m.wikipedia.org/consulted online on 06/15/2022.
[6]J. ECAILLE et al., "Designing applications on touch pads to stimulate learning to read: with what scientific assumptions? » in *Information and Communication Sciences and Technologies for Education and Training*, Vol 23, n°2, 2016, pp.33-56.

[7]K. GOODWIN, Use of tablet technology in the classroom. Strathfield, NSW: Curriculum and learning Innovation Centre, NSW Department of Education and Communities, 2012.
[8]LD McMANIS and SB GUNNEWIG., "Finding the education" in *educational technology with early learners, Young Children*, 67, pp.14-24, 2012.
[9]JP. BALET, Waste management, Paris, 5th edition, Dunod, 2016, p.9.

property that is abandoned or that the holder destined for abandonment. »[10]In other words, any item that is discarded is waste. This does not mean that this element is unusable, as is or after modification. "Only what is qualified as final waste is really unusable and must be stored to avoid environmental pollution. »[11]

In the same lexical field, we find "detritus", "garbage", "residue", terms also used to designate these objects or remains that are no longer wanted.

"Since the dawn of time, man has produced waste. In its earliest and simplest activities, human waste was limited to organic remains degraded in nature by natural biological processes. It is by increasing its technicality and its equipment, as well as the concentration of population in the same place, that the waste becomes visible and invasive. It is their concentration and the lack of consideration that makes waste a problem for human populations. »[12]

In view of the immense quantities of waste produced across the globe, there is a real need to collect and manage it.

B. Waste indicators[13]
Here are some indicators related to waste:
➢ quantity of waste produced
➢ waste degradation time
➢ composition of waste
➢ specification of indicators (number, type and location of volumes of waste collected and treated)
➢ percentage of population with access to an improved sanitation network (total, urban, rural)
➢ quantity (%) of waste recycled, recovered and reused
➢ volume of unusable (unrecoverable) waste
➢ type of treatment
➢ release of toxic substances and nutrients from industrial sectors

C. Kinds of waste
There are several kinds of waste but in the context of this research, we will only dwell on the case of WEEE.

WEEE**[14]**are waste electrical and electronic equipment, they cover any product that works with electricity and they are hazardous waste. The mobile phone as well as the tablet are part of it.

This waste from various origins can undergo different fates consisting either of "recycling it, incinerating it or burying it, in compliance with the standards in force.[15]

D. Hazardous waste
WEEE, which includes mobile phones and tablets, is qualified as hazardous waste because of they are 15 properties that make waste hazardous (Explosive, Highly flammable, Irritant, Toxic, Carcinogenic, Corrosive, Ecotoxic,…). "Scrapyards release nearly 98 million tonnes of carbon dioxide each year, or 0.3% of global emissions from the energy sector. This waste is a real danger to the health of those who live or work near these landfills. The mercury found in mobile phone causing brain damage in some people. In addition, the storage of waste pollutes the soil, subsoil, air and water (groundwater, rivers) and makes food from the food chain unfit for consumption".

"Environmental damage is harmful during the dismantling, recovery and final disposal phases of hazardous materials because toxic substances are discharged directly into the ground. The burning of electrical wires contributes to polluting the ambient air and to forming polluting piles of ash. Toxic fuels (tires, insulating foam) pollute incineration sites by releasing substances that deplete the ozone layer and contribute to the production of greenhouse gases in the atmosphere and the environment. »[16]Their dangerousness is comparable to "waste containing large quantities of materials, substances or culture media presenting a risk of spreading infectious agents, cultures of infectious agents, waste from infectious patients in isolation); medicinal waste (waste of expired medicinal products and containers having contained medicinal products)".[17]

V. ICTS AND WASTE

As already indicated in the introduction to this article, there is an intrinsic link between the ICTs we use in our daily lives and the waste they generate. It is precisely this type of waste which is difficult to degrade which poses serious problems for humanity and which contributes to the pollution of the environment. Let's see in this point the quantity of mobile phones and tablets produced in the world as well as the quantity of waste generated by these ICT tools.

1) Mobile phones
Various "sources converge to place the impact of mobile phones in greenhouse gases at 21 kg of CO2, the lifespan

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[10]Definition | Waste | Futura Planet, Available at URL, https://www.futura-sciences.com › Planet › Definitions, accessed online 2022-04-16.
[11]Ibidem.
[12]T. TURLAN, *Waste, Collection, treatment, sorting, recycling*, Paris, DUNOD, 2013,2018, p.3.
[13]Waste indicators, available at URL, waste – Eurostat, https://ec.europa.eu › ... › Eurostat › Waste › Data, accessed online on 19/04/2022.

[14]WEEE, what is it – EcoInfo, available at the URL address, https://ecoinfo.cnrs.fr › 2014/05/19 › 1-les-deee-quest-..., consulted online on 05/26/2021.
[15]T. TURLAN, *Waste, Collection, treatment, sorting, recycling*, Paris, Dunod, 2013, 2018., p.10.
[16]Electronic and electrical waste, a danger... – Anviga, available at the URL address: https://www.anviga.com › post › electronic-waste.., consulted online on 05/23/2022.
[17]ICRC, Medical waste management manual, Geneva, 05/2011, p.13.

having a decisive impact: between 13 to 25 kg for a lifespan of 1 to 2 years".[18]

This statistic shows the number of smartphones sold to end users worldwide between 2007 and 2021. In 2018, more than 1.5 billion smartphones were sold worldwide.720 million mobile phones are thrown away every year worldwide according to the ABI research firm, which estimates that this represents 60% of the 1.2 billion units sold annually.[19]

"The recovery rate does not exceed 5% even when the operator provides a financial advantage of 10 euros in the event of the return of old laptops. Used phones are economically unattractive in rich and dangerous countries. Of the 25 million new terminals thus placed on the French market each year, less than one million would be recovered. »

Nokia has contributed to a university study including, among other things, the analysis of the impacts of a mobile phone through the ecological footprint. For a mobile phone only the chargers, battery, accessories, network are outside the scope of 90 grams and used for 2.5 years and whose impacts are taken into account over the entire life cycle, the ecological footprint obtained oscillates between 104 and 115 m2 per phone per year, depending on the scenario, or 7,000 to 8,000 times more than the size of the phone itself. Related to an available average biological capacity of around 1.89 ha per inhabitant (value available at the time of the study), the telephone's ecological footprint would represent between 0.55 and 0.6% of this average capacity per inhabitant.

2) Tablets
According to some statistics, almost "46 million tablets were sold worldwide in the fourth quarter of 2021."[20]

The waste produced by the tablets is included in what is called WEEE. The industry behind the manufacture of these technological tools is beginning to show its limits as the world is sinking under a mound of waste. According to certain statistics, 'Each French person produces 20 kg of electrical and electronic waste per year. »[21]

"A recent report by the International Telecommunication Union and the International Solid Waste Association, in collaboration with the United Nations, and published on December 13, 2017, reveals that the number in volume of electronic waste increased by 8% between 2014 and 2016. Which represents 44.7 million tons of garbage in total. »[22]

VI.   RESPONSIBILITY IN THE USES OF ICT

Mobile phones and tablets contribute to the accumulation of hazardous and difficult to degrade waste, which is why it is important to increase the lifespan of these devices as much as possible. For this, it would be necessary not to give in to compulsive purchases which consist in always being holders of fashionable, state-of-the-art devices, by giving in to buying fever.

We must also be aware that the companies that produce these ICT tools resort to planned obsolescence which will ensure that the devices do not last long, that with regular updates, they become less efficient or that the repair devices cost more than buying a new one. All these techniques aim to lead to an overconsumption of tools that we could do without. This is the reason why, it would not be necessary to make updates regularly and this, in order to increase the lifespan of these devices. We should also think about giving a new life to computers and mobile phones that we no longer need by reselling them at a low price or even by offering them to those who lack them.

Recycling these devices is also an option in order to be able to recover certain materials they contain. Repair is also an option. To increase the lifespan of these tools, it is advisable to protect them with anti-breakages, the use of firewalls, anti-virus software, use a lightning protection inverter and install a lightning rod. It would be wise to put unused peripherals on standby or switch off, to favor reuse, to avoid leaving the charger plugged in when the charge is finished, to use the telephone when the charge is too low so as not to damage it too quickly.

From all that has just been seen, it is indisputable that, apart from all the beneficial and essential services provided by technological tools, "the multiplication of equipment and uses linked to ICTs generates very heavy impacts on the environment. »[23]

This justifies the appeal launched, throughout the writing of this article, for a reasoned use of these technologies through the adoption of responsible ethical behavior.

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[18]F FLIPO et al, Digital technologies and environmental crisis: can we believe in green ICT?, Final report, 2009, p.48.
[19]ABI Research, available at URL:https://www.abiresearch.com/, consulted online on 06/20/2021.
[20]Tablets and Chromebooks: the end of the euphoria-Silicon.fr, available at the URL address:https://www.silicon.fr/tablettes-chr, consulted online on 06/15/2022.

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[22]The world is awash in e-waste, available at URL:https://www.reponse-conso.fr/mo, consulted online on 06/12/2022.
[23]F. BERTHOUD et al., *Ecological impacts of Information and Communication Technologies, The hidden faces of immateriality*, Les Ulis, ed. EDP Sciences, 2012, p.19.

VII. CONCLUSION

Today's world is experiencing very significant changes induced by the advent of ICTs that have changed the world even in its operating structures. ICT tools provide services that no sensible person could deny them. But under the appearance of zero environmental impact, we realize, little by little, the pernicious side of these technologies which, after use, cause the production of a considerable amount of waste whose degradation proves to be painful. Hence the call for reasonable and responsible use of ICTs.

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