DIGITALIZATION, THE INFORMATION SOCIETY AND THE ENVIRONMENT

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Abstract:
Enviromental pollution represents a major issue of contemporary times. Human existence depeds on the environment, and environmental factors (air, water, soil) are constantly being negatively altered as a result of human use. AstfelThus, as a consequence of human activities and major scientific progress, digital pollution has also emerged. The numerous restrictions imposed during the Covid -19 pandemic brought discussions about global warming back into focus. Consequently, digitalization has expanded worldwide, and the internet has become indispensable.
As internet traffic, video streaming, the number of online conferences, and activities on social networks have increased various ,,costs" have appeared – among them, digital pollution.
Information and communication technologies (ICT) are no longer merely tools of efficiency but tre drivers of sustainable progress, capable of transforming the way people interact with the environment.
Keywords: *pollution, environment, impact, digitalization, information society.*

1. DIGITALIZATION AND IKTS IMPACT ON THE ENVIROMENT

Digitalization represents the technological process trough which activities, services and information are transformed into digital format. It is practical transformation that involves the use of information and communication technologies (ICT) to increase the efficiency of economic, administrative or social processes.

Although it is often perceived as a path toward modernization and efficiency, digitalization has both positive and negative ecological consequences.

Positive effects of digitization on the environment:

- Reduction in the consumption of material resources (digitalization of administration and business processes);
- Energy efficiecy and ecological monitoring (smart technologies – IoT, sensors, digitalized electricity networks);
- Promotion of the circular economy (car-sharing applications);

- Reduction in polluting transport and mobility (remote work , e-commerce and delivery services).

Negative effects of digitalization on the environmental:

- Increased electricity consumption;
- Electronic waste (e-waste);
- Digital carbon footprint;
- Extraction of resources for technology production.

2. GENERAL ASPECTS OF DIGITAL POLLUTION AND THE ROLE OF ARTIFICIAL INTELLIGENCE IN INCREASING THE DIGITAL

Currently, a term closely associated with the environment is pollution. Pollution represents the price that humans pay for the benefits brough by modern technology.

The significant decline in biodiversity, climate change, the depletion of the ozone layer, and the energy crisis have all led to numerous discussions about pollution. One of the major causes contributing to global environmental problems is the development of technology, but especially yhe way in which humans use it.

Technology, as a whole, is represented by the sum of tools and consequences created and accumulated by humans, aimed at producing objects that enhance natural physical capabilities to perform actions or tasks that would otherwise be impossible. The development of technology is a dynamic and cumulative process, offering advantages (visible benefits for society and industry) as well as disadvantages (impact on the environment and human health).

The implementation of new digital technologies leads to increased electricity consumption and digital pollution.

Digital technology is a form of technology that has expanded significantly in recent years. It has substantial effects on the carbon footprint, with devastating consequences for the environment. Devices and data centers, as well as the use of resources for producing electronic equipment, represent the various ways digital pollution manifests.

In a technology-dependent society, digital pollution is a controversial subject. Therefore, digital pollution can be defined as the type of pollution that arises both from the use of IT infrastructure and from the production of digital tools. The energy, resources

used, and discarded technological devices that become electronic waste are elements that pollute the environment and can be hazardous to humans.

The effects of digital pollution, resulting from excessive use of energy and resources, cannot be ignored. The problem of digital pollution is fueled by several factors whose management requires the attention of users, industry, and governments.

Artificial intelligence (AI), as it becomes increasingly integrated into our lives, can have a negative impact on the environment. The development and excessive use of AI raise issues related to high energy and resource consumption, with the most severe problem being the increase in ecological footprint.

For example, mining a single bitcoin uses more electricity than the combined consumption of Norway and Ukraine. Regarding water consumption, training the GPT-3 model required 3.5 million liters of water for data center cooling.

AI has become an integral part of our lives, from accessing smartphones and checking emails to interacting with virtual assistants (Siri, Alexa, Google), with people even becoming dependent on these systems, which poses threats to security, democracy, and job preservation.

The fact that AI continuously updates hardware and software to meet demands leads to high production costs for AI devices.

AI plays a significant role in increasing the digital footprint through intensive use of computing resources and energy. All of these factors contribute to digital pollution through the high energy consumption of AI models, intensive data center usage, heavy reliance on hardware, and increased data traffic.

Even though AI brings economic and technological benefits, it also contributes to the growth of digital pollution.

To mitigate its negative environmental impact, sustainable practices are necessary, such as algorithm optimization, the use of renewable energy, and regulation of resource consumption.

3. THE MAIN SOURCES OF DIGITAL POLLUTION

Each source of pollution has a significant impact on the environment. Among the common sources of pollution, we mention:

Data centers are buildings used to host computing equipment such as servers, telecommunications systems, networking systems, and storage devices. The main issues associated with data centers include energy consumption, greenhouse gas emissions, and infrastructure impact. Data centers consume enormous amounts of energy to power servers and cooling systems. Most of the energy used by data centers comes from fossil sources, which amplifies CO2 emissions and consequently contributes to global warming. Moreover, the construction and maintenance of data centers involve the use of materials and resources that affect the surrounding environment.

The production of electronic devices has a significant impact on the environment, both during the extraction of raw materials and throughout the manufacturing, usage, and disposal phases. At the European level, the **RoHS Directive** (Restriction of Hazardous Substances) limits the use of ten hazardous substances in electrical and electronic equipment. Additionally, the **WEEE Directive** (Waste of Electrical and Electronic Equipment) requires the collection, recycling, and reuse of electronic waste, while the **Basel Convention** regulates the transboundary transport of hazardous waste, including e-waste. Therefore, the production of electronic devices is important for the society we live in, but it also has drawbacks, as it comes with a high ecological cost. International regulations, technological innovations, and changes in consumer behavior can significantly reduce the environmental impact.

Although digitalization helps highly polluting industries improve their environmental performance by reducing the harmful effects of problematic production technologies, replaced with “green” versions, this does not necessarily or immediately translate into an overall increase in factor productivity [1].

Electronic waste (e-waste) refers to electrical or electronic equipment that is no longer functional or no longer wanted (phones, laptops, televisions, household appliances). Its impact on the environment is significant, as e-waste contains heavy metals such as lead, mercury, and other chemicals, which can contaminate soil, groundwater, and air if burned or improperly disposed of. In 2023, over 62 million tons of e-waste were generated globally, with only 17% being properly recycled; the rest ended up in landfills or was illegally exported to underdeveloped countries. In Romania, the

WEEE and **RoHS Directives** have been implemented, imposing obligations on manufacturers, including waste collection and the organization of awareness campaigns.

The energy consumption of personal devices depends on the type of device, duration of use, charging habits, and energy efficiency. While individual energy consumption of personal devices is relatively low, when aggregated, it becomes a significant source of consumption and CO2 emissions.

Although digitalization has brought and continues to bring benefits in the economy, education, and communication, it is not without ecological costs. **Digital pollution** is an "invisible" form of pollution, yet it has real effects on the planet. Environmental protection in the digital era must be based on the principle of sustainable development, integrating clean technologies, coherent legislation, and digital ecological education.

4. THE INFORMATION SOCIETY AND ENVIRONMENTAL PROTECTION

The **information society** represents a new form of human civilization, in which the equal and universal right to information, directly connected to a developed information and communications infrastructure, contributes to reducing poverty, improving quality of life, and achieving sustainable socio-economic development.

The transition to an information society is essential for maximizing the benefits of using digital technologies and the Internet in order to achieve sustainable development, increase productivity and competitiveness, create new jobs, and support social and societal progress [2].

The information society influences all areas of life, including environmental protection, providing tools for monitoring, transparency, public participation, and the optimization of environmental policies.

Environmental protection represents one of the most important social and legal values at both national and international levels.

The **European Union** defines three criteria to determine whether we belong to the information society: whether we use e-mail, whether we browse the World Wide Web, and whether we learn, work, and communicate using a computer network. New information and communication technologies are transforming old activities into new ones. Being part of an information society naturally raises concerns about its impact on

us and the environment, how we can protect it, and what opportunities the information society offers for environmental protection. It can be said that the development of information and communication technology can also help solve some environmental problems.

Digital technologies are transforming the way we monitor, analyze, and address environmental issues and provide solutions to promote sustainability and resilience. Digitalization and information technology contribute to environmental protection through energy efficiency and intelligent resource management but can also create risks, such as electronic waste and high energy consumption of IT infrastructure.

Research on the relationship between sustainable development and the information society has focused on the potential of information systems to help decision-makers monitor and assess environmental conditions.

Environmental Information Systems (EIS) programs aim "to improve the quality, efficiency, and accountability of decision-making processes through applications that systematically use environmental information." In this sense, the development of EIS seeks to enhance the use of harmonized environmental data by improving data availability, facilitating data access, and ensuring that different datasets are compatible [3].

Environmental information policy includes the elements of generation, dissemination, and management of information [4]. Generation refers to aspects of validation, data sources, classification and mapping schemes, quality, and format. Dissemination determines the extent to which information is shared among parties, as well as issues related to confidentiality. Information management policies regulate ownership, sharing, timeliness, and archiving of environmental information [5].

To ensure the compatibility of the development of the information society with the principles of sustainable development, balanced legal regulation is essential. In this regard, the Digital Agenda for Europe promotes internet access, interoperability, and the use of ICT for sustainability; Law no. 365/2002 on electronic commerce and Law no. 506/2004 on the processing of personal data in the electronic communications sector regulate aspects related to the functioning of the information society at the national level;

the National Digital Agenda Strategy for Romania 2020 promotes the use of ICT for energy efficiency and environmental protection.

At the global level, the main documents establishing the link between technology and environmental protection include: the Rio Declaration on Environment and Development (1992) – which promotes free access to environmental information and public participation in decision-making (Principle 10); Agenda 21 and the United Nations Sustainable Development Goals (2015) – which recognize the role of information technology in supporting sustainable development; and the Paris Agreement (2015) – which promotes technology transfer and data sharing to combat climate change.

5. CONCLUSIONS

The relationship between the information society and environmental protection is complex, and legal regulation is constantly evolving. The goal is not only to limit the negative effects of digitalization on the environment but also to leverage technological potential in favor of environmental protection.

Environmental protection directly benefits from digital advancements – intelligent pollution monitoring systems, platforms for reporting ecological incidents, open databases, and artificial intelligence in climate analysis provide a much clearer and faster perspective on environmental issues. Digitalization also brings new legal and ethical challenges, such as personal data protection, cyber security, and the management of electronic waste generated by technological expansion.

Future legislation will need to integrate the principles of sustainable development with those of digital governance, creating a coherent legal framework in which innovation supports the protection of nature rather than threatening it.

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