

Application Of Information and Communication Technologies in Environmental Protection

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Abstract— The protection of environment and natural resources is an important part of development. Environmental protection contributes to improving human health conditions, sustaining agriculture and other primary production. Without adequate initiatives to protect environment development activities are affected. Information and communication technologies (ICT) present new way in which information and knowledge can effectively be shared to enhance developmental activities including environmental protection. Information and communication technologies (ICT) are a set of technological tools and resources that are used to transmit, store, create, share or exchange information. The use of ICT is reducing the dependence on environmental resources to reduce environmental pollution caused by inappropriate use of natural resources. ICT has both positive and negative effects on the environment. Whereas ICT tools are used to improve energy efficiency, resulting in reduced CO₂ emissions and environmental pollution. The creation and use of ICT tools is rapidly changing human lives. The impact of pollution on the environment and the improvement in the quality level of safety systems and the applications of ICT systems in environmental protection have been presented in this paper.

Indexed Terms- Information and Communication Technologies (ICT), Environmental Protection, Natural Resources.

I. INTRODUCTION

Information and Communication Technology (ICT) is a word with a special meaning in itself which opens the door to development in various fields including environmental sustainability. The world blossoms just by imagining ICT. ICTs offer strong Management tools for quick and user-friendly coordination between and within institutions, countries in different sectors of the economy. In these days, new experiments are creating many dimensions of development, innovation process, technological modernization and increase in

consumption are continuously visible. Thousands of electronic parts and devices are being manufactured every day due to which Our life is becoming easier. We are moving towards a better life while living in the era of new versions, new models and new technology. ICT generally works without worrying about social consequences. Although such actions there is a disproportionate increase in technological waste, which points towards an environmental conflict in the times to come. Today we are living in an era where it is not only impossible but very difficult to imagine a world without Information and Communication Technology (ICT). Technology is becoming increasingly widespread. The use of ICT has transformed people's lives and continues to drive economic growth. The contribution of ICT to greenhouse-gas (GHG) emissions is increasing. However, ICT is also considered most important especially for reducing GHG emissions which include Industries are major emitters. Industries include energy production, waste disposal, building construction and transportation, etc. Information and Communication Technology (ICT) has become fundamentally established in all areas of our society today, including in the wake of natural disasters protecting, caring for and improving the environment, etc.

II. OBJECTIVES OF THE STUDY

- To facilitate environmental research and its application to law makers and the general public through the use of information and communication technologies.
- To create awareness about the use of ICT to reduce environmental pollution caused by inappropriate use of natural resources.

- To encourage and keep the environment clean and green for present and future generations.
- To make the surrounding people aware about the rapidly depleting natural resources and to motivate them to contribute to its conservation.
- To provide basic knowledge about the environment and its related problems and to solve the problem.
- To create awareness among people about environmental problems. To develop an attitude of concern towards environmental protection.
- To encourage the use of ICT tools and services in everyday life, including measures to reduce greenhouse gas emissions.
- To promote the development of methods and indicators to measure and monitor environmental impacts.

III. THE CHALLENGES OF ENVIRONMENTAL PROTECTION

Electronic waste is a major environmental issue, as it can contain toxic substances, such as lead, cadmium, and mercury, which can pollute the environment and harm human health. In addition, e-waste can contribute to climate change as it releases greenhouse gases during the disposal process. The empirical findings unfold that ICT, when measured in mobile phones, consumption of energy, and economic growth significantly help to increase the level of environmental degradation. In contrast, ICT proxied as measured in internet access and financial development helps to mitigate CO₂ emissions. Environmental pollution and our survival are among the biggest challenges of future as pollution and contamination of natural resources are adversely affecting global livelihood.

IV. HOW ICT CAN HELP TO SOLVE THE ENVIRONMENTAL CHALLENGES

ICTs can create jobs via the leap frog effect (e.g., mobile computing), thus providing income and creating purchasing power for food hence, eradicate extreme poverty and hunger. ICTs can enable distance and online learning via the Internet and mobile devices. Distance and online learning technologies can reduce the need for brick and mortar buildings as well

as the need for transportation in delivering education. ICTs can promote e-democracy as well create economic opportunities via broad band, micro financing and crowd sourcing, and mobile computing and devices (e.g., mobile currency to enable banking). On different health dimensions, such as reducing infant mortality, improving maternal health, and combating HIV/AIDS, malaria, and other diseases, ICTs can play a critical role via e-health, m-health, telemedicine, and other applications that promote education, communication and dissemination, and delivery of public health, ICTs can improve transportation via the use of smart meters to monitor traffic (resulting in congestion pricing) and make energy delivery and consumption more efficient with the use of smart thermostats. Tele- and video-conferencing can reduce travel needs, leading to reduced carbon emissions for the environment.

V. APPLICATION OF ICT IN ENVIRONMENTAL PROTECTION

Information and communication technologies for environmental sustainability (ICT Ensure) is a general term referring to the application of information and communication technologies (ICTs) within the field of environmental sustainability.[1] Information and communication technologies are acting as integrating and enabling technologies for the economy and they profoundly affect our society. Recent changes in ICT use globally have damaged the environment (in terms of waste and energy consumption etc.) but also have the potential to support environmental sustainability. More and more application areas are becoming relevant to sustainable development in industry, health care, agriculture and the information society, and they affect the perspectives of ICT, the environment, policy and science. More and more interest has been emerged as well to risk and disaster management, adaptation to climate change and resource use.

- **ICT in Energy Consumption/Efficiency-** Information and communication technologies play an important role in the efficient management of renewable and sustainable energy. ICT integration enables real-time monitoring, automated control and data analysis and helps in improving energy efficiency and reducing costs. Over the past decade energy efficiency across the ICT sector has improved, but demand for ICT has increased.

- ICT in Climate Change- ICTs help to monitor and analyze short- and long-term climate trends, raise awareness, help protect the environment and reduce carbon emissions.
- ICT and Sustainable Use of Natural Resources- maintaining the long-term use of resources while maximizing social benefits and minimizing environmental impacts.
- ICT for Biodiversity- ICTs directly impact the environment, biodiversity, loss resulting from raw material extraction, increased production, contaminating disposal of end-of-life ICT equipment, and land occupation.
- Eco-industrial Applications and ICT for Industrial Ecology- ICTs are enablers for economic growth because of their crosscutting nature thus affecting all sectors.
- ICT in Agriculture- Utilizing GPS and GIS technologies, precision farming allows farmers to monitor their fields closely, ensuring optimal utilization of resources and maximizing yield.
- ICT for Landscape Ecology- Landscape ecology is the science of studying and improving relationships between ecological processes in the environment and particular ecosystems.
- Personal Information Systems and Quality of Life- Information systems are collections of multiple information resources to gather, process, store, and disseminate information. Tools such as laptops, databases, networks, and smart phones are examples of information systems.
- ICT for Sustainable Urban Development- As society depends more and more on ICT for many of its activities, there is a need to make ICT infrastructure an essential component of urban planning and development.
- ICT in Health Care-ICT provides following benefits in the field of healthcare: Computers and ICT technologies are making healthcare for all patients more efficient and accurate.
- ICT for Environmental Risk Management- ICTs are widely employed for environment and climate monitoring including weather forecasting, and are crucial in early-warning and disaster relief communications.

CONCLUSION

ICTs underpin economic, social and environmental development due to their crosscutting nature and impact all sectors. Making the environment sustainable means using ICT to reduce the environmental burden caused by humans. Issues of environmental sustainability are now more urgent than ever as the world faces extraordinary challenges such as air and water pollution, food insecurity, climate change, natural disasters, rise of slums, inadequate sanitation, unprecedented loss of forests and biodiversity. Used to be, fragmented leadership, conflict and complex emergencies at local, national and international levels, and glaring disparities in human development around the world. Therefore, tools and strategies that enable environmental sustainability have become critical to development. Information Communication Technology (ICT) is a tool that is helping in employment generation, simplifying distance and online education through the Internet and mobile devices, e-democracy as well as broadband, micro financing and crowd funding. Economic opportunities are being created through sourcing. Through e-health, m-health, telemedicine and other applications that enhance education, communication and dissemination and delivery of public health. ICT traffic monitoring is resulting in improvements in transportation through the use of smart meters to reduce congestion and create energy. Video-conferencing is reducing the need for travel, thereby reducing carbon emissions for the environment.

FUTURE PLANS

- Citizens working in ICT should support the efforts of society and international organizations for environmental sustainability.
- Innovation, research and development in the use of ICT for environmental sustainability the path of should be developed.
- It should be ensured that every ministry/department develops and manages and implements a computerized information system.
- It should also be ensured that every government ministry and parastatal should have an updated informative and interactive website.

- Create an e-Government Agency to coordinate and rationalize efforts by government entities working on ICTs.
- The government should pay more attention to founding of ICT, so that it can be of greater help tools in monitoring security system

REFERENCES

- [1] Chatti, W. Moving towards environmental sustainability: Information and communication technology (ICT), freight transport, and CO2 emissions. *Heliyon* 2021, 7, e08190.
- [2] Asongu, S.A.; Le Roux, S.; Biekpe, N. Enhancing ICT for environmental sustainability in sub-Saharan Africa. *Technol. Forecast. Soc. Chang.* 2018, 127, 209–216.
- [3] Santarius, T.; Pohl, J.; Lange, S. Digitalization and the Decoupling Debate: Can ICT Help to Reduce Environmental Impacts While the Economy Keeps Growing? *Sustainability* 2020, 12, 7496.
- [4] Lasme, M.N.; Moinul, I.; Makoto, K. ICT and environmental sustainability: Any differences in developing countries? *J. Clean. Prod.* 2021, 297, 126642
- [5] Higón, D.A.; Gholami, R.; Shirazi, F. ICT and environmental sustainability: A global perspective. *Telemat. Inform.* 2017, 34, 85–95.
- [6] Alataş, S. (2021). Information and communication technologies role in environmental sustainability: Evidence from an extensive panel data analysis. *Journal of Environmental Management*, 293, 112889. <https://doi.org/10.1016/j.jenvman.2021.112889>
- [7] Altinoz, B., Vasbieva, D., & Kalugina, O. (2020). The effect of information and communication technologies and total factor productivity on CO2 emissions in top 10 emerging market economies. *Environmental Science and Pollution Research*, 28(45), 63784–63793. <https://doi.org/10.1007/s11356-020-11630-1>
- [8] Danish, Zhang, J., Wang, B., & Latif, Z. (2019). Towards cross-regional sustainable development: The nexus between information and communication technology, energy consumption, and CO 2 emissions. *Sustainable Development*, 27(5), 990–1000. <https://doi.org/10.1002/sd.2000>
- [9] Mirza, F. M., Ansar, S., Ullah, K., & Maqsood, F. (2019). The impact of information and communication technologies, CO2 emissions, and energy consumption on inclusive development in developing countries. *Environmental Science and Pollution Research*, 27(3), 3143–3155. <https://doi.org/10.1007/s11356-019-07131-5>
- [10] Erdmann, L. (2008). The future impact of ICTs on environmental sustainability, OECD-NITA Workshop on ICTs and Environmental Challenges, Copenhagen.
- [11] Wu, S., and Raghupathi, W. 2012: A panel analysis of the strategic association between information and communication technology and public health delivery. *Journal of Medical Internet Research*, 14(5): e147, <http://www.jmir.org/2012/5/e147/>(accessed May 20, 2013).