

PEDAGOGICAL SCIENCES

SUSTAINABLE DEVELOPMENT: THE CASE OF BIG DATA

Dziatkovskii A.

*Ph.D. in Education (Information Technologies)
CEO of PLATINUM VC & Incubator Australia
(AI; ML; Zk proofs; Blockchains based on C++/
Move / Rust / Solidity)*

Abstract

The impact of information and communication technologies on sustainable development is discussed. Possible effects of artificial intelligence on the achievement of the Sustainable Development Goals are given. The conclusion is made about the need to have a discussion about the pros and cons of digitalization of the process of countries' transition to sustainable development, its ethical principles.

Keywords: sustainable development, digitalization, artificial intelligence, blockchain, zero-knowledge proof.

Berlin Declaration on Education for Sustainable Development ("Learn for our planet: act for sustainability") (2021) as well as the Roadmap for Education for Sustainable Development (2021) consider the role of digitalization of the modern world in the context of the Sustainable Development Goals [12]. The role of artificial intelligence in achieving the UN Sustainable Development Goals in relation to new engineering and technological solutions is justified. ICT can contribute greatly to solving the problems faced by society in the 21st century, which have three dimensions of sustainability: economic (including technological development), social (including social development and equality), and environment (including its quality and resources) [11].

Each dimension of sustainability is about collecting, analyzing, and using large amounts of data for a variety of purposes [1]. These are fighting poverty; solving food problems; resource allocation; identifying and managing health risks; predicting and preventing epidemics; creating reliable and transparent systems in health care; preventing corruption; using data from social networks to develop social services; promoting sustainable agriculture; providing accessible education for all; developing quality data systems; ethics and transparency in data collection, use and dissemination, etc. [7]

AI applications are evolving rapidly, determining the speed of the fourth industrial revolution, which determines the temporal characteristics of the development of ways to achieve the SDGs.

The development of sustainable development strategies requires huge amounts of data, their processing, evaluation and accurate forecasts. And here one cannot do without the capabilities of artificial intelligence, blockchain, and zero-disclosure proof.

These technologies are powerful tools for transforming the world. Because of the power of these tools, there is a perceived need for countries to negotiate global digital cooperation, to create reliable, secure artificial intelligence that works for the good of humanity. The ethics of using AI are the focus of the 2019 and 2021 UNESCO reports. The UNESCO report (2019) proposes assessing the development of AI using

ROAM (Human Rights, Openness, Accessibility, Multistakeholder participation) indicators in key categories: human rights, openness, accessibility, and multistakeholder participation. The development of AI includes: freedom of speech, access to information, privacy protection, digital media, information literacy, the gap between countries in the development of AI. According to experts, one of the key recommendations of UNESCO is the use of indicators at the national level for research, to assess and improve the environment in which artificial intelligence is developed and used [14].

This means that artificial intelligence (AI) is no longer so much the future as it is the present. The AI industry is projected to be worth \$22.6 billion by 2025.

Artificial intelligence is the ability of machines or computer programs to learn, think and reason like the human brain. The positive qualities of AI include their impartiality and independence. However, one should not rely on digitalization alone to solve all the problems of SD: new technologies, while solving urgent problems, give rise to new ones. The disadvantages of AI include the same qualities: impartiality and independence. Artificial intelligence has no responsibility, no empathy, and no understanding of ethics.

Studies of the fields of application of AI in the implementation of the SDGs have shown that AI can contribute to 134 tasks out of 169 on all objectives (their contribution is estimated at 70% or higher).

The greatest amount of evidence for the positive impact of AI is on SDGs 1,4,6,7, 9,11, 14 [3; 5; 6]. However, a negative impact is also possible, for example, on SDGs 4, 7, 10.

It has been confirmed that AI can act as a factor contributing to the achievement of each of the SDGs ("Society", "Economy" and "Environment"); its contribution is estimated at 82%, 70% and 85%, respectively). Such AI capabilities are associated with the analysis of interconnected large databases to develop joint actions aimed at preserving the environment, understanding climate change, and modeling its possible consequences [8, 9, 13].

AI contributes to maintaining low-carbon energy systems, renewable energy sources (SDGs 13,36,37). AI helps preserve ecosystems (prevent and reduce marine pollution). It can automatically detect possible oil

spills. Neural networks can be used to improve satellite imagery to combat desertification and restore degraded soils. AI can collect information from large areas for environmental planning in a short time.

Thus, AI is a potential means to achieve many of the SDG goals and indicators.

At the same time, the application of AI technologies requires large amounts of energy (especially the use of blockchain technology) [10]. The possible consequences of AI failures are great. Therefore, it is relevant to study the safety and ethics of AI use, to find out the causes of AI system failures. In addition, the development of AI technology in developed countries may increase inequality between countries, which is contrary to the overall goal of the SDGs, since the transfer of AI projects to countries with low levels of technology development remains problematic. The tremendous benefits of AI could go to those who are already well off and displace jobs, causing people in other countries to deteriorate. Therefore, developing a paradigm for the use of AI in today's world is relevant. Overall, AI can impede 59 tasks, respectively, for the "Economy" sphere - 30%, "Society" - 36%, "Environment" - 33% [2; 4].

Legislation regarding transparency and accountability of AI should be developed, and ethical standards to which AI-based technologies should be subjected should be defined.

Conclusions

The development of intelligent computing tools can help achieve the Sustainable Development Goals (SDGs) through the use of vast amounts of complex data and rapid responses to problems.

Overall, the development of ICT expands the scope of society, security in the short and long term, increases global productivity, and creates conditions for controlling natural and environmental threats, stability in social life, and inclusiveness in a broad sense. However, the rapid development of digitalization of all spheres of society must be supported by the necessary regulations and oversight of digital technology to ensure sustainable development.

References

1. Acemoglu, D. & Restrepo, P. Artificial Intelligence, Automation, and Work. NBER Working Paper

No. 24196 (National Bureau of Economic Research, 2018).

2. Bissio, R. Vector of hope, source of fear. *Spotlight Sustain. Dev.* 77–86 (2018).

3. Fuso Nerini, F. et al. Connecting climate action with other Sustainable Development Goals. *Nat. Sustain.* 1, 674–680 (2019).
<https://doi.org/10.1038/s41893-019-0334-y>

4. Helbing, D. & Pournaras, E. Society: build digital democracy. *Nature* 527, 33–34 (2015).

5. International Energy Agency. *Digitalization & Energy* (International Energy Agency, 2017).

6. Jean, N. et al. Combining satellite imagery and machine learning to predict poverty. *Science* (80-) 353, 790–794 (2016).

7. Kazi, Mohammad Abrar Faisal. Artificial Intelligence for Sustainable Development Goal. A systematic literature review - (PDF) A SYSTEMATIC LITERATURE REVIEW - Artificial Intelligence for Sustainable Development Goal (researchgate.net)

8. Kwok, R. AI empowers conservation biology. *Nature* 567, 133–134 (2019).

9. Norouzzadeh, M. S. et al. Automatically identifying, counting, and describing wild animals in camera-trap images with deep learning. *Proc. Natl Acad. Sci. USA* 115, E5716–E5725 (2018).

10. Truby, J. Decarbonizing Bitcoin: law and policy choices for reducing the energy consumption of Blockchain technologies and digital currencies. *Energy Res. Soc. Sci.* 44, 399–410 (2018).

11. UNESCO General Assembly (UNGA). A/RES/70/1 Transforming our world: the 2030 Agenda for Sustainable Development. Resolut. 25, 1–35 (2015).

12. UNESCO. Steering AI and Advanced ICTs for Knowledge Societies. A Rights, Openness, Access, and Multi-stakeholder Perspective. 372132eng.pdf (unesco.de)

13. United Nations Economic and Social Council. Sustainable Development (United Nations Economic and Social Council, 2019).

14. Vinuesa, R., Azizpour, H., Leite, I. et al. The role of artificial intelligence in achieving the Sustainable Development Goals. *Nat Commun* 11, 233 (2020).
<https://doi.org/10.1038/s41467-019-14108-y>