CHAPTER 11

Economic Perspectives on the Relationship between Artificial Intelligence and Climate Change

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ABSTRACT

AI has gained significant influence in shaping economic systems, environmental governance, and policies on climate changes in developed and developing countries. The present research paper will discuss the economic aspects of the impact of AI in relation to climate change, exploring the contradictory influence of AI on the environment due to its ability to increase environmental sustainability and at the same time promote the growth of energy consumption for running digital infrastructures and performing computational operations. The research is carried out using a qualitative approach to research based on secondary data obtained from various reports, policy documents, and scientific literature on the topics of environmental economics, governance, and digital transformation. The research concludes that AI produces a double externality, as it helps reduce greenhouse gas emissions through optimization, forecasting, and effective resource allocation, but also adds to environmental stress as a result of the rising need for electricity in data centers and AI systems.

Introduction

Global warming and digital transformation represent two of the most powerful forces that currently affect modern societies, economic systems, and governance structures. The connection between AI and global warming becomes especially important for today's society due to the role played by modern information technologies in managing the processes involving energy resources usage, environmental management, production, transport, and even public policy development. Thus, global warming is one of the most difficult problems faced by modern societies, to solve which a completely new set of policies will be required going beyond traditional economic policy making methods and involving governmental institutions in particular. Moreover, modern democratic governance, which relies on representation, accountability, and active participation of citizens, plays a crucial role in how societies are expected to address environmental issues, problems related to resource scarcity and economic development. In a democratic society, a legitimate process is as important as its effectiveness and ability to account for the citizens' needs and priorities under conditions of global coordination challenges. As the effects of climate change increase, manifesting in increased global warming, frequent occurrence of adverse weather conditions, and increasing tensions in the ecosystem, democratic nations are faced with two conflicting tasks of maintaining stability in the economy and undergoing extreme environmental change[1]. The dilemma has resulted in an increased importance of innovation using technology and artificial intelligence (AI) as a way of addressing the conflict of maintaining a sustainable environment and economic development through democracy. Within an incredibly brief period, artificial intelligence (AI) has quickly progressed from a mysterious concept into an indispensable part of the present-day economy, impacting areas such as production, markets, and policies. It has been made possible due to the ability of AI to analyze huge amounts of data, forecast upcoming trends, and facilitate the automation of complicated decisions in order to eliminate inefficiencies that have a direct impact on the environment. Artificial intelligence applications within the energy, transport, and agriculture industries help achieve better demand forecasts, effective resource use, and

[1] United Nations. 2024. "Governing AI for Humanity: Final Report." UN. https://www.un.org/sites/un2.un.org/files/governing_ai_for_humanity_final_report_en.pdf

minimal waste, thus alleviating the costs of carbon emission reduction[2].

In terms of environmental economics, these developments indicate that AI is the type of productivity-enhancing technology whose economic benefits are consistent with sustainability objectives. On the other hand, the incorporation of AI into governance systems implies new issues for democracies, requiring regulatory adjustments that should be made with regard for preserving accountability and maximizing efficiency. A closer look at the relation between AI and climate change reveals that efficiency cannot be considered its only effect. The emergence of digital infrastructure gives rise to new forms of environmental pressure and challenges the applicability of economic explanations of climate change. In particular, an increasing rate of development of such technologies as data centers, cloud computing systems, and super computing technologies has caused a considerable growth in electricity demand, which poses questions about the potential carbon footprint of AI implementation[3]. Such an interaction creates a tension in which attempts to employ technological solutions to reduce the level of greenhouse gas emissions actually increase energy consumption, specifically in those economies where electricity production continues to generate carbon dioxide. Traditional approaches of environmental economics modeling often overlook such a relationship since conventional models perceive technological progress as beneficial with respect to both energy and emissions. On the other hand, modern research suggests that AI has the properties of a two-sided externality that influences the environment in a mixed manner, thus requiring a flexible approach to addressing this challenge. Such consideration is especially important for democratic societies.

However, the aforementioned issues are intensified in view of the different stages of economic development that may be considered when looking at this problem. This points out the inequality in how the benefits and costs of using AI technology are distributed. Economically more developed countries with the necessary institutional capacity, resources, and infrastructure have been able to adopt AI technology into their

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[2] IEA. 2023. "Electricity Market Report 2023." IEA. https://www.iea.org/reports/electricity-market-report-2023.

[3] OECD. 2022. "Measuring the environmental impacts of artificial intelligence compute and applications: The AI footprint." OECD Digital Economy Papers, No. 341, OECD Publishing, Paris, https://doi.org/10.1787/7babf571-en.