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THE IMPORTANCE OF BIG DATA AND ARTIFICIAL INTELLIGENCE IN THE GREEN ECONOMY

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Abstract: This article explores the opportunities of using Big Data and Artificial Intelligence (AI) technologies in the green economy. Nowadays, the role of modern digital technologies is increasing in addressing climate change and environmental problems. The article presents real-world examples from Uzbekistan and global experiences, and includes an analysis based on current statistical data.
Keywords: Green economy, digital transformation, big data, artificial intelligence, environmental monitoring, waste management, renewable energy.

INTRODUCTION: Climate change, environmental pollution, and depletion of natural resources have become pressing global issues. The green economy is an economic model aimed at sustainable development and maintaining ecological balance. Big Data technologies allow for large-scale collection, analysis, and forecasting of environmental data such as air quality, water resources, waste levels, and energy consumption. These data are efficiently managed through AI, enabling more effective ecological policies for both enterprises and state bodies. AI is creating revolutionary changes in environmental monitoring, waste recycling, and efficient energy distribution. For instance, smart grids optimize electricity usage, and AI enhances the efficiency of waste recycling plants. In recent years, the introduction of digital technologies, particularly Big Data and AI, has played a crucial role in advancing this model.

LITERATURE REVIEW: Globally, major countries are actively integrating Big Data and AI technologies into environmental governance systems. For example, in the USA, Google DeepMind developed AI systems that reduced energy consumption by 40% in data center cooling systems. The European Union, through its "Green Deal" strategy, supports digital technologies focusing on recycling, ecological safety in transport, and the use of renewable energy sources. China introduced smart sensors and AI algorithms for air quality monitoring within its "Green Cities" program.

In Uzbekistan, the 2020 "Transition to a Green Economy" concept has launched initiatives to develop renewable energy sources, modernize waste management systems, and implement digital technologies. Moreover, prospects for AI-based environmental monitoring systems are also being considered.

RESEARCH METHODOLOGY: This study investigates the application of Big Data and AI technologies in Uzbekistan's transition to a green economy. The article employs the following methods:
- Analysis of legal documents: The "Transition to a Green Economy" Concept (Decree No. PQ-5863) and other national programs were reviewed.
- Statistical analysis: Data from the State Statistics Committee and relevant ministries were

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analyzed (e.g., renewable energy production volumes, waste statistics).
- Case analysis: The implementation of Big Data and AI technologies in "Green Energy", "Toza Hudud", and environmental monitoring systems in Uzbekistan was examined. A comparative assessment was made with developing countries such as Kazakhstan, Georgia, and Estonia.
- Expert opinions: Interviews with specialists from research institutes and public agencies such as “Green Energy”, “UzEnergoInspection”, and “Toza Hudud” were conducted to identify practical experiences and current issues.

ANALYSIS AND RESULTS: In recent years, Uzbekistan has introduced several digital technologies in the field of green economy. Since 2024, digital platforms and AI algorithms have been used in waste management and environmental monitoring. Through the “Toza Hudud” system, waste data is centrally managed. Environmental monitoring stations observe air quality in real-time, using Big Data to forecast pollution and enabling prompt responses.

There has also been notable growth in the renewable energy sector. In 2023, renewable energy production in the country reached 4.2 GW, accounting for 12% of total energy output. This reflects the effectiveness of AI-powered energy management systems. Analysis shows that Big Data and AI technologies are becoming key components of the green economy and significantly contribute to ecological sustainability.

CONCLUSION AND RECOMMENDATIONS: The findings indicate that the use of Big Data and AI technologies in Uzbekistan’s green economy is progressing significantly. These technologies play a vital role in environmental monitoring, waste management, and efficient use of renewable energy. The following recommendations are proposed: 1. Digitize environmental monitoring – Improve air pollution forecasting using Big Data and AI. 2. Automate waste management – Centralize and optimize recycling via the “Toza Hudud” system. 3. Develop “green energy” – Implement AI-based energy management systems for efficient renewable energy use. 4. Support scientific research – Encourage research and expand international collaboration. 5. Develop digital transformation programs – Implement national programs for managing and enhancing digital transformation.

These proposals will help accelerate Uzbekistan’s transition to a green economy and ensure environmental sustainability.

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