O'zbekistonda yashil iqtisodiyotga o'tish va ESG tamoyillarini joriy etish mamlakatning barqaror rivojlanishi uchun muhim qadam hisoblanadi. Aksiyadorlik jamiyatlari va mas'uliyati cheklangan jamiyatlarning ushbu tamoyillarga rioya qilishi nafaqat ularning o'z faoliyatini yaxshilash, balki mamlakat iqtisodiyotining yashil yo'nalishga o'tishiga ham katta hissa qo'shadi. Yashil iqtisodiyotga o'tish jarayoni uzoq muddatli va murakkab bo'lsa-da, u O'zbekistonning kelajagi uchun muhim imkoniyatlar yaratadi.

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ARTIFICIAL INTELLIGENCE AND GREEN ECONOMY MANAGEMENT IN UZBEKISTAN: CHALLENGES AND FUTURE PROSPECTS

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Abstract: *This article explores the integration of Artificial Intelligence (AI) into Uzbekistan's green economy management, focusing on its potential to enhance sustainability and resource efficiency. As Uzbekistan transition towards a green economy, AI-driven solutions can play a transformative role in optimizing energy consumption, waste management, and agricultural efficiency. However, challenges such as limited AI infrastructure, regulatory gaps, and*

financial constraints hinder widespread adoption. This research examines the current state of AI in Uzbekistan's green economy, identifies key barriers, and provides future recommendations.

Keywords: *Artificial Intelligence, green economy, sustainable development, Uzbekistan, digital transformation, environmental management, waste management.*

Introduction

Global climate change, resource depletion, and environmental degradation have made green economy management a top priority for sustainable development. Uzbekistan, as part of its commitment to carbon neutrality by 2050, has introduced policies to transition towards renewable energy, eco-friendly industries, and efficient resource utilization [1]. However, traditional economic management models struggle to address complex environmental issues effectively.

Artificial Intelligence (AI) is a game-changer in sustainability efforts, offering real-time data analysis, predictive modeling, and automation. Countries like China, Germany, and the USA have successfully integrated AI into green economy management, particularly in smart energy grids, climate monitoring, and waste management [2]. Uzbekistan is at an early stage of Ai adoption in sustainability, making this research crucial for future policy and technological advancements.

Despite Uzbekistan's green economy initiatives, several barriers hinder AI integration:

1. Limited AI adoption - AI applications in environmental sustainability, agriculture, and waste management remain underdeveloped;
2. Technological and Infrastructure Gaps - Lack of advanced computing power, data centers, and AI research facilities slows implementation;
3. Regulatory Uncertainty - Absence of clear policies and legal frameworks for AI-driven environmental governance;
4. High costs and investment barriers - AI deployment in renewable energy and smart agriculture requires substantial capital investment;
5. Skill shortages - Uzbekistan lacks AI specialists trained in environmental sustainability applications.

This research aims to analyze the role of AI in green economic management within Uzbekistan. To achieve this goal we set objectives of our study. They:

- Assess existing challenges limiting AI-driven sustainability initiatives;

- Identify international best practices in AI for green economy transformation;
- Propose AI-based solutions to enhance energy efficiency, waste management, and environmental monitoring;
- Recommend policy reforms and investment strategies for AI adoption.

Literature review. The concept of a green economy in Uzbekistan has been extensively discussed in recent literature. According to a study published in the International Journal of Artificial Intelligence, the transition to a green economy in Uzbekistan necessitates the adoption of renewable energy sources and measures to combat ecological crises [3]. Uzbekistan's Green Economy Strategy (2019-2030) aims to reduce carbon dioxide (CO2) emissions by 10%, increase renewable energy capacity, and improve resource efficiency [4]. However, experts argue that without AI-driven automation, Uzbekistan's green transition will be slower and less efficient [5].

AI has been widely adopted in global green economy models, particularly in:

- Smart energy management - AI-driven grids optimize electricity consumption, reducing energy waste;
- Climate change monitoring - AI-based satellite systems track deforestation, air pollution, and water levels;
- Sustainable agriculture - AI-powered precision farming improves crop yields while reducing water use [6].

In Uzbekistan, AI adoption in sustainability is at an early stage. The Navoi solar Plant integrates AI algorithms for energy efficiency, while Tashkent's waste management system tests AI-based sorting for recycling improvement [7]. However, AI-driven environmental policy frameworks remain underdeveloped.

Methodology. This study employs a qualitative research approach, analysis and synthesis, induction and deduction. SWOT analysis.

Analysis and results. In 2023, Karimov conducted a pivotal study focusing on the application of AI technologies within Uzbekistan's energy sector. This research primarily addressed the challenges of energy distribution and consumption in the context of the country's green economy initiatives. AI smart grids can predict energy demand, optimize solar/wind power, and reduce grid losses. In Uzbekistan's Navoi Solar Plant, AI-based monitoring increased energy efficiency by 18%. To enhance the accuracy of energy supply and demand predictions, utilizing machine learning algorithms to analyze historical energy consumption data alongside real-time inputs. It has achieved a 25% improvement in forecasting accuracy, leading to more efficient energy distribution and reduced wastage. Moreover, to modernize the existing power grid infrastructure for better

resilience and efficiency implementing AI systems capable ob real-time monitoring and autonomous decision-making to balance loads and detect faults, reported a 20% reduction in operational costs ans a significant decrease in power outages [7]. Karimov's study underscores the transformative potential of AI in revolutionizing energy management practices, thereby supporting Uzbekistan's transition towards a more sustainable and efficient energy ecosystem.

Abdullayev has been instrumental in advancing the application of AI technologies to enhance agricultural productivity in Uzbekistan. AI-based agricultural data analysis to develop predictive models for improving crop yields by utilizing multiple linear regression and AI techniques to analyze agricultural data. In result, formulated models that assist in forecasting agricultural productivity, aiding in strategic planning and resource allocation. Automation in agriculture can reduce manual labor and increase operational efficiency by implementing AI-driven automation systems in various agricultural processes. Abdullayev's work emphasizes the transformative potential of AI in modernizing Uzbekistan's agriculture, focusing on data-driven decision-making and automation to boost productivity.

AI-based waste sorting and recycling systems are widely used in developed countries to enhance the efficiency of waste management. In Uzbekistan, AI-driven waste classification technologies could significantly improve recycling efforts by identifying reusable materials and reducing landfill waste. A study emphasizes the potential of digital technologies to transform waste recycling in Uzbekistan. The authors propose the development of automated control systems that utilize AI to create valuable products from waste, fostering innovative projects within the digital economy [8].

Agriculture is one of the key economic sectors in Uzbekistan, and efficient water resource management is crucial for sustainable development. AI-powered smart irrigation systems can analyze soil moisture levels, predict weather changes, and optimize water use, reducing wastage. Research indicates that integrating AI technologies, such as machine learning and predictive analytics, can significantly enhance water conservation efforts. These systems enable precise irrigation practices, ensuring that crops receive the optimal amount of water, thus improving yields and conserving water resources [9]. The implementation of AI in these sectors aligns with Uzbekistan's strategic goals of embracing digital innovation to promote sustainable development. By investing in AI-driven solutions, Uzbekistan can address critical challenges in waste management and agriculture, paving the way for a more sustainable and efficient future.

Table 1

The SWOT analysis of integrating AI into Uzbekistan's green economy management

Strengths	**Weaknesses**
1. Government commitment to digitalization and sustainability; 2. Growing investments in AI and Smart technologies; 3. Potential for AI-driven efficiency improvement; 4. Rising awareness and academic research in AI and sustainability.	1. Limited AI infrastructure and digitalization; 2. Shortage of skilled AI professionals; 3. Regulatory and policy gaps; 4. High costs of AI implementation.
Opportunities	**Threats**
1. AI-driven innovations in renewable energy and circular economy; 2. International cooperation and investments; 3. Advancements in AI research and local startups; 4. Public and private sector collaboration.	1. Global AI regulations and ethical concerns; 2. Economic and political risks 3. Cybersecurity and data privacy issues; 4. Resistance to AI adoption in traditional sectors.

This SWOT analysis highlights the strong potential of AI in Uzbekistan's green economy, provided that weaknesses and threats are addressed. To accelerate AI adoption in sustainable development, Uzbekistan should: Invest in AI infrastructure and workforce development by creating AI-focused academic programs and training centers. Enhance regulatory frameworks to support AI-driven environmental monitoring, energy optimization, and waste management.Foster AI research and innovation through incentives for AI startups in the sustainability sector. By overcoming existing challenges, Uzbekistan can successfully integrate AI into its green economy management, achieving long-term economic, environmental, and technological sustainability.

Discussion. The integration of AI into Uzbekistan's green economy management holds significant promise for achieving sustainable development goals. AI's potential to enhance efficiency, reduce environmental impact, and promote economic growth aligns with the nation's strategic objectives. However, addressing the identified challenges is crucial. Strengthening technological

infrastructure requires substantial investments and policy reforms to enhance encourage innovation and attract private sector participation. Developing a skilled workforce necessitates educational reforms, including the introduction of specialized AI programs and collaboration with international academic institutions. Financial constraints can be mitigated through public-private partnerships and international funding mechanisms aimed at supporting green technologies.

Conclusion. Integrating AI into Uzbekistan's green economy management presents a viable pathway to sustainable development. While challenges such as technological limitations, workforce shortages, and financial constraints exist, strategic initiatives focusing on policy support, international collaboration, and educational reforms can address these issues. By leveraging AI's capabilities, Uzbekistan can enhance its environmental sustainability, economic resilience, and position itself as a regional leader in green innovation.

After analysing all related to this research theme, we find some challenges and to leverage them we can give some recommendations.

Firstly, enhancing technological infrastructure: Invest in upgrading digital infrastructure to support AI applications, including expanding internet connectivity and establishing data centers.

Secondly, developing human capital: Implement educational programs focused on AI and green technologies to cultivate a skilled workforce capable of driving sustainable initiatives.

Thirdly, promote research and development: Encourage innovation by funding research projects that explore AI applications in environmental management and sustainable practices.

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CHARCTERISTICS OF THE CURRENT RECLAMATION STATE OF SOILS IN IRRIGATED MEADOW-PASTURE LANDS (A case study of the Besharyk district)

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Abstract: *This article presents the results of scientific research conducted on the soils of irrigated meadows in the Fergana region. The study examines natural and anthropogenic factors that provoke negative processes occurring in the region. It determines the depth, mineralization, and qualitative composition of groundwater, as well as the total and toxic salt reserves in genetic and various soil layers. Based on these findings, the current reclamation state of the soils is assessed, and objective evaluations are conducted to develop measures and recommendations for their improvement. Additionally, the processes of salinization and desalinization that may occur in the future are analyzed to predict reclamation and environmental changes.*