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ARTIFICIAL INTELLIGENCE-BASED DIGITAL ECONOMY: SUSTAINABLE DEVELOPMENT MODELS FOR UZBEKISTAN

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Abstract. This article examines artificial intelligence (AI) as the core driver of a sustainable digital economy in Uzbekistan. Grounded in the "Digital Uzbekistan — 2030" Strategy, the National AI Strategy 2030, and UNDP empirical research, it analyses Uzbekistan's ICT landscape, AI readiness, and MSME adoption barriers. A three-pillar sustainable development model — economic, social, and environmental — is proposed and evaluated. The study concludes with targeted policy recommendations for regulators, academia, and private sector actors.

Keywords: artificial intelligence, digital economy, sustainable development, Uzbekistan, Digital Uzbekistan 2030, e-government, MSMEs, green technology

Annotatsiya. Ushbu maqola sun'iy intellekt (SI) O'zbekiston uchun barqaror raqamli iqtisodiyotni shakllantirishning asosiy harakatlantiruvchi kuchi sifatida o'rganadi. "Raqamli O'zbekiston — 2030" strategiyasi va BMTTD tadqiqotlariga asoslanib, uch ustunli barqaror rivojlanish modeli taklif etiladi: iqtisodiy, ijtimoiy va ekologik.

Kalit so'zlar: sun'iy intellekt, raqamli iqtisodiyot, barqaror rivojlanish, O'zbekiston, AKT, yashil texnologiyalar

Аннотация. В статье рассматривается искусственный интеллект (ИИ) как ключевая движущая сила устойчивой цифровой экономики Узбекистана. На основе стратегии «Цифровой Узбекистан — 2030» и исследований ПРООН предложена трёхуровневая модель устойчивого развития: экономическая, социальная и экологическая.

Ключевые слова: искусственный интеллект, цифровая экономика, устойчивое развитие, Узбекистан, ИКТ, зелёные технологии

I. INTRODUCTION

The global diffusion of artificial intelligence (AI) is reshaping economic systems, governance structures, and development pathways at an unprecedented pace. For Uzbekistan — a landlocked, rapidly urbanising nation with a population exceeding 36 million and a growing young workforce — AI represents both a transformational opportunity and a strategic imperative. The country has embarked on an ambitious digital reform agenda anchored by the "Digital Uzbekistan — 2030" Strategy and the National AI Strategy for 2024–2030, the latter approved by Presidential Decree on October 14, 2024.

In five years, Uzbekistan's ICT sector exports grew nearly six-fold, from \$170 million to approximately \$1 billion, and the country climbed 17 positions in the





Oxford Insights Government AI Readiness Index (GAIR), securing first place in Central Asia. However, inclusive and sustainable AI-driven growth remains constrained by rural infrastructure deficits, human capital shortfalls, underdeveloped data governance frameworks, and limited private-sector access to AI finance.

This article addresses the following research question: How can Uzbekistan design and implement an AI-driven digital economy model that fulfils all three pillars of sustainable development — economic, social, and environmental? It proceeds through the IMRAD structure: Section 2 describes the methodological approach; Section 3 presents results drawn from policy and empirical sources; Section 4 discusses the proposed sustainable development model and its implications; Section 5 draws conclusions and policy recommendations.

II. METHODOLOGY

This study employs a qualitative policy analysis methodology, integrating document review, comparative benchmarking, and case-based reasoning. Primary sources include: (i) the National AI Strategy 2030 background document published by the Ministry of Digital Technologies [1]; (ii) the UNDP Digital Economy of Uzbekistan study (2025), which draws on quantitative surveys of startups and businesses and extensive institutional data [3]; (iii) the UNDP report on AI Adoption in the Private Sector in Uzbekistan (2026), built on in-depth interviews with private sector and government stakeholders [4]; (iv) official data from the Government Portal of Uzbekistan [2]; and (v) a 2024 government panel discussion on AI's economic role [5].

The comparative benchmarking dimension draws on three internationally recognised AI readiness frameworks: the Oxford Insights Government AI Readiness Index (GAIR), the UNDP Artificial Intelligence Landscape Assessment (AILA), and the Stanford HAI AI Index. These allow for a contextualised assessment of Uzbekistan's AI position within its regional peer group.

The proposed sustainable development model synthesises findings from the above sources within the three-pillar framework of the United Nations Sustainable Development Goals (SDGs) — economic, social, and environmental — and is further informed by international AI policy best practices identified in UNDP's comparative policy analysis [3: 80–90.]. The study does not rely on primary fieldwork by the authors; rather, it critically analyses and synthesises published institutional research to derive a coherent national AI-development model.

III. RESULTS

3.1 Macroeconomic and Institutional Landscape





Uzbekistan's ICT sector has demonstrated exceptional growth momentum. Between 2019 and 2024, ICT exports expanded from \$170 million to nearly \$1 billion. The total startup and venture ecosystem reached \$3.9 billion in value by 2024–2025, with domestic startups exceeding 750, 15 active venture funds, and venture capital volumes surpassing \$180 million. Internet speed rose seven-fold and mobile internet 4.5 times over the same period, while 760 government services were digitised and used by 10 million citizens in the preceding year.

The National AI Strategy 2030 allocates \$50 million for AI infrastructure, including commissioning of a modern supercomputer and the establishment of AI laboratories in 15 universities. Its goal is to create a national AI model and train one million AI specialists. The strategy is structured around five functional pillars: legal framework development; AI implementation in social and economic sectors; standards and international cooperation; technical data-processing infrastructure; and human capital development.

In international benchmarking, Uzbekistan ranks first in Central Asia in the GAIR 2024, having risen 17 positions compared to earlier assessments. In UNDP's AILA and the Stanford HAI AI Index, however, Uzbekistan's private sector AI activity and research output remain modest, highlighting a gap between government commitment and real-economy AI uptake

3.2 AI in Government: G2C and G2B Services

AI-enabled government services represent the most advanced dimension of Uzbekistan's AI deployment. The my.gov.uz portal integrates chatbots, automated document processing, and predictive analytics for public service delivery. Digitisation of railway cargo management reduced the ordering process from 7 to 3 stages and cut processing time from 72 to 12 hours. The UNDP-supported "Advancing Digital Transformation in Uzbekistan" project (2021–2023) delivered AI-enabled pilots in healthcare and linguistics, demonstrating the feasibility of AI-powered public services within existing infrastructure. Minister of Digital Technologies Sherzod Shermatov articulated the state's vision at a 2024 forum: AI should simplify citizens' lives and help anticipate societal challenges.

3.3 Private Sector AI Adoption and MSME Barriers

Despite growing AI awareness, private sector AI adoption — particularly among MSMEs — remains shallow. UNDP's 2026 study identifies four core barrier groups: (1) financial barriers, including high upfront AI investment costs and absence of AI-specific credit products; (2) infrastructural and technical barriers, notably rural connectivity gaps and limited cloud service availability; (3) human capital and skill gaps, with shortages of AI engineers, data scientists, and ethicists; and (4) data governance and regulatory barriers, including ambiguity around data sharing and algorithmic accountability.





On the demand side, surveyed businesses show growing AI familiarity and interest in customer service automation, financial management, and supply chain analytics. Fintech startups have led private-sector AI adoption, driven by access to structured digital dataset. The Cabinet of Ministers Resolution No. 617 established an AI regulatory sandbox, a constructive innovation for controlled AI experimentation that mirrors international best practices.

3.4 Human Capital and Research Output

AI-specific academic programmes have expanded steadily: the number of public and private higher education institutions offering AI-related programmes grew between 2020 and 2025, and doctoral programme numbers rose over the same period. However, AI research publications per institution per year remain limited by international comparison. Startups consistently cite access to skilled talent — particularly ML engineers and full-stack AI developers — as among their foremost growth constraints. Over 215 IT training centres have been opened nationwide, and the "One Million Uzbek Coders" programme has equipped tens of thousands of young people with foundational digital skills.

IV. DISCUSSION

4.1 A Three-Pillar AI-Driven Sustainable Development Model

The evidence reviewed supports the construction of a three-pillar sustainable development model in which AI functions as the integrating technology across economic, social, and environmental dimensions. This model extends the conceptual framework of the SDGs — specifically SDGs 8, 9, 10, and 16 — into an operationally specific national strategy for Uzbekistan.

Economic Pillar. AI accelerates GDP growth through ICT export expansion, agricultural productivity gains, and AI-enabled financial services. The National AI Strategy's target of a national AI model supports competitive regional positioning in AI-powered service exports. A four-stage startup support system — grants, tax incentives, co-financing, and export compensation — provides the commercialisation architecture for AI ventures. Global consulting estimates (McKinsey, BCG, PwC) referenced in the AI Strategy documentation project substantial productivity multipliers from AI adoption in sectors such as agriculture and manufacturing, both critical to Uzbekistan's economic base.

Social Pillar. Equitable distribution of AI's benefits requires closing the rural-urban digital divide, expanding AI literacy, and ensuring gender-inclusive participation. UNDP's findings identify limited digital literacy in rural areas and low female entrepreneurship in digital sectors as structural gaps that AI policy must explicitly address. AI-powered G2C services — personalised healthcare, automated social benefit processing, legal aid — can measurably improve service quality for underserved communities. The AI Strategy's commitment to one



million trained specialists and 15 university AI labs represents the foundational human capital investment required for this pillar.

Environmental Pillar. Uzbekistan's environmental vulnerabilities — water scarcity, land degradation, the Aral Sea legacy — create a compelling case for AI-enabled environmental governance. AI applications in precision irrigation, renewable energy grid optimisation, and smart urban planning can deliver both economic and ecological returns. The design of Uzbekistan's supercomputing infrastructure must embed energy efficiency as a core criterion, co-locating where possible with renewable energy zones, to avoid the environmental costs associated with large-scale AI compute.

4.2 Key Challenges and Policy Implications

Realising this model requires confronting the structural barriers identified in Section 3. Three challenges are most binding. First, infrastructure inequality: rural connectivity gaps must be addressed through targeted fibre-optic and mobile base station expansion, as documented in the steady growth of these indicators in the UNDP study, but the pace must accelerate. Second, data governance: a comprehensive, internationally harmonised AI governance framework — providing clear rules on algorithmic accountability, privacy, and data sharing — is prerequisite to unlocking AI adoption in both the public and private sectors. Third, finance for MSMEs: AI-specific financial instruments — vouchers, blended finance, AI adoption subsidies — are needed to bridge the investment gap for the businesses that constitute the majority of the national economy.

The AI regulatory sandbox (Resolution No. 617) is a particularly promising mechanism. International experience from Estonia, the UAE, and Singapore shows that well-designed sandboxes significantly accelerate private sector AI adoption by providing legal certainty and shared testing infrastructure. Uzbekistan should expand this sandbox with dedicated tracks for agriculture, healthcare, and environmental AI, with clear transition pathways to full regulatory compliance.

V. CONCLUSION

Uzbekistan has established credible institutional foundations for an AI-driven digital economy. The near six-fold growth in ICT exports, first-place regional ranking in the GAIR, and the adoption of a well-structured National AI Strategy 2030 with \$50 million in dedicated infrastructure investment collectively demonstrate that the country is on a viable developmental trajectory. The challenge now is to translate top-down strategic commitment into inclusive, economy-wide, and environmentally responsible outcomes.

The three-pillar model proposed in this article — integrating economic productivity, social inclusion, and environmental sustainability under AI as the enabling technology — provides a coherent framework for this transition. Its



realisation demands coordinated action across four actor groups: (i) government regulators must develop comprehensive AI governance frameworks, expand the regulatory sandbox, and invest in interoperable public data platforms; (ii) academic institutions must reform curricula, expand applied AI research, and grow international research partnerships; (iii) private sector actors and financial institutions must develop AI-specific financial products and sectoral AI consortia for MSMEs; and (iv) international development partners — particularly UNDP and bilateral donors — must sustain inclusive AI capacity-building programmes targeting women, rural communities, and youth.

Uzbekistan's 2030 ambition to lead Central Asia's digital economy is realisable. Achieving it sustainably, however, requires that technological ambition be grounded in institutional depth, equitable access, and environmental stewardship. An AI-powered economy that is also a just and green economy is both the strategic goal and the developmental responsibility of Uzbekistan's policymakers today.

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