ISSN 2181-9408

Scientific and technical journal



Sustainable Agriculture



№4(24).2024







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The journal "Sustainable Agriculture" is registered in the Press Agency of Uzbekistan on the 12th of February in 2018 (license № 0957).

In 2019, the journal is included in the list of recommended scientific publications by the Higher Attestation Commission of the Republic of Uzbekistan.

ECONOMY. ECONOMIC SCIENCE. OTHER BRANCHES OF THE ECONOMY.

Sh.A.Mirzaev, F.T.Egamberdiev
Islamic finance and digital economy: New horizons for sustainable agricultural development.....5

Z.S.Shokhojaeva, U.R.Sangirova
Modernization of agriculture in the transition to a digital economy.....9

I.O.Yunusov
Directions of state support for food supply of fish farms.....12

Sh.K.Narbaev, A.A.Akhmadaliev
Issues of technical and technological modernization of land management.....15

Sh.Mirzaev, A.Akhmedov, M.Mirmahmudov
Islamic Finance Operations for Achieving Environmental Sustainability.....18

A.M.Maksumkhanova
Ensuring employment of rural population: problems and solutions.....22

G.D.Dusmuratov
Foreign experience of public-private partnership in water management.....26

M.M.Yakhyaev
Dynamics of changes in the volume of meat production in pasture livestock farming Kashkadarya region in the example.....30

A.Suvanov
Trends and growth in agricultural production from dekhkan and subsidiary farms in Uzbekistan.....32

A.Estekov
Agribusiness and areas of its support.....34

Sh.A.Mirzaev, A.Abbosjonov
Islamic Finance: examples of key instruments and their features.....36

M.Kholikulov
Methodology for calculating the effectiveness of investments in the fruit and vegetables sector.40

D.R.Mukhtarova
Theoretical bases of organizational and economic foundations of floral production.....43

N.Makhmudova
Improvement of methods of accounting intangible assets.....47

U.A.Nurmanov
The importance of economic analysis of the impact of monetary funding on sustainable development.....49

ENVIRONMENTAL PROTECTION. WATER MANAGEMENT, HYDROLOGY.

Z.S.Bobomuradov, Z.R.Boboqulov, J.B.Fayzmurodov, J.I.Sakiboyev
The effect of different planting dates and schemes on the growth and grain yield of maize hybrids.....51

HIGHER EDUCATION. PEDAGOGY.

D.I.Mukumova, Z.I.Temirova
Impact of increased environmental anxiety on the youth of Uzbekistan.....53

D.I.Mukumova, Z.I.Temirova
The role of socio-psychological factors in the formation of the image of a modern pedagogue.....56

POWER ENGINEERING, ELECTRICAL ENGINEERING, AUTOMATICS. COMPUTING TECHNOLOGY.

A.J.Parpieva, B.N.Rakhimov, N.A.Makhmudov, K.A.Shavazov
Mathematical solution of problems of distribution of fuel products in extreme conditions...62

A.M.Plakhtiev, G.A.Gaziev, Akbarova, O.Ch.Donierov
Efficient Continuous High-Current Transducers.....66

S.Sh.Aripov
Definition and importance of natural gas in the energy sector.....69

MODERNIZATION OF AGRICULTURE IN THE TRANSITION TO A DIGITAL ECONOMY

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Abstract

As demonstrated by global experience, in addition to the boundless benefits of digital economy development, this objective process also foresees many challenges. The digital economy generally refers to any economic activity related to the production, distribution, and consumption of goods and services through digital technologies, including e-commerce, web and internet economies. In the current environment, agriculture stands on the brink of overcoming global challenges associated with the transformative processes in the economy and society as a whole.

Keywords: *digital economy, technology, e-commerce, dot-com, digital platforms, infrastructure, irrigation, drivers, transaction costs.*

Introduction. The rapid development of digital technologies leads to radical transformations not only in the economy but also in society itself. Digital technologies significantly reduce the cost of economic and social transactions for governments, companies, and individuals by reducing informational costs. These technologies drive innovation, enabling transaction costs to approach nearly zero, while drastically increasing efficiency: existing activities and services become cheaper, faster, or more convenient. Finally, digital technologies promote integration, granting people access to previously inaccessible services.

The formation and development of the digital economy has led to several issues. Primarily, access to information and the creation of more efficient technologies for its processing and application are expected to reduce transaction costs (expenses related to information search and processing) and enhance economic flexibility and efficiency. However, this may not occur if previous information-processing technologies do not phase out and if transaction costs rise due to the need for information protection, credibility assessment, and more.

The digital economy is characterized by reliance on intangible assets, widespread use of data, the universal adoption of multi-sided business models, and the complexity of determining the jurisdiction in which value is created. The digital economy is a primary source of growth, stimulating competition, investment, and innovation, leading to improved service quality, expanded consumer choice, and the creation of new jobs.

Methodology: In researching this topic, the authors applied methods such as analysis, observation, comparison, and biological review.

Discussion: The economy, boosted by digital technology advancements, experiences growth in labor productivity, company competitiveness, reduced production costs, job creation, poverty reduction, and decreased social inequality. Agriculture currently faces global challenges associated with transformational processes in both the economy and society at large. Major global trends affecting agricultural stability worldwide include the need to ensure food security for a growing global population, shifting to organic foods for urbanized areas, increasing population differentiation in terms of living standards and access to healthy foods, the need to extend life expectancy while maintaining quality of life, global warming, increasing aridity and desertification of agricultural lands, and the rising anthropogenic impact on ecosystems.

Ensuring Uzbekistan's food security, addressing the import substitution of essential agricultural products, raw materials, and food, and fostering sustainable rural development require systemic transformations in agriculture. Current modernization approaches are insufficient to overcome significant technological and market barriers that prevent local agricultural producers from entering global markets with highly processed products. Consequently, there is a need to develop a comprehensive theoretical, methodological, and practical approach to agricultural modernization aligned with global technological trends.

A solid regulatory framework has been established in Uzbekistan to foster the digital economy. Key presidential decrees include Decree No. UP-6079 “On Approval of the Strategy for Digital Uzbekistan 2030” and measures for its effective implementation (October 5, 2020), Decree No. UP-4947 “On the Strategy for Further Development of the Republic of Uzbekistan” (February 7, 2017), Decree No. UP-5544 “On the Strategy for Innovative Development of the Republic of Uzbekistan in 2019–2021” (September 21, 2018), Decree No. PP-3832 “On Measures to Develop the Digital Economy in the Republic of Uzbekistan” (July 3, 2018), Decree No. PP-4642 “On Measures to Broadly Introduce Digital Technologies in Tashkent” (March 17, 2020), and Decree No. PP-4699 “On Measures to Expand Digital Economy and E-Government” (April 28, 2020).

Practical experience shows that the digitalization of the economy demands the development of new approaches to organizing the collection, processing, transmission, distribution, and storage of information, as well as continuous training for specialists based on the current needs of the innovative environment. Therefore, the material presented in this article is timely and relevant.

Given current circumstances, the modernization of agriculture is the sole option for achieving stable economic growth, particularly amid global trends, the need to increase the competitiveness of Uzbekistan's agricultural business in a globalized environment, the spread of digital and robotic technologies, and the strengthening role of the agricultural sector in the national economy. Modernization, as an essential aspect of societal development, has re-emerged as a systemic phenomenon during periods of necessary advancement from socio-economically developed countries. Modernization issues are closely tied to the technological transition, which defines its type and the specific management mechanisms.

The legal framework continues to evolve. A number of laws regulating electronic document circulation have been adopted in Uzbekistan (e.g., laws “On Electronic

Document Circulation," "On Electronic Digital Signatures"). Presidential Decree No. UP-5099 (June 30, 2017) laid a significant foundation for developing software in Uzbekistan. For the first time in the country's history, an Innovation Center for Supporting Information Technology Development "Mirzo Ulugbek Innovation Center" was established on an extraterritorial principle. This center and its residents have been granted unprecedented tax and customs benefits.

In the future, grant funding efficiency for scientific research within state science and technology programs will be enhanced, along with state co-financing for promising projects to produce competitive high-tech domestic products through the Fund for Supporting and Developing Science and Technology. Simultaneously, the successful development of the digital economy depends on timely problem-solving, including the conditions for expanding the adoption and use of digital technologies, continuing the development of basic ICT and essential infrastructure, ensuring universal and widespread internet access, and reducing the regional digital divide.

The gradual implementation of digital technologies in land resource management, primarily in monitoring, will not only improve the efficiency of land users but also aid in the effective return of abandoned land to agricultural use through government control.

Proper land accounting is one of the most complex and key tasks for achieving efficient agriculture, including the transition to digital land quality management, which is increasingly vital due to soil degradation. Several key directions for digital transformation in agriculture and scientific and technological development in "smart agriculture" have been identified, involving the introduction of projects for a complete innovative scientific and technological cycle within the country's entities, such as "smart agricultural enterprises," "smart fields," "smart farms," "smart greenhouses," and "smart gardens," based on modern competitive domestic technologies, methods, algorithms, and systems.

Understanding the future of agriculture and prioritizing it as a "driver" of economic transformation highlights distinctive modernization approaches in the transition to a digital economy or knowledge economy, reflecting the features of the sixth technological paradigm. Thus, the dialectics of two modernization models is evident: the traditional (technological and biological) and the transitional (transitive) modernization.

General economic evolution defines the formation of a new agricultural modernization model, focusing on a phased transition from traditional agrarian economy to a new digital agroeconomy. According to the authors' hypothesis, agricultural modernization in digital transformation conditions cannot be achieved instantly; a transitional period is required.

Conclusions: Experts note that the drivers of digital transformation in Uzbekistan's agribusiness include a high degree of cooperation among digital service providers for this sector and minimal competition, the presence of large agroholdings, and government measures for developing the digital economy.

Agricultural producers expect that modern digital technologies will assist them in addressing pressing economic and production issues, including:

- low profitability, which is insufficient for effective production development;
- the need to anticipate and mitigate agricultural risks, such as weather, crop and animal diseases, pests, seasonal product prices, fuel costs, and others;
- difficulties in accessing expertise from qualified specialists;
- significant personal time investment in field planning and monitoring, which detracts from other production and managerial tasks;
- unproductive resource losses (fertilizers, fuel, pesticides, etc.);
- challenges in accessing advanced technologies, practices, and knowledge bases;
- the need to simplify interactions with the government (taxes, reporting, inspections);
- limited access to financing and insurance.

Thus, the primary focus areas for digital technology application in the agri-food sector can include:

- enhancing production efficiency (crop yields and livestock productivity);
- reducing production costs and increasing labor productivity;
- timely response to climate change;
- minimizing transaction costs in sales by establishing transparent supply chains from field to consumer;
- mitigating management risks;
- reducing the shortage of qualified labor;
- simplifying access to loans;
- facilitating agricultural producers' access to digital distribution channels.

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