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THE CURRENT STATE OF AGRICULTURE, KEY CHALLENGES, AND FUTURE DEVELOPMENT PROSPECTS

The work analyzes the current state of agriculture, key challenges, and development prospects both in Ukraine and globally. It highlights major issues in the Ukrainian agricultural sector, including imperfect land reform, insufficient funding, corruption, and the consequences of war. Global trends such as the Green, White, and Biotechnological Revolutions, as well as urbanization and innovative approaches, are also examined. Special attention is given to technological innovations, organic farming, and the principles of sustainable development. The article emphasizes the need to implement modern technologies and transition to environmentally safe and socially responsible agricultural production.

Keywords: *agriculture, Ukraine, innovation, sustainable development, organic farming, agrotechnologies.*

У статті проаналізовано сучасний стан сільського господарства, ключові виклики та перспективи розвитку як в Україні, так і у світі. Окреслено основні проблеми аграрного сектору України, зокрема недосконаліть земельної реформи, недостатнє фінансування, корупцію та наслідки війни. Розглянуто світові тенденції, як-от «зелена», «біла» та біотехнологічна революції, урбанізація та інноваційні підходи. Особливу увагу приділено технологічним інноваціям, органічному землеробству та принципам сталого розвитку. Наголошено на необхідності впровадження сучасних технологій і переходу до екологічно безпечного та соціально відповідального агровиробництва.

Ключові слова: *сільське господарство, Україна, інновації, сталий розвиток, органічне землеробство, агротехнології.*

Agriculture is one of the most important sectors of the economy, ensuring food security, employment, and export potential. In the modern world, this industry faces numerous challenges, such as climate change, soil degradation, population growth, and the need for sustainable development.

As the global population approaches 10 billion by 2050, agricultural systems worldwide are under pressure to increase productivity while adopting environmentally responsible practices. This dual challenge is particularly acute for agrarian economies like Ukraine, which must balance its role as a global breadbasket with the need for ecological stewardship and technological modernization. The country's agricultural trajectory reflects both the universal tensions in modern farming and unique local challenges stemming from geopolitical and institutional factors.

The work deals with the current state of agriculture, the main problems, and prospects for its development in Ukraine and globally.

State of Agriculture in Ukraine

Ukraine has significant agricultural potential due to fertile soils, a favorable climate, and a large area of agricultural land [6]. Agriculture accounts for about 10% of the country's GDP and provides employment for a significant portion of the population [6]. The main areas include crop production (grain, oilseeds, vegetables, and fruits) and animal husbandry (cattle, pigs, and poultry).

However, the industry faces several issues:

✓ land reform: imperfections in land reform limit small farmers' access to land, hindering the development of small and medium agribusiness [2].

✓ underfunding: limited state support complicates modernization and implementation of new technologies [6].

✓ corruption: corruption in agricultural policy reduces the sector's efficiency [2].

✓ war: the Russian invasion destroyed infrastructure, mined fields, and loss of export opportunities [2].

Global Trends in Agriculture

Globally, agriculture is undergoing significant transformations (pic. 1). Major trends include:

✓ Green Revolution. In the 1960s-70s, introducing high-yield varieties, mechanization, and chemicalization increased productivity, especially in developing countries [1].

✓ White Revolution – growth in milk and egg production through high-yield livestock and poultry breeds [1].

✓ Biotechnological Revolution. Since the 1980s, genetic engineering, computerization, and informatization have been introduced into agricultural production [1].

✓ Urbanization. Growing urban populations drive urban farming and demand for locally produced fresh products [1].

Picture 1. Agricultural transformations

Innovations and Technologies in the Agro-Sector

Modern agriculture is undergoing a technological transformation aimed at boosting efficiency while minimizing environmental harm. Digital livestock farming leverages sensors, Radio Frequency Identification tags (RFID tags), and drones to monitor real-time animal health, optimizing feeding and care practices [5] Meanwhile, biotechnology enhances crop resilience and livestock productivity through genetic improvements, reducing reliance on chemical pesticides [6]. Sustainable land management is advanced through no-till farming, which conserves soil moisture, prevents erosion, and sequesters carbon [7]. Additionally, automation, particularly via drones, revolutionizes field monitoring and precision application of inputs, cutting costs while reducing the overuse of fertilizers and pesticides [7]. Together, these innovations demonstrate how technology can drive both productivity and ecological sustainability in agriculture.

Organic farming is gaining popularity as an eco-friendly alternative to conventional production. It avoids synthetic fertilizers and pesticides, using natural plant protection and soil fertility methods. Organic farming provides meaningful advantages that extend across ecological, public health, and economic dimensions. This production approach avoids synthetic inputs, thereby protecting natural resources by preventing soil contamination and water pollution while maintaining diverse ecosystems. From a consumer perspective, organic methods yield food products without chemical residues, offering nutritional benefits and reducing potential health risks [4]. On the economic front, the premium prices commanded by organic goods enable farmers to achieve better profit margins and access expanding international markets that value sustainable production [4]. These interconnected benefits demonstrate how organic agriculture serves as a comprehensive solution addressing environmental conservation, human wellbeing, and rural economic development.

Sustainable Agricultural Development

Sustainable development in agriculture balances economic efficiency, environmental safety, and social justice. Key principles include:

✓ resource efficiency – optimize water, energy, and fertilizer use to reduce environmental impact [3].

✓ soil conservation – implement practices to prevent erosion and degradation [3].

✓ social responsibility – support local communities, ensure fair labor, and promote rural development [3].

In conclusion, agriculture remains a key sector of global and national economies, ensuring food security and livelihoods while facing challenges like climate change, war, and resource depletion. In Ukraine, land reform, underfunding, and war-related destruction hinder growth. However, the country's fertile lands and agricultural potential offer hope with proper investment and policy reforms.

Technological advancements, biotechnology, precision farming, and organic agriculture are transforming the sector globally. Sustainable practices, innovation, and responsible policies are crucial to guaranteeing long-term food security and environmental protection. By embracing these changes, agriculture can meet future demands while preserving resources for generations to come.

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