

PROSPECTS OF THE POST-WAR INNOVATIVE DEVELOPMENT OF THE UKRAINIAN AGRARIAN SECTOR

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Abstract: *The influence of modern world trends on the prospects of the post-war development of domestic agricultural production is outlined. The importance and key directions of implementation of the results of innovative solutions for the post-war transformation of the agricultural sector of Ukraine on the basis of sustainability are determined.*

Key words: agrarian innovation activity; post-war transformations; global trends; sustainability.

All over the world, under the influence of the implementation of innovative solutions, the structure of agricultural production is gradually changing: its scale and vertical coordination are increasing, segments such as urban agriculture (Urban Agriculture, Urban Farming, city farming), regulated production of food products without sunlight and soil (Indoor Cultivation Systems), vertical farming (Vertical Farming), etc. are appearing.

The limitation of natural resources, their pollution and the loss of biodiversity have intensified the transition to alternative (innovative, resource-saving) systems of agricultural production (this includes, in particular, organic production, precision agriculture, permaculture, smart farming, carbon farming, regenerative agriculture, farming practices like “Strip-till” “Verti-till”, “Mini-till”, “No-till”, “closed loop”, i.e. circular economy, etc.), aquaculture, as well as the implementation of the achievements of genetic engineering and revolutionary digital technologies. So, for example, it is expected that the world market of precision agriculture technologies, which is based on the use of information technologies, bioengineering, robotics and automation, big data in order to optimize the management of agricultural crops, will grow by more than 13% per year and by 2028 will reach 16, 4 billion dollars (compared to \$6 billion in 2020) [1]. The experience of the UK confirms that the use of a vertical farm allows you to get about four times more harvest than in a conventional greenhouse of the same area (although in the current conditions of high energy prices, this type of farming is recognized as too expensive). It is also known that thanks to the achievements of breeding in the EU over the past 20 years, it has become possible to ensure the current level of global production of agricultural crops without the involvement of an additional 21 million hectares and to prevent the emission of greenhouse gases in the amount of 4 billion tons.

The transformation of agricultural production was greatly facilitated by the change in consumer preferences of the population as a result of increased environmental responsibility and awareness of the benefits of healthy nutrition, which was reflected in particular in the increase in demand for food products produced without harming the environment and in compliance with more humane standards for the treatment of farm animals. Under the influence of the growing demand for nutritionally balanced products, the trend of biofortification (selection of agricultural crops with the aim of enriching them with vitamins and trace elements during growth) has intensified. The production of alternative proteins is developing rapidly. It is predicted that by 2030 the cost of such proteins will be five times, and in 2035 – ten times lower than the cost of animal proteins. In addition, alternative proteins must surpass animal proteins in all key characteristics: be 100 times more efficient in terms of land use and 10-25 times - raw materials, 20 times more economical in terms of time and 10 times more efficient in terms of water consumption, and also produce by an order of magnitude less waste [2]. In 2020 alone, \$3.1 billion was invested in the alternative protein segment, which accounted for more than half of the 5.9 billion dollars invested in this direction over the last decade. Plant proteins are produced / planned to be produced from various plant products, for example, oats, legumes (peas, mung beans), spinach, as well as from insects, mushrooms, duckweed and even air elements.

The agricultural production of Ukraine, which in the pre-war period was largely oriented to the needs of the world food market, developed in general along the lines of the indicated trends. It scaled, digitized, increased

productivity, expanded the use of advanced technologies, in particular, resource-saving ones, and was gradually included in global value chains.

The impact of modern global trends on the prospects of the post-war development of domestic agricultural production will mainly be manifested due to the need for: adaptation of farmers to increased climate changes and reduction of labor resources, restoration of natural resource production potential, leveling of the negative consequences of the growth of corporate concentration of ownership and control in the agro-food sector, compliance by agricultural producers with biosafety requirements, traceability, environmental friendliness of their products, consideration of variations in consumer preferences and the price situation of the world food market. It can be assumed that in the future, the importance of such factors as climate and natural resource limitations, as well as environmental responsibility and consumer awareness of nutrition, will only increase. The same can be said about the corporatization of the country's agrarian sector, its saturation with large industrial and financial capital.

At the same time, the impact of natural resource factors will be able to be significantly smoothed out by the implementation of innovative solutions in the agricultural and related spheres. First of all, this is connected with the development of regenerative, smart, carbon-based agriculture. Even before the war, the transition of agrarians to precision farming technologies (the direction of smart farming), which involves the management of crop production using IT solutions, robotics, and drones, was noticeably scaling up in Ukraine. Such approaches were used by farmers in controlled territories and during the war. There is no doubt about the continuation of this trend in the post-war period.

The activation of the implementation of digital technologies to ensure a comprehensive transition to the sustainable development of the agri-food sector is also foreseen by the current EU agricultural development strategies (in particular, by the European Green Deal - F2F - "From farm to fork"). It is recognized that the development of the European agri-food sector in the period until 2030 will be based on the development and distribution of digital technologies that will cover all levels of the food value chain [3]. This will be facilitated by new business models (for example, by the sharing economy or the economy of shared consumption, e-commerce, traceability, personalized food products, etc.), as well as regulatory changes (in particular, documentation obligations, restrictions on fertilizers and pesticides, food safety standards products, etc.).

In Ukraine, the digitization of agricultural production along with the further wider use of soil moisture saving technologies ("Mini-till", "No-till") and the implementation of breeding achievements will allow increasing the volume of agricultural production and minimizing the adverse consequences of climate change. It is assumed that technologies for management and conservation of carbon and moisture will be developed within the framework of precision agriculture.

So, the development of the agricultural sector of Ukraine in the post-war period should ensure national food security and the reproduction and preservation of natural resources of agricultural production. To achieve this, innovative modernization of the agricultural sector and its structural transformation are needed.

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