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AGRICULTURE OF UKRAINE DURING THE WAR: CHALLENGES AND CHANGES

Key words: Ukraine, war, agriculture, changes, threats, losses, lessons of the war for the agricultural industry

ABSTRACT. The purpose of the study was to identify the main changes in the agriculture of Ukraine caused by the war and to summarize the main lessons of this war for the agricultural industry. The research period focuses on the time of the full-scale war in Ukraine (2022-2024). At the same time, comparisons were made with the pre-war situation, what in combination with a dialectical approach to the study of socio-economic phenomena and with the methods of induction, deduction and scientific abstraction, synthesis and generalization made it possible to identify the main changes in the agriculture of Ukraine because of the war and as a response of the industry to the challenges, associated with the war. In the course of the research, the task of finding an estimate of the damage caused to the agrarian sector of the economy by the war was also carried out, in terms of their types. It was established that almost all producers of agricultural products suffered from the devastating consequences of the war in Ukraine, but the reaction of different groups of agricultural producers to challenges for agriculture was somewhat different due to the dual nature of Ukrainian agriculture and certain features of its main sectors. Nevertheless, the agro-food sector of the economy of Ukraine in the conditions of the war proved to be the most resistant to its negative impact, compared to other industries, and continues to fulfill its mission of providing the population with food and foreign currency income for the country from export activity.

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INTRODUCTION

The Russian invasion brought enormous destruction to the agriculture and rural areas of Ukraine and created a whole series of problems in the form of destruction or theft of products, withdrawal of land from economic circulation due to its destruction and mining, destruction or theft of material resources, reduction of the number of labor resources, disruption of logistics chains, which caused a decrease in production volumes, export restrictions, loss of sales markets, financial and material losses. Solving these problems and working to eliminate the consequences of the war, Ukrainian producers of agricultural products had to respond accordingly to the mentioned factors, trying to adapt to the change in the operating environment. The strength of the reaction of different groups of these producers was different due to the characteristics inherent in these groups. We are primarily talking about large agricultural enterprises and small and medium-sized enterprises, as well as farmers and households of different sizes. Therefore, the purpose of the study was to identify and systematize the main changes in the agriculture of Ukraine, caused by the war on its territory, and to generalize the main lessons of this war for the agricultural industry, which can be useful for agricultural producers in other countries as well.

MATERIAL AND METHODS

The basis of the research methodology was the use of a dialectical approach to the study of socio-economic phenomena. The effectiveness of such an approach was ensured by combining it with the method of scientific abstraction and the descriptive-analytical method, as well as with the methods of induction and deduction followed by the synthesis and generalization of the obtained results, which, together with the method of comparative analysis, made it possible to identify changes in the nature and structure of agriculture in Ukraine as a result of the Russian military aggression, which has been going on for the third year, and to form the main lessons of the war for agriculture, which may be of interest to agricultural producers of other countries and their power structures. The quantitative results collected in the course of the study do not claim absolute accuracy and completeness due to problems of an information-source nature, caused by the state of war and hostilities on the territory of Ukraine, as a result of which there are limitations in access and collection of statistical information in view of the relevant interests of the country during the war and the need to comply with information discipline requirements. Therefore, the factual data used in the course of the research and writing of this article are based on the research results of the Institute of Economics and Forecasting of the National Academy of Sciences of Ukraine, publications of scientists and practitioners related to the specified research problem, as well as materials, contained on relevant information and analytical platforms, the main of which are Agronews, AgroPortal.ua, Agroreview, CEMA, Epravda, Knowledge, KSE "Agrocentre", Kurkul, Seeds, Ukurier, Voxukraine and others. The results of the author's own observations, allowed for open publication, were also used.

RESEARCH RESULTS

Agriculture in Ukraine is recognized as a priority area of the Ukrainian economy and provides food for a significant part of the population of the country and the world. In the pre-war period, Ukrainian agriculture accounted for 41% of the country's total exports [Mamonova et al. 2023]. As of 2021, Ukraine accounted for more than 40% of world exports of sunflower oil, more than 10% of corn and barley, and about 10% of wheat and rapeseed [Matveev 2023]. Before the Russian invasion, Ukraine supplied 50% of the grain reserves of the United Nations World Food Program (WFP), the largest humanitarian organization in the world [Roman 2024].

A lot of state resources and foreign investments were spent on reforms and programs to support the development of agriculture. As a result of this and as a result of the specifics of the dynamic situation, a complex structural dynamics of the Ukrainian agricultural sector was formed: large agrarian industrial business competes with farms and small-scale family-type farms (personal peasant farms[2]). Large agribusiness controls 53.9% of arable land and provides 54.5% of Ukraine's gross domestic agricultural production, mainly specializing in the production of grain and oil crops for export. The other share, 46.1% of agricultural production, is provided by various small and medium-sized family farms and personal peasant farms, which cultivate 45.5% of the land [Mamonova et al. 2023]. Farms have an average size of between 50 and 100 ha, which is relatively large compared to the EU average farm size of 17.4 ha. Farms cultivate about 15% of arable land in Ukraine (they own land and rent land from neighbors) and produce 8.7% of domestic agricultural products. Some personal peasant farms function as commercial family farms (so-called sole proprietorships), others as food producers, focused on their own existence. Private family farms and peasant farms produce 37.4% of domestic agricultural production, cultivating 30% of the country's agricultural land (they are quite heterogeneous in terms of land use: 85% cultivate from 1 to 5 ha, 9% – from 5 to 10 ha, 6% – more than 10 ha). Farms together with family farms and private farms produce 95% of potatoes produced in Ukraine, 85%

[2] Personal peasant farms (PPF) in Ukraine are not by their nature full-fledged family farms according to the criteria recognized by the United Nations, but in Ukrainian legislation they are called PPF.

of vegetables, 80% of fruits and berries, about 75% of milk and more than 35% of meat for personal consumption and sale on domestic markets. Their production methods are more socially and environmentally sustainable compared to large agribusinesses and are mostly carried out in accordance with local traditions and practices. Many agricultural and rural development programs are de jure aimed at supporting various food producers, but the de facto beneficiary is agribusiness, which receives about 60-70% of government agricultural subsidies and monopolizes the industrial agri-food value chain [Mamonova and Zamuruyeva 2024]. Approximately 40% of large agribusiness companies are incorporated into agricultural holdings, which are the largest land users in Ukraine. The top 10 largest agricultural holdings control 2.6 million ha of agricultural land, which is 8% of all arable land in Ukraine [Mamonova et al. 2023].

In Ukraine, there is no clear definition and classification of family farms. Different agencies provide different information about their size, quantity and volume of agricultural production. According to the Institute of Economics and Forecasting of the National Academy of Sciences of Ukraine, 31,800 farms and 3.9 million personal peasant farms are registered, but the real number may be higher [Mamonova et al. 2023].

Such a dual agrarian structure is the result of several processes. One of them is the land reform, during which the aim was to distribute the lands of collective farms and state farms among the rural population for private farming. A twenty-year moratorium on land sales ensured land rights for Ukrainian peasants, who leased the allotted land to agribusinesses for little money or produce, while continuing to farm their homesteads themselves.

Another factor of the formation of the dual system of agriculture in Ukraine was the idea of absolutism and unlimited advantages of large-scale farming over small-scale farming, which is still being lobbied by agricultural holdings in the country's power structures in the minds of people for 70 years.

In general, the development of agriculture in Ukraine, as in the whole world, for a long time took place according to the model of modernization, based on specialization, intensification and scale of production. In particular, the experience of the development of the agricultural sector of the EU shows that the modernization of farms and agricultural policy have for a long time been focused on specialization, consolidation of land and reduction of production costs to meet the demand for cheaper food products. This process was accompanied by the introduction of labor-saving and land-saving technologies [Bartolini and Viaggi 2013].

The Russian invasion just before the start of the spring sowing campaign of 2022 brought enormous destruction and problems to agricultural production and rural areas. In addition, the war did not eliminate the tension between large and small producers of agricultural products in Ukraine. On the contrary, it exacerbated tensions – the war did not stop, but only intensified the struggle for resources and state support between big agribusiness and peasant farms, constantly raising the question of the future of Ukrainian agriculture to the agenda.

The full-scale war demonstrated the systemic vulnerability of globalized neoliberal agriculture, which is characterized by narrow specialization in agricultural production, dependence on international trade in food products, fuel and fertilizers, and excessive dependence on the production of a few basic products (such as wheat, sunflower seeds, corn, etc.) for most diets. Targeted attacks by the Russian military on Ukrainian agriculture, such as shelling of agricultural facilities and infrastructure across Ukraine, mining and burning of agricultural land near active combat zones, a five-month blockade of Black Sea ports (and resumption of the blockade as of July 2023), and the explosion of the dam of the Kakhovskaya HPP, extremely complicated the functioning of the Ukrainian agricultural sector [Mamonova et al. 2023]. Russia's frequent attacks on Ukrainian power plants have threatened the existence of industrial livestock and poultry farming in Ukraine, which, like similar production in other countries, is very dependent on the supply of electricity. For example, a critical situation that almost became an ecological disaster occurred in May 2022 at the Chornobayiv poultry factory (the largest poultry factory in Europe) in the Kherson region, where more than 4 million chickens and about 700 thousand chicks died without the possibility of their disposal in as a result of an airstrike by Russian aircraft on a local power plant.

The war showed that highly specialized agriculture is viable only in conditions of stable markets. Ukrainian export-oriented agriculture, represented by large agricultural enterprises, was paralyzed in the first months of the war. Agricultural holdings were practically unable to continue their business because they could not cope with logistics. Mountains of grain (more than 25 million tons) were formed on the Ukrainian borders, when the Black Sea ports were blocked by the Russian fleet, and land routes were not enough to transport the entire volume of products. In addition, supplies of fuel and fertilizers have stopped, as they were previously imported from Russia and Belarus. So, large industrial agribusiness uses complex technologies and methods of production, which do not give the opportunity to adjust their activities in the absence of certain resources. This sector of industry could not quickly adapt to the shock and challenges of the war. Their complex logistics, technology, and sheer scale could be effective in peacetime, but not in wartime.

The way of production organization also makes Ukrainian agricultural holdings extremely vulnerable to serious shocks and disturbances. In the first days of the war, as a result of the great dispersion of the agricultural business of one holding practically throughout the country, it led to the disruption of production and technical-technological ties. As a result, even those agricultural holdings whose lands were outside the zone of active hostilities were unable to cultivate their fields, as supply chains were destroyed.

Meanwhile, family farms and personal peasant farms were able to adapt relatively quickly and start producing food for their needs, their communities, the army and the people of Ukraine. Local food producers are less dependent on external resources and international trade, because they have their own equipment, machinery and storage facilities, they often use organic fertilizers and local seeds, they process and sell their food in local markets and through informal networks, and they depend on the household or local workforce.

As agricultural products became scarce, small landowners began to use more manual labor and less machinery, sometimes even plowing the fields with horses. They replaced chemical fertilizers with organic ones, and export-oriented farms were able to quickly reorient themselves to the domestic market, producing, for example, buckwheat instead of corn. But the most important factor was extraordinary cohesion and solidarity, which help the Ukrainian people to survive in the most difficult times.

The trend of the development of the situation is also "warmed up" by the emphasis in the aid of the partner countries to the agrarian sphere of Ukraine's economy in the direction of small producers. On March 30th, 2023, the World Bank announced the restructuring of its own Programfor-Results on Accelerating Private Investment in Agriculture to Ukraine, supporting the recovery of agricultural production affected by Russia's invasion of Ukraine. The World Bank will make available USD 132 million for government programs that improve access to finance through the credit program "5-7-9" and partial credit guarantees for small farms. Money will be targeted towards diversify agricultural production by supporting horticulture, and improve water deficit management and climate change adaptation. Funds will be made available for small farmers to access finance. This will certainly help cover the immediate financial needs of smaller farm holdings [CEMA 2023].

Of course, it would be wrong to say that family farmers and individual farms were not affected by the war. Disruptions to value and supply chains, as well as price unpredictability, have consequences for the people involved in farming, underscoring their interdependence with the country's agrarian economy. Russian artillery attacks, land mining, destruction of infrastructure and agricultural facilities also occur on farm and personal farm lands, causing them to face problems similar to those described above for agribusiness, but on a smaller scale due to their smaller size.

One of the ways to diversify the activities of agricultural enterprises, which can increase their economic stability, is their reorientation to the production of niche products [Prokopenko and Udova 2023]. Reducing the area under grain crops and under sunflower, producers will replace them with niche crops, for example, mustard, flax, millet, sorghum, vegetables, etc. Special attention is currently being paid to the cultivation of legumes (peas, beans, chickpeas), vegetables (rucola, asparagus, Swiss chard, sweet potato, Jerusalem artichoke) and energy crops (eucalyptus, poplar, willow, switchgrass, miscanthus, paulownia and others), which are quite well-known and already quite common crops in Ukraine. Okra, daikon radish, fennel, cornflower, monarda double and many others are just entering the culture of consumption and have considerable prospects [Mirzoieva and Tomashevskyi 2023, p.127]. Cultivation of niche crops can provide a fairly high income on small areas.

According to the latest review of the Kyiv School of Economics (KSE) Third Rapid Assessment of Damage and Recovery Needs (RDNA3) report, as of December 2023, Ukrainian agriculture has suffered damages and losses of USD 80 billion. Losses include stolen, destroyed or damaged assets totaling USD 10.3 billion, with agricultural machinery accounting for 56.7% of the lost value. An estimated 181,000 pieces of agricultural machinery were damaged or destroyed, and 2.8 million tons of grain, 1.2 million tons of oilseeds, 124,000 tons of fertilizer and 11.6 million liters of fuel are believed to be lost or stolen. According to KSE estimates, Ukraine has lost almost 20% of its storage capacity, excluding facilities in the occupied territories. Although the livestock and aquaculture industries represent a smaller share of Ukrainian agriculture than the crop and oilseed industries, they also suffered significant losses, estimated at USD 254 million and USD 35 million, respectively. Total revenue losses are estimated at USD 69.8 billion. This is about lost income due to a decrease in the production of agricultural crops and livestock, a decrease in prices, as well as an increase in production and reclamation costs borne by Ukrainian producers [Roman 2024, p. 7].

The next big category of damage is stored crops. Damages caused by the destruction and theft of stored products are estimated at USD 1.9 billion. The third (largest) category of damage is storage facilities (e.g., grain silos), which accounted for 15% of all losses or USD 1.3 billion [Makovey 2024]. So, the total estimated reconstruction and renovation needs of Ukraine exceed USD 411 billion. The needs of agriculture make up at least 7% of this amount. At the same time, it is necessary to understand that the war continues and Russia will not stop the destruction and looting of the Ukrainian production infrastructure, accordingly, even more damage will be caused [DLF 2023].

In addition to the direct impact on agriculture, the war has significantly destroyed the environment, contaminating the soil and water, which has a negative effect and will affect agriculture and directly affect people in the long term. We are talking about mined areas, funnels from shelling, landslides, destroyed military equipment on the fields.

To solve the problem of Russia's blockade of Black Sea ports, the government of Ukraine together with its European allies initiated "Solidarity Lanes" for the transportation of Ukrainian grain by non-sea routes to Europe for further delivery to the countries of the Middle East or Africa. However, certain shortcomings in the terms of the transfer allowed some local players in Poland, Bulgaria, Hungary, Romania and Slovakia to make money from the resale of Ukrainian grain on domestic markets in the EU. Ukrainian products are cheaper than their counterparts in the EU due to the so-called “scale effect”, less stringent environmental requirements, cheaper land and labor, temporary suspension of activity export duties and tariff quotas. Of course, the saturation of the domestic market of European countries with Ukrainian grain caused the reaction of European farmers in the form of a blockade of the borders with Ukraine and protests [Agroreview 2024, Ukragroconsult 2024].

Nevertheless, on June 23, 2022, Ukraine received the status of a candidate for membership in the European Union, where Ukraine is perceived not only as a partner, but also as a powerful competitor. So, the problem is to find the balance between these two identities [Kravchenko 2024].

There is absolutely no reason to claim that it is necessary to completely stop large-scale agricultural production in Ukraine. Agribusiness brings revenues to the budget, which are needed for the reconstruction of the country after the war (before the war, agricultural exports accounted for 45% of all export revenues). In addition, many countries depend on Ukrainian grain exports, and Ukraine has good land and a favorable climate to remain the “granary of the world”.

In general, in 2023 there is an increase in the volume of production of agricultural products up to 5% compared to 2022 [Kryvolap 2023]. Despite the fact that the acreage has decreased by 25%, farmers are adapting to conducting business in wartime conditions, changing the range of products, looking for new suppliers, sales markets, as well as opportunities to reduce the cost of their products and costs for sale and storage [Vytoptova 2024, p. 211]. If in 2022 the share of agricultural products in exports was 53%, then in 2023 it reached 62% [Kravchenko 2024]. At the same time, there was a reorientation in the sales markets. Among other changes, as early as 2022, China lost its long-standing status as the largest importer of Ukrainian grain, ceding to the collective European Union. In 2023, the European Union accounted for 57% of all Ukrainian agricultural exports [Kravchenko 2024].

In this context, it is impossible not to mention such a phenomenon as the revival of “gardening”. With the beginning of the war, more and more Ukrainians began growing their own food to solve the problem of food shortages and high food prices.

It is obvious, that it is important to introduce more restrictions into big agribusiness, including strict environmental requirements and making agribusiness more transparent. It is also important that the Ukrainian government changes its priorities in agricultural policy from “the more is the better” to support family farms and personal peasant farms. Of course, this is easier said than done, as the dual structure of agriculture, which is unfair to small farmers, is deeply rooted in Ukrainian institutions.

CONCLUSIONS

Thus, the main lessons of the war in Ukraine for agriculture.

1. The agrarian sector of the country's economy as a whole, even with its pronounced dual structure, demonstrates the highest, compared to other industries, ability to survive in the national economy against the background of complex – not only military – problems. But the reaction of different groups of agricultural producers to the consequences of the war was and remains quite different.
2. The full-scale war demonstrated the systemic vulnerability of globalized neoliberal agriculture, which is characterized by narrow specialization in agricultural production, high levels of concentration and large scale of production, dependence on international trade in food, fuel and fertilizers, and excessive dependence in the production of only a few main export-oriented goods.
3. Under the conditions of the war, large agricultural enterprises in Ukraine turned out to be less mobile, economically inert, more difficult to adapt to the catastrophic consequences of the war – the disruption of logistics chains and access to traditional sales markets, the increase in the price of fuel and fertilizers and other materials, the outflow of labor resources due to mobilization into the ranks of the Armed Forces of Ukraine and migration abroad, occupation of large territories, destruction and theft by the occupiers of industrial premises and equipment, including tractors, combines, cars, and elevators, finished products, animals and poultry, burning crops directly in the fields, mining large areas of the territory – and therefore sharply reduce the efficiency of using their potential. The war forced them to either reduce or even stop their activities, or to look for new directions of operation, including niche production, which has long become commonplace for small and very small producers.
4. Smaller agricultural producers, which in Ukraine are medium and small and small agricultural enterprises, farmers, family farms and personal peasant farms and even „gardeners", adapt better and faster to the difficult and dynamic conditions of war. That is, a small agrarian business in the conditions of war is more stable and capable of economic survival due to a higher level of mobility and adaptability than a large agribusiness with its narrow specialization, even with a much higher level of mechanization.
5. All groups of agricultural producers have losses from the consequences of military actions, and both are forced to diversify their activities directions, including also through the development of niche production, what, again, is realizing faster and more efficient in the sector of smaller farms and is a more common practice for them. Due to circumstances, large producers also had to some extent reorient

themselves to niche crops and types of products, but for them these transformations of specialization were more difficult to implement, because before the war these farms were practically not engaged in this – they were completely satisfied with cereals, rapeseed, corn, soy, sunflower, which they mainly exported abroad in the form of raw materials, and the large scale and high level of mechanization of production processes allowed them to sell these products abroad at prices lower than the prices of competitors.

6. At least in the near future, the sector of smaller producers, including even revived "gardeners", has the greatest chance of development in Ukraine, what is facilitated by the investment and financial assistance of Western partners, which is focused almost entirely on this sector.
7. Nevertheless, there is absolutely no reason to completely stop large-scale agricultural production in Ukraine because of that big agribusiness brings revenues to the budget, which are needed for the reconstruction of the country after the war (before the war, agricultural exports accounted for 45% of all export revenues). In addition, many countries depend on Ukrainian grain exports, and Ukraine has good land and a favorable climate to remain the "granary of the world", what objectively to a greater extent refers just to the field of large agribusiness. It is only necessary to wait for the final victory over the enemy and to establish logistics in all spheres of agribusiness. The advantages of large-scale production are objective, although certain conditions are required for their implementation. In addition, they are also limited in nature. In connection with what it is necessarily to introduce more restrictions into big agribusiness, including strict environmental requirements and making agribusiness more transparent.

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ROLNICTWO UKRAINY W CZASIE WOJNY: WYZWANIA I ZMIANY

Słowa kluczowe: Ukraina, wojna, rolnictwo, zmiany, zagrożenia, straty, lekcje z wojny dla przemysłu rolnego

ABSTRAKT. Celem badania było zidentyfikowanie głównych zmian w rolnictwie Ukrainy spowodowanych wojną oraz wskazanie najważniejszych skutków wojny dla branży rolniczej. Okres badań obejmuje lata pełnoskalowej wojny w Ukrainie, czyli 2022-2024. Dokonano także porównania z sytuacją przedwojenną, co w połączeniu z dialektycznym podejściem do badania zjawisk społeczno-ekonomicznych i metodami indukcji, syntezy i uogólnień, pozwoliło zidentyfikować główne zmiany w rolnictwie Ukrainy spowodowane wojną oraz pokazało reakcję branży na wyzwania związane z wojną. Podjęto także próbę oszacowania szkód wyrządzonych sektorowi rolnemu przez wojnę oraz uszeregowania ich ze względu na rodzaje. Ustalono, że niemal wszyscy producenci produktów rolnych ucierpieli z powodu niszczycielskich skutków wojny w Ukrainie. Ze względu na dwoistą naturę ukraińskiego rolnictwa i specyfikę jego głównych sektorów, reakcja różnych grup producentów rolnych na wyzwania związane ze skutkami wojny była różna. W porównaniu z innymi gałęziami gospodarki Ukrainy, sektor rolno-spożywczy w warunkach wojny okazał się najbardziej odporny na jej negatywne skutki i nadal wypełnia swoją misję dostarczania ludności żywności oraz dochodów dla kraju z działalności eksportowej.

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