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Ukraine's Agrarian Sector in the Conditions of COVID-19 Distribution and Restrictive Quarantine Measures: Methodological Principles of Empirical Evaluation

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Abstract. Conditioned upon the negative impact of pandemic restrictions explained by the spread of COVID-19 disease, the global economy is declining, which has led to real risks and threats to the development of the Ukrainian agricultural sector. Identifying these risks and threats, assessing the impact of the spread of the COVID-19 pandemic and the quarantine measures introduced in response to the agricultural sector is an important problem of agricultural policy that requires maximum efforts to solve it. The purpose of the article is to summarise the methodological basis for assessing the impact of restrictive quarantine measures 2020-2021 related to the spread of the COVID-19 pandemic for the agricultural sector of the Ukrainian economy, to substantiate the basis for determining criteria and indicators of impact and to carry out their empirical measurement. Analysis and synthesis, induction and deduction, analogy and comparison are used to generalise the theoretical and methodological aspects of the study. To diagnose the dynamics of economic indicators, economic and statistical methods are used in analytical studies. A number of techniques of abstract-logical tools made it possible to formulate intermediate and final conclusions. Methodological foundations, scientific, methodological and practical approaches to assessing the impact of restrictive quarantine measures 2020-2021 related to the spread of the COVID-19 pandemic for the agricultural sector of the Ukrainian economy have been improved by substantiating the optimal research tools, identifying the most informative indicators and indicators. It is proved that from the standpoint of an integrated approach, all indicators that are a measure of the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector should be considered in accordance with the target segments for assessing changes at the macro and micro levels. In particular: macroeconomic trends in business efficiency; entrepreneurial activity; foreign economic activity; social and labour relations; finance and investment, state support, etc. The analysis showed that the progressive development of agriculture in Ukraine during 2020 explained by quarantine restrictions demonstrated structural, economic and financial effects (results) of a downward nature. Promising areas for further research in this direction should include the development of a set of strategic measures to minimize risks for the agricultural sector of Ukraine during and after the end of the COVID-19 pandemic

Keywords: agricultural sector, COVID-19 pandemic, quarantine restrictive measures, external shocks, internal factors of influence, assessment method



INTRODUCTION

The downturn in the global economy caused by the spread of the COVID-19 pandemic has led to significant changes in all spheres of life and economic activity, including the agricultural sector. Compared to the previous global crisis, in the situation of the spread of the COVID-19 pandemic, countries are responding relatively quickly, trying to limit the negative consequences for the usual consumer standards of living and working, and slow down the economic downturn. Since in agriculture the economic process of reproduction of production is closely intertwined with natural (biological) processes, the restrictive measures introduced by central or local authorities in response to the spread of the COVID-19 pandemic, especially adversely affect the productive employment of peasants, the budgets of rural households, the functioning of the social sphere of rural territories, etc. This pressure is significantly increased conditioned upon a variety of objective and subjective factors, the imperfection of the institutional environment and the uniqueness of the rural way of life.

The impact of the crisis on the economy will depend on the duration of the emergency, the rigidity of restrictive measures and control over their compliance, the stability of the economy, social orders and other characteristics of the country, as well as on the effectiveness of compensation measures for all segments of the population, enterprises, institutions and organizations [1].

The agricultural sector of Ukraine has been affected by restrictions related to the spread of the COVID-19 pandemic and the introduction of quarantine measures, both at the global and national levels. In particular, external shocks include the following: restrictions on trade transactions between states, restrictive measures on the movement of goods, the closure of certain global agri-food markets, and so on. Internal factors of influence are: restrictive measures for the sale of seasonal products, the movement of goods, the closure of local retail and wholesale food markets, the removal from work of infected workers or workers who have been in contact with infected people, changes in consumer sentiment and the structure of the consumer basket, a decrease in effective demand, especially socially vulnerable segments of the population, a reduction in production volumes from suppliers of resources for agriculture, an increase in prices for means of production and raw materials, a depreciation of the national currency, and so on.

So, for example, in Ukraine, quarantine restrictions caused by coronavirus disease did not affect large agricultural holding companies and did not actually affect the level of their capitalization. At the same time, a significant number of small and medium-sized farms suffered significant losses. The closure of food markets in March-May 2020 deprived small agricultural producers of the opportunity to sell their grown products. To a large extent, this problem is explained by the fact that about 85% of early vegetables, herbs and berries are sold through local agri-food markets. One of the restrictive measures

in the framework of the lockdown imposed by the government was their complete closure, which lasted for several months and provoked a problem with the sale of grown products. Many farmers suffered huge losses as a result of such actions. In addition, in some regions of the country, especially in rural areas, there was a restriction of public access to food resources and a decrease in the range of available goods, which affected food security. At the same time, large retail chains, taking advantage of the situation, which was accompanied by temporary panic and partial uncertainty, resorted to raising food prices. As a result, there was a permanent decrease in consumer demand from the population, which affected the change in the structure of agricultural production and its sale. To a large extent, this was the reason that the growth rate of prices for agri-food products in Ukraine during April-May 2020 exceeded the same growth rate in the EU countries by 20-30% [2].

Researchers [2] note that the situation that developed as a result of quarantine restrictions was accompanied by a deterioration in the level of food security of the population, the destruction of agri-food chains, the aggravation of social tension in society, the mass curtailment of small and micro businesses, the growth of shadowing of agri-food markets, which negatively affected the provision of anti-epidemic control in this area, provoked a galloping increase in food prices in retail chains and an uncontrolled increase in their imports.

Assessing the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector of Ukraine requires balanced and reasonable methodological approaches to its study. As noted by V.V. Nechyporenko [3], the research methodology is a system of concepts of basic principles, methods, means of studying the object and implementing a creative idea in the form of a program (algorithm), ways to know the truth and achieve the goal. Its effectiveness is manifested by confirming or refuting the hypothesis put forward and solving a scientific and practical problem. Ukrainian and foreign scientists are currently conducting active research on the development, systematisation, testing and improvement of the entire set of methods and techniques for studying this problem.

Notably, in the practice of management and economic analysis, quite often methods, approaches, algorithms, evaluation models, etc. differ too much from each other. The variety of existing methods for assessing the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector and their differences in methods, approaches and indicators are explained by the following: the variety of assessment goals that require relevant approaches; the compliance of individual methods only with certain stages or research tasks; the use of both statistical and expert indicators in the evaluation process; the use of the expert assessment method to determine the weight coefficients of

partial indicators in integrated assessment systems; problems associated with the lack of necessary statistical data for a long period of time; difficulties in evaluating processes conditioned upon the overload of the indicator system; the complexity of choosing the object of research for comparison, and so on.

In general, determining the most appropriate methodology is now often recognised as one of the most difficult problems in assessing phenomena and processes in socio-economic systems. An additional difficulty lies in the fact that the evaluation method must be universal, positioning, informative and accessible to use.

Purpose of the article there is a generalisation of methodological bases for assessing the impact of restrictive quarantine measures 2020-2021 related to the spread of the COVID-19 pandemic for the agricultural sector of the Ukrainian economy, justification of methodological approaches to determining criteria and indicators of impact and implementation of their empirical measurement. The purpose of the study provides for the implementation of such *tasks*:

- to summarise the methodological foundations for studying the impact of the spread of the COVID-19 pandemic and restrictive quarantine measures on the development of the agricultural sector;

- to develop methodological approaches to assessing the impact of quarantine measures and the spread of COVID-19 on the development and functioning of the agricultural sector of Ukraine with the definition of the most informative indicators and indicators;

- to assess the impact of COVID-19 quarantine measures on the functioning of the agricultural sector of Ukraine.

LITERATURE REVIEW

Despite the fact that the COVID-19 pandemic is a fairly new phenomenon, however, its research has become a priority for many scientists, both foreign and Ukrainian. There are quite a lot of approaches to research here. Thus, according to Fan, Jamison and Summers [4], the COVID-19 pandemic causes direct and indirect losses of added value. Barua [5], using a standard macroeconomic model, demonstrated that the COVID-19 outbreak can seriously damage global supply chains, as well as cause a significant negative economic impact.

H.M.M. Taqi and colleagues [6] based on the analysis of literature sources and their own observations highlight the following results of the spread of the COVID-19 pandemic and quarantine measures to the economy: cancellation of orders from brands and retailers; reduction of production and non-fulfillment of orders; slow shipments and inconsistent delivery, inflated delivery costs; excessive inventory; job cuts; disruption of international logistics, slowing down financial calculations.

The authors of the study “Commodity Market Prospects: the impact of COVID-19” [7] draw attention to the impact of quarantine measures on the price situation

in the agricultural market. The deep global economic shocks caused by COVID-19 affect producers' cash flows and financial liquidity conditioned upon limited production capacity, limited market access, loss of remittances, lack of employment, and unexpected medical expenses [8].

In particular, it is noted that in Africa, the greatest negative impact was felt by farms. Thus, the restriction of the movement of people explained by the spread of the COVID-19 pandemic led to a shortage of labor in farms; the decrease in crop yields was the result of a violation of access to agricultural resources (seeds, fertilizers, veterinary materials, feed). Disruptions in logistics, processing and market access have negatively affected the value creation of agricultural products. Labour shortages because of stay-at-home policies have affected food production and processing, especially in labour-intensive meat processing plants. Restrictions on public transport stopped most of the campaigns, and the rest of them were forced to reduce their activity, and organisations had to adapt to physical distancing. The slowdown in overall logistics has negatively affected food safety and quality. The closure of many informal markets in urban and suburban areas to avoid crowding has disrupted food supply systems, especially for fresh produce such as meat, eggs and milk. This affected the structure of consumer demand. For livestock breeders, there is a loss of income from the sale of livestock and products (milk, butter, eggs), which led to a general decrease in the purchasing power of households [9].

As an important aspect of the methodology for assessing the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector, the lack of unified analysis indicators should be noted. However, scientists are working fruitfully to determine them. Specialists of the Economic Development Agency PPV Knowledge Networks regarding approaches to assessment at the sector level identified the following key indicators: production, shortage of raw materials for production; supply and demand for products, price conditions, sales volumes of manufactured products, excess of finished products in stock, waiting times and payment terms for goods and services, availability of frozen contracts; liquidity – availability of financial resources to repay debts to suppliers, to pay wages, taxes, rent, loan repayment, accounts receivable, staff employment, etc [10]. The expediency of including in the system of indicators those that characterize food security (prices, demand, production, sales, consumption, availability of food products, food habits (types of diet, daily consumption of certain products, number of meals per day, etc.) is justified by A.E. Obayelu, O.A. Obayelu, K.K. Bolarinwa, and R.A. Oyeyinka [11].

Specialists of the public organization “Center for Applied Research” in cooperation with “Economic truth”, as indicators suggested using indicators of revenue, the number of contracts and clients, the volume of services provided [12]. The main purpose of the search was to obtain information from the owners and top management

of Ukrainian companies on the transformation of operating activities, expected risks due to the re-introduction of lockdown by conducting structured in-depth interviews.

Assessment of the impact of the pandemic and restrictive measures on the agricultural market by D.Varshne, D. Roy, and J. Meenakshi is suggested by determining differences (DiD-in-difference) and differential results between high and low load points. At the same time, data on the daily dynamics of wholesale prices for agri-food products and their supply on the market were analysed [13].

G. Gregorioa and R. Ancog argue that the restrictions caused by COVID-19 have affected the supply of labour, which in turn has affected overall agricultural production and sector performance. Therefore, in their study to assess the impact of the spread of the coronavirus pandemic and restrictive quarantine measures on agricultural development, they calculated the relative change in agricultural production and the share of industry GDP in the country's economy. In particular, the data collected and used in the analysis included (a) employment in agriculture, (B) the volume of production of the basic sectors of the agricultural sector, (C) the share of agriculture, forestry and fisheries in GDP (in US dollars) [14].

Another important aspect of the methodology for studying the impact of the spread of COVID-19 and restrictive quarantine measures on the state and development of Agriculture is the identification of related objects of analysis. UN analysts have paid considerable attention to this segment of analytical work in their research [15]. In particular, they identified three levels of analysis: macro, meso, and micro. The assessment was aimed at studying the direct and indirect impact of the pandemic on micro, small and medium-sized enterprises, employment levels, living conditions, means for normal life, and autonomy in decision-making for women and men. At the same time, considering the type of settlement (urban, rural), age, gender, in all regions of Ukraine with an emphasis on identifying gender adaptation opportunities for each topic/sector. The researchers studied the impact of restrictive measures on international trade, production volumes, the labour market and employment in certain sectors of the economy, inflation, the exchange rate, GDP, unemployment, current account, public debt and foreign exchange reserves of the country [15].

Despite the existence of a number of scientific papers covering the diverse aspects of the impact of the COVID-19 pandemic caused by the Sars-CoV-2 coronavirus and the restrictive measures it causes, new, unprecedented problems are now emerging to ensure the stable functioning and development of the Ukrainian agricultural sector. More thorough research is needed to identify the degree of impact of quarantine restrictive measures on economic and foreign economic activity in the agricultural sector. This is necessary to develop in the future a targeted, effective and targeted state policy aimed at increasing the competitiveness of the agricultural sector, ensuring a stable position of Ukraine in the world market

of agri-food products, ensuring the socio-economic development of the country in the context of a pandemic, transforming development problems into competitive advantages.

MATERIALS AND METHODS

The theoretical provisions of the study are based on the works of Ukrainian and foreign scientists who justify the impact of the COVID-19 pandemic on the agricultural sector. The methodological basis of the study is a systematic approach to the study of the studied phenomena and processes and a dialectical method of cognition, which allowed us to comprehensively consider the processes associated with the impact of the spread of the COVID-19 pandemic and quarantine measures on the agricultural sector of Ukraine. The methods of abstract-logical method, analysis and synthesis, induction and deduction, analogy and comparison are used to generalise the theoretical and empirical aspects of the study.

The study uses a mixed approach, which includes institutional norms for the introduction of quarantine measures by the state on the territory of Ukraine during the COVID-19 pandemic, including indicators for determining complex (general) and partial (personalised) indicators of the state of the problem under study with structuring partial indicators into a wider range of indicators available in the system of statistical observations in the period being evaluated. From the standpoint of an integrated approach, all indicators that are a measure of the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector of Ukraine were considered in accordance with the target segments for assessing changes at the macro and micro levels. In particular, such as: macroeconomic trends in business efficiency; entrepreneurial activity; foreign economic activity; social and labour relations; finance and investment, state support, etc.

The collection of statistical information and the formation of the database cover: the GDP of Agriculture of Ukraine and its share in the total GDP of the country, capital investment in the agricultural sector and the share of the industry in the total volumes of capital investment, the volume of production of agricultural products, including livestock and crop production, labor productivity, consumer price indices, sales price indices of agricultural products, the total index of expenditures on agricultural products, export and import of agri-food products, Foreign Trade Balance, foreign direct investment in agriculture of Ukraine, the exchange rate, the number of employed rural population, employment level and unemployment rate of rural population, the number of people employed in agriculture of Ukraine, wages in the agricultural sector, total expenses on average per month per household in rural areas, the share of expenses for food, utilities, health-care, the number of enterprises that carried out agricultural activities, including farmers, financial results of management, the level of profitability and other macroeconomic indicators.

To diagnose the dynamics of economic indicators, analytical research uses economic and statistical methods (comparative analysis, average and relative values, grouping, trend analysis, graphical method, index, coefficient analysis, and others). Calculation of absolute and relative indicators is necessary to determine the current state of affairs in the industry, the dynamics of changes, and establish certain relationships, such as identity, similarity, or difference between the characteristics of the processes and phenomena under study. The graphical method was used to summarise statistical data, analyze them, and study complex relationships between socio-economic phenomena and processes in the movement of dynamics indicators. A number of techniques of abstract-logical tools made it possible to formulate intermediate and final conclusions and proposals. The reliability of the obtained results and conclusions is confirmed by calculations using statistical observations and testing.

The information base of the study is: data from the State Statistics Service of Ukraine, the State Employment Service, the National Bank of Ukraine, legislative and regulatory legal acts for their implementation; scientific publications. The study period covers 2019-2021.

RESULTS AND DISCUSSION

Methodological bases for studying the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector of Ukraine

Assessment of the impact of the spread of COVID-19 and restrictive quarantine measures on the state and development of the agricultural sector should be based on the following principles: legality, complexity, consistency, compliance with national interests, prevention of unfair competition, parity of development of economic

entities, promotion of innovation, sustainable rural development, balance of interests of stakeholders, social responsibility and control, improving the standard of living of the population, etc. These principles determine the interaction and relationships of subjects (households, agricultural enterprises, personal farms, individual entrepreneurs, state institutions and organizations, non-state institutions), directions and measures for implementing these assessment results.

From all the objects worked out during the study, it becomes clear that in economics and practice today there is no single approach to measuring the impact of the spread of COVID-19 and restrictive quarantine measures on the state and development of the agricultural sector. There is also no single standpoint in the scientific community on the list of indicators that should be used to conduct such an assessment. And whether it is worth calculating a certain complex aggregated Index, whether it is enough to use a set of individual indicators in certain areas of intelligence.

Establishing work on assessing the impact of quarantine measures and the spread of COVID-19 on the development and functioning of the agricultural sector of Ukraine requires first of all justification of methodological approaches and development of tools for conducting such an assessment. When assessing the impact of quarantine measures and the spread of COVID-19 on the development and functioning of the agricultural sector, we suggest the following algorithm (Fig. 1). This algorithm is universal in nature, it is advisable to use it to assess the impact of quarantine measures and the spread of COVID-19 on the development and functioning of various sectors of the economy and make decisions to support the development of the agricultural sector of Ukraine.

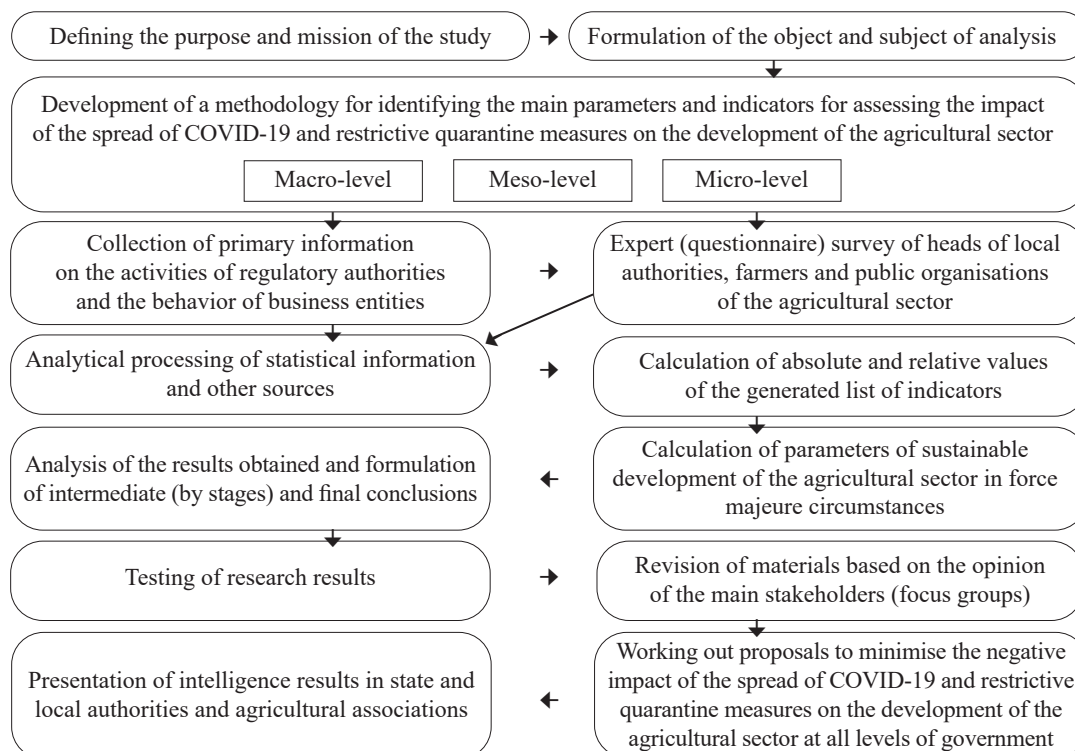


Figure 1. Structural and logical scheme for assessing the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector

Source: compiled by the authors

Considering that assessing the impact of quarantine measures is a complex multi-factor task, which boils down to identifying and interpreting a set of indicators that characterize various aspects of the industry under study, the issue of forming a relevant system for measuring risks and ways to eliminate them or mitigate destructive consequences is updated. The accuracy and reliability of the selected indicators ensure the adequacy of the entire proposed algorithm in general. Hence, only a rationally selected assessment method, a well-formed system of indicators and a rational organisation of the process can provide an objective analysis and identification of true changes associated with force majeure circumstances.

According to the authors of the article, it is most justified, from the standpoint of an integrated approach, to consider indicators that are a measure of the impact of the spread of COVID-19 and restrictive quarantine

measures on the development of the agricultural sector in two planes: at the macro- and micro-levels. Methodological approaches to determining criteria (indicators) and indicators for assessing the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector are summarised in Figure 2. The methodological design of the study of the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector of Ukraine is built in accordance with the target segments of assessment of changes, in particular: macroeconomic trends in business efficiency; entrepreneurial activity; foreign economic activity; social and labour relations; finance and investment, state support, etc. The system of suggested indicators allows us to comprehensively characterise the state of each of the subsystems of the agricultural sector.

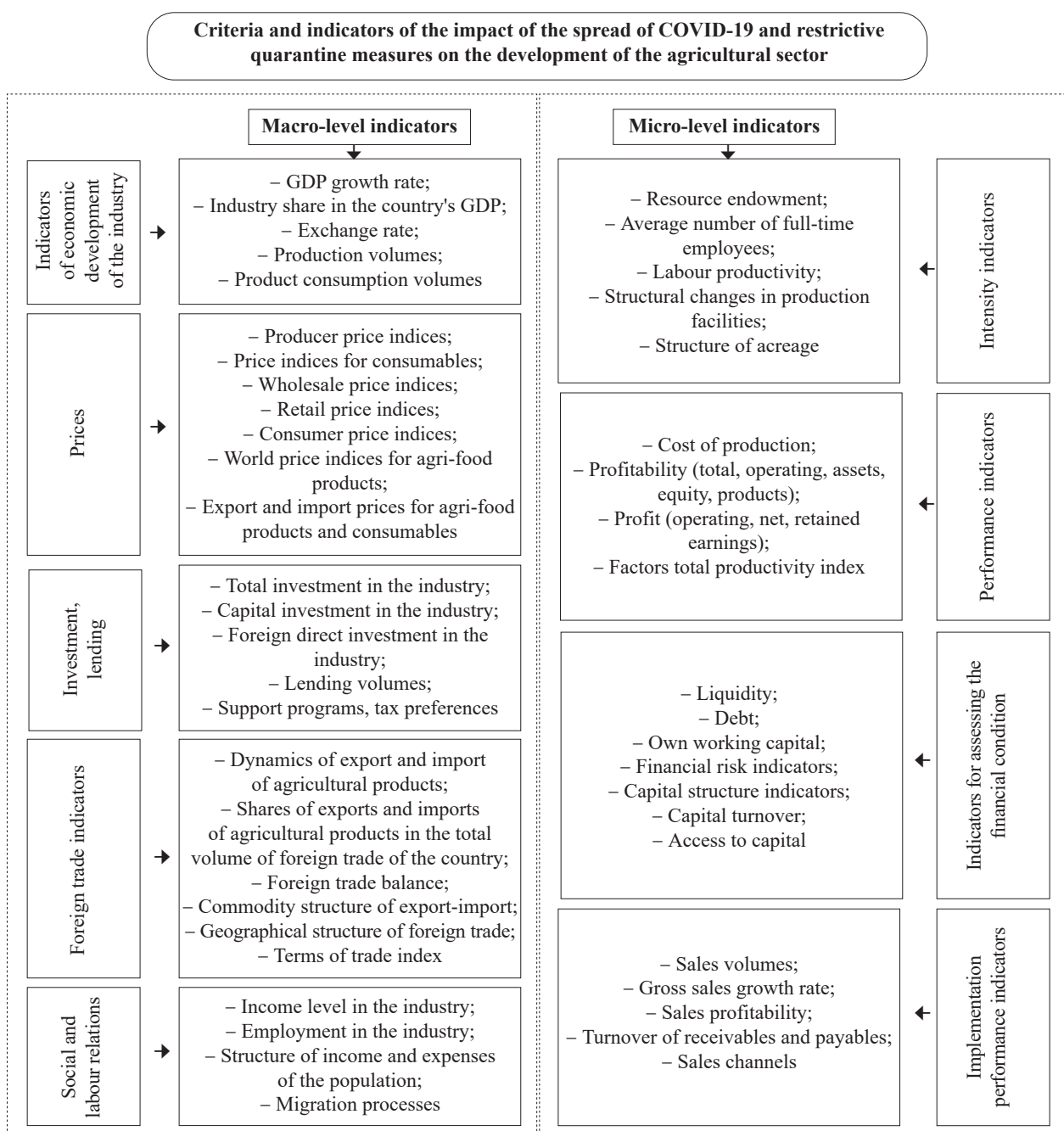


Figure 2. Criteria and indicators for assessing the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector

Source: compiled by the authors

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Empirical assessment of the impact of COVID-19 and quarantine restrictive measures on the agricultural sector of Ukraine

Macroeconomic trends in economic efficiency. The development of the industry is expressed by the level and dynamics of its share in the country's GDP. This is a complex indicator that reflects the processes of social reproduction occurring in a particular industry and technologically related activities. At the same time, the impact of the state's economic policy on the development of the industry and expected and unexpected risks for commodity producers is also important. The value of this indicator is considered by investors when making decisions about starting a business and investing in a particular industry,

which also characterizes the level of its attractiveness in terms of payback periods, future risks, product sales markets and competitiveness. It is positively evaluated with dynamic growth. In 2020 compared to 2019, Ukraine's agricultural GDP, expressed in actual prices, increased by 8.9%. However, if we analyse the value of the industry's GDP, expressed in constant prices in 2016, the opposite trend can be traced – there was a decrease of 11.5% (Table 1). At the same time, the share of agriculture in the GDP of the country's economy as a whole decreased by 0.8% points, if we consider quarterly dynamics (Fig. 3). This decrease is caused by violations in the work of logistics infrastructure, in particular transport, including the organization of export of agricultural products.

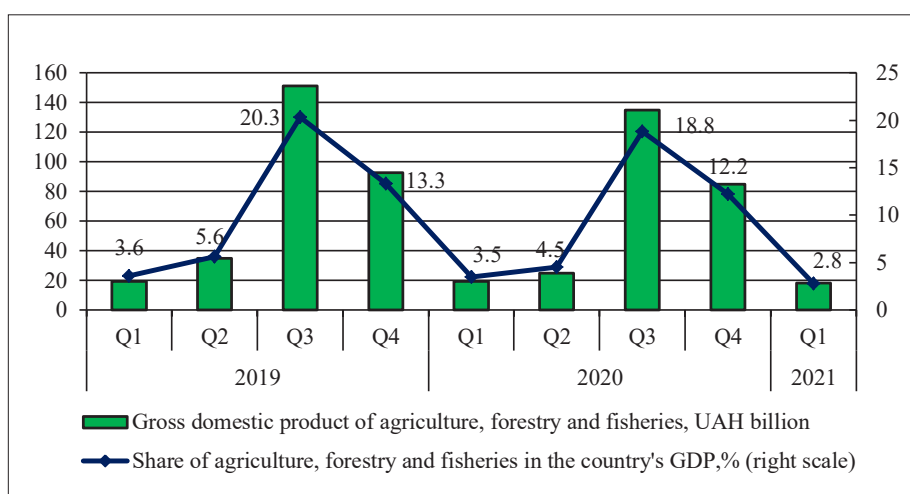


Figure 3. GDP of Agriculture, Forestry and Fisheries of Ukraine, 2019-2021 (in constant prices in 2016)

Source: formed by the authors according to the state statistics service of Ukraine [16]

Ensuring the effective functioning and development of the agricultural sector of Ukraine requires significant investments, both in infrastructure and production itself. Capital investments are funds allocated for the reproduction of fixed assets, expansion, reconstruction and modernisation of enterprises, implementation of technical and technological progress in the industry, construction of social and cultural facilities, design work, etc. Capital investment serves as a basic parameter of the reproduction

process, which determines the possibilities of structural reforms and sustainable long-term economic and social development of the industry. They are positively evaluated when growing in dynamics. However, according to the analysis, the total volume of capital investment in agriculture in Ukraine has steadily declined. Thus, for the period 2019-2020, the volume of capital investments decreased by 34.5%, and similar trends continue in 2021 (Table 1, Fig. 4).

Table 1. Key macroeconomic, socio-economic and financial indicators of Agriculture in Ukraine, 2019-2021

Indicator	Units	Years, periods					2020 to 2019	Q1 2021 to Q1 2019
		Q1 2019	2019	Q1 2020	2020	Q1 2021		
Agricultural GDP	billion UAH	24.4	356.6	24.0	388.4	28.3	108.9%	116.0%
Share of industry GDP in the country's total GDP	%	3.0	9.0	2.8	9.3	2.8	0.3 p.p.*	-0.2 p.p
Agricultural GDP (in constant prices in 2016)	billion UAH	19.4	298.1	19.1	263.9	18.2	88.5%	93.8%
Capital investment	billion UAH	11	55	7	36	9	65.5%	81.82%
Share of the industry in total capital investments	%	10.1	9.5	9.2	8.7	11.2	-0.8 p.p.	1.1 p.p.
Production of agricultural products (in constant prices in 2016)	billion UAH	-	681	-	612	-	89.9%	-

Table 1, Continued

Indicator	Units	Years, periods					2020 to 2019	Q1 2021 to Q1 2019
		Q1 2019	2019	Q1 2020	2020	Q1 2021		
Including crop production	billion UAH	–	539	–	473	–	87.8%	–
Animal husbandry	billion UAH	–	142	–	139	–	97.9%	–
Production of gross output per 1 employed in agriculture (labor productivity)	thousand UAH	–	929	–	857	–	92.2%	–
Consumer price indices (by the corresponding period of the previous year)	%	108.9	107.9	102.6	102.7	107.4	-5.2 p.p.	-1.5 p.p.
Agricultural sales price indices (by the corresponding period of the previous year)	%	101.3	92.4	92.7	119.2	165.1	26.8 p.p.	63.8 p.p.
Aggregate index of agricultural production costs (by the corresponding period of the previous year)	%	105.5	93.4	92.7	118.5	130.4	25.1 p.p.	24.9 p.p.
Export of agri-food products	million US dollars	5,343	22,144	5,643	22,179	4,997	100.2%	93.5%
Export of agri-food products	million US dollars	1,434	5,736	1,686	6,498	1,724	113.3%	120.2%
Foreign trade balance	million US dollars	3,909	16,408	3,955	15,681	3,276	95.6%	83.8%
Foreign investment	million US dollars	-36.5	587.2	-9.8	444.9	-7.7	75.8%	21.1%
Exchange rate	UAH/USD	27.30	25.84	25.04	26.96	27.97	104.3%	102.5%
Rural employment	thousand people	5,027.4	5,205.7	5,141.7	4,968.3	4,810.9	95.4%	95.7%
Rural employment rate	%	47.2	48.9	48.8	47.1	46.1	-1.8 p.p.	-1.1 p.p.
Rural unemployment rate	%	10.4	8.6	9.4	10.3	11.5	1.7 p.p.	1.1 p.p.
Number of people employed in agriculture	thousand people	–	3,010	–	2,721	–	90.4%	–
Average salary in agriculture	UAH	7,782	8,738	8,947	9,734	1,0058	111.4%	129.2%
The ratio of the average wage in agriculture to the average in the economy	%	76.0	83.2	78.2	84.0	73.4	0.8 p.p.	-2.6 p.p.
Total expenses on average per month per household in rural areas	UAH	7,379.4	–	7,464.9	–	8,705.7	–	118.0%
Share of spending on food and non-alcoholic beverages	%	39.1	–	42.0	–	38.4	–	-0.7 p.p.
Share of utility costs	%	19.3	–	16.8	–	19.5	–	0.2 p.p.
Share of health care costs	%	5.4	–	5.4	–	5.7	–	0.3 p.p.
Number of enterprises engaged in agricultural activities	units	–	48,504	–	47,523	–	98.0%	–
including farms	units	–	32,452	–	31,851	–	98.1%	–
Financial results before tax	billion UAH	–	93.6	–	81.6	–	87.2%	–
Net profit	billion UAH	–	92.9	–	81.0	–	87.2%	–
Level of profitability of operating activities	%	–	19.8	–	19.0	–	-0.8 p.p.	–
Level of profitability of all activities	%	–	16.6	–	13.9	–	-2.7 p.p.	–

Note: * p. p. - percentage points

Source: calculated by the authors according to the state statistics service of Ukraine [16]

A representative indicator for analysing trends in the development of the agricultural sector during the period of quarantine measures is the dynamics of growth rates

and the structure of gross agricultural output. These indicators indicate the stability of production, the ability of producers to use comparative and competitive advantages,

including “scale effect”, the ability to adequately respond to price volatility and the variability of the agri-food market. They characterise labor productivity per 1 employee and the land intensity of production of the main

crops. According to statistics, in 2020 in Ukraine there was a significant decrease in agricultural production – by 9.1%, including in crop production – by 12.2, animal husbandry – by 2.1%, while labor productivity decreased by 7.8% (Table 1).

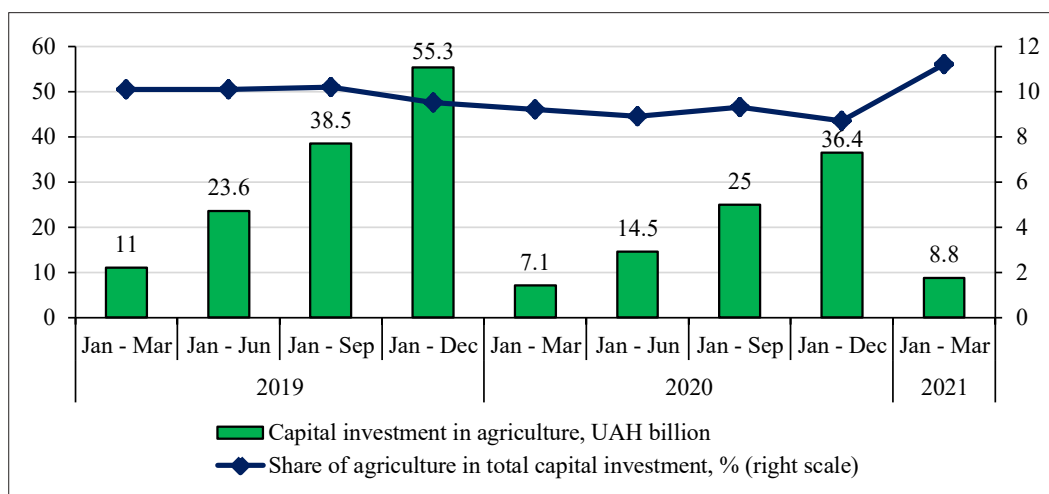


Figure 4. Capital investments in agriculture of Ukraine, 2019-2021

Source: formed by the authors according to the state statistics service of Ukraine [16]

This resulted in the spread of the COVID-19 pandemic and quarantine measures on the foreign economic activity of the agricultural sector of Ukraine. The agricultural sector of Ukraine is largely a raw material and export industry, so its effectiveness significantly depends on the foreign economic situation on world markets. As it is known, with the spread of the COVID-19 pandemic and the introduction of quarantine measures at the global level, it has undergone significant changes. In particular, conditioned upon the rupture of logistics chains between individual companies, non-fulfillment of contracts, restrictions on trade transactions between states, restrictive measures on the movement of goods, the closure of agri-food markets, and so on. Uncertainty in agri-food markets and the general economic downturn have put foreign trade revenues at risk.

As can be seen from Table 1, the volume of exports of agri-food products in 2020 compared to 2019 remained virtually unchanged—an increase of only 0.2% or 35 million dollars. While in 2015-2019, the average annual export growth rate was 11.2%, and in 2019 – 19.0% [16]. The opposite trend was observed in the import sector. In 2020, the volume of imports of agri-food products increased by 13.3% compared to the previous 2019. And this is at a time when in the previous 2015-2019 the average annual growth rate of imports was 8.0%, and in 2019 it decreased by 7.6%. An increase in imports and a slowdown in exports led to a significant deterioration in the foreign trade balance of agri-food products – for the first time in the last decade, the foreign trade balance decreased, although it remained positive (Table 1, Fig. 5).

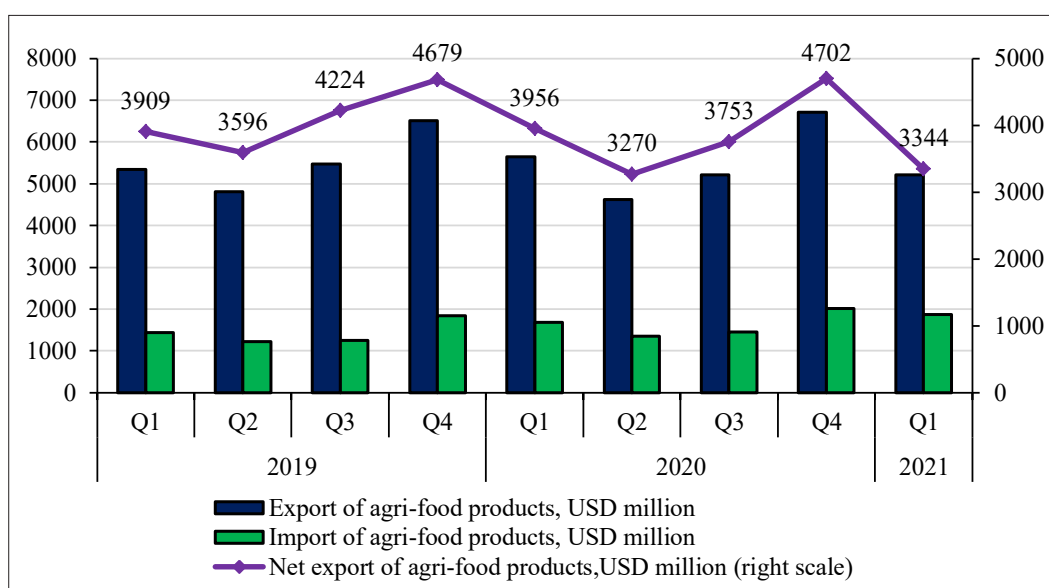


Figure 5. Foreign trade in agri-food products of Ukraine, 2019-2021

Source: formed by the authors according to the state statistics service of Ukraine [16]

In the future, such trends will have a negative impact, namely, a decrease in the competitiveness of Ukrainian companies' products, their loss of market share, which, in turn, will lead to even worse long-term consequences, such as a decrease in production and sales volumes, a drop in income, a shortage of working capital for current needs and resources for innovative expanded reproduction, mass dismissal of employees, and so on.

The recovery of the global economy in late 2020 – early 2021, the revival of international trade and sectoral factors led to an increase in prices in the world's commodity markets. Thus, according to the Food and Agriculture Organization of the United Nations (FAO), the average value of the FAO Food Price Index (FFPI) in September 2021

was 130.0 points, which is 1.5 points (1.2%) higher than in August and 32.1 points (32.8%) higher than in the same period last year. The increase in the value is mainly conditioned upon the increase in prices for most cereals (the average value of the FAO grain Price Index in September 2021 was 132.5 points, which is 2.6 points (2%) higher than in August and 28.5 points (27.3%) higher than in September 2020) and for vegetable oils (the average value of the FAO Vegetable Oil Price Index in September was 168.6 points, which is 2.9 points (1.7%) higher than in the previous month and almost 60% higher for the same period last year). Prices for dairy products and sugar also increased, while the meat price index remained almost at the same level (Fig. 6).

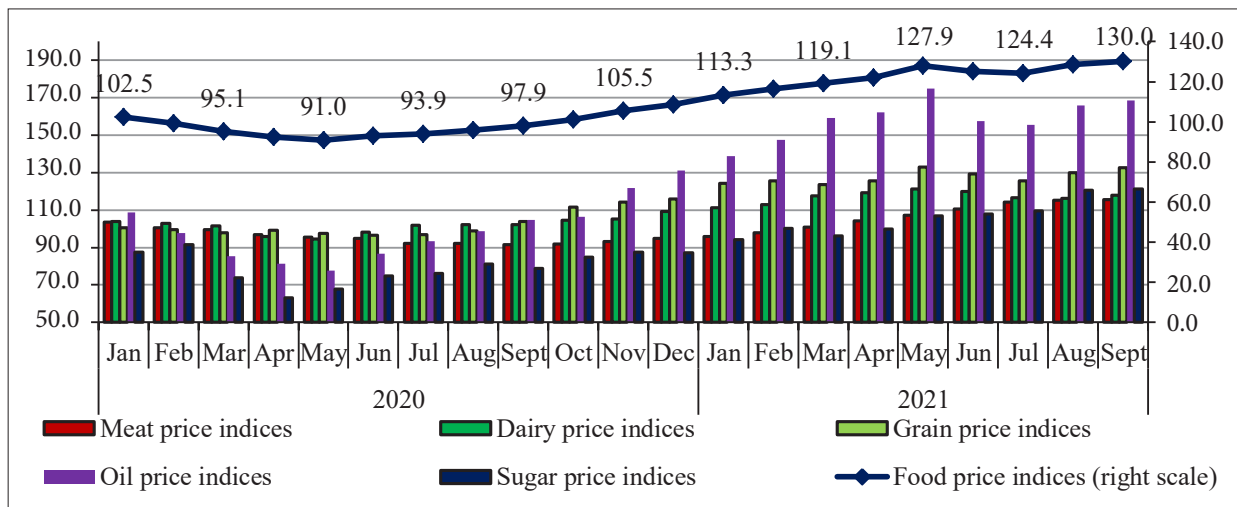


Figure 6. Nominal food price index, 2020-2021

Source: formed by the authors according to FAO data [17]

This is a favorable factor for Ukrainian agricultural exports. High prices essentially remained the main driver of export revenue growth. Wheat prices rose due to adverse weather conditions and low yields in exporting

countries, corn – due to the high demand of livestock and bioethanol production, sunflower oil – explained by a decrease in stocks (Fig. 7).

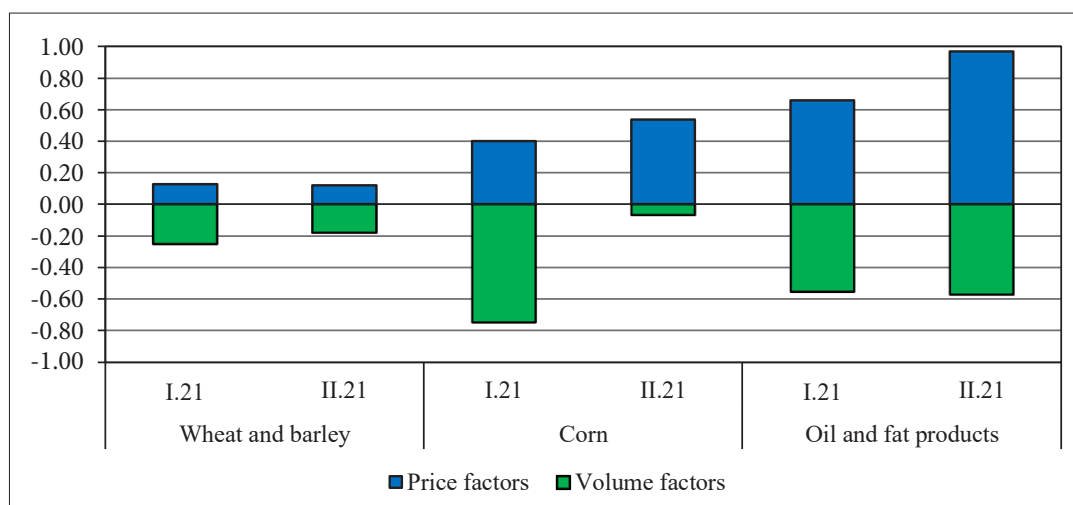


Figure 7. Absolute annual change in prices and export volumes for certain agri-food products, 2021, USD billion

Source: formed by the authors according to the state statistics service of Ukraine [16]

One of the most effective tools for the development of the agricultural sector is foreign investment. The volume of Foreign Direct Investment (FDI) in the industry is a sign of its attractiveness, as it indicates absolute and comparative advantages that investors cannot get in other countries. Foreign investment contributes to modernisation, provides access to modern technologies not only in production, but also in management, which serves as an important factor in the development of market forms of management and the introduction of modern methods of conducting agricultural business; sales of products and their promotion to new foreign markets; meet the need for means of production, equipment for in-depth processing of raw materials and its marketing. Foreign investment, if used effectively, can provide the necessary scale and pace of structural adjustment of Agriculture, which will make it possible to join the global value chains and take its rightful place in the international system of division of labour. The current situation in the context of the growing new wave of the coronavirus pandemic does not contribute to this. For the period 2019-2021, the volume of FDI to agriculture in Ukraine was insignificant. Their share in total FDI volumes in Ukraine was only 1.1-1.7%. Moreover, during the analysed period, their amount decreased by almost 24.2%, which indicates a significant outflow of foreign capital from the industry (Table 1).

The forecast of experts that in the context of the coronavirus pandemic, the volume of FDI in the agricultural sector will grow conditioned upon the fact that this sector is the most stable and less vulnerable to this

type of shock compared to other industries (tourism, transportation, hotel and restaurant business, mass event industry, etc.) – did not come true. Therefore, it is advisable to conclude that the main reason for the lack of strategic foreign investment is the unfavorable investment climate in Ukraine, frequent changes in legislation and under-reformed judicial reform. In particular, because of this, there is still uncertainty about further cooperation on the part of investors who have already invested their funds in agriculture in Ukraine. According to Table 1, 150.0 USD million was withdrawn from the industry in the period 2019-2021. Therefore, experts' forecasts that the opening of market turnover of rights to agricultural land plots will give a green light to investment, in the short term, turned out to be somewhat exaggerated.

Impact of the spread of the COVID-19 pandemic and quarantine measures on the labour market, employment and income level of the rural population of Ukraine. The data in Table 1 show that in the first quarters of three consecutive years (2019-2021), the number of employed rural population decreased, which in 2021 amounted to 4810.9 thousand people, or 216.5 thousand less compared to 2019, and compared to the previous year – by 330.8 thousand people. The least popular in the rural labour market were people aged 15-29 years – the reduction in this category of employees amounted to 159.7 thousand people, or 73.8% of the total number of dismissed employees. As you know, the risk group for the possibility of COVID-19 was people aged 60 years and older, so the number of employees in this age category decreased by almost 28 thousand, which is 13% (Fig. 8).

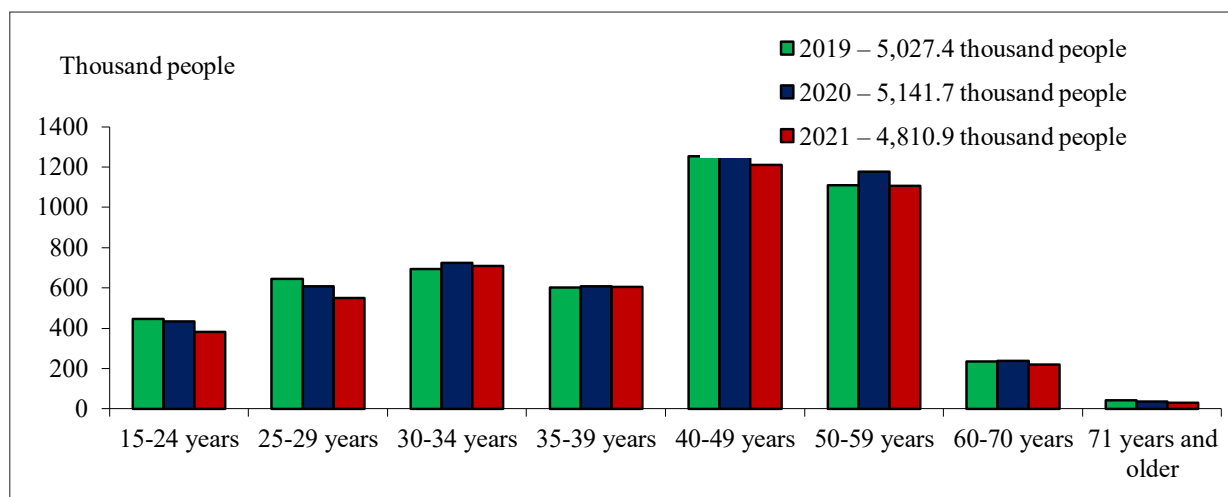


Figure 8. Employment of the rural population of Ukraine by age group in January-March 2019-2021, thousand people
Source: formed by the authors according to the state statistics service of Ukraine [16].

The release of employees from enterprises, institutions and organisations in the agricultural sector, including due to COVID-19, led to a significant increase in unemployment in 2020-2021. In particular, the unemployment rate of the rural population increased by 2.9% points from 8.6% in 2019 to 11.5% in the first quarter of 2021.

An important marker of the impact of quarantine restrictions on rural residents is their income and the

extent of poverty. As of March 2021, the average monthly salary in agriculture of Ukraine in the equivalent of full employment was UAH 10,058.0, which is on average UAH 3,554.0 less than the average salary in the Ukrainian economy, and UAH 4,063 less than in industry for the specified period. As of March 2021, wages in agriculture were only 73.9% and 67.1% of their level in the country's economy and Industry, respectively (Fig. 9).

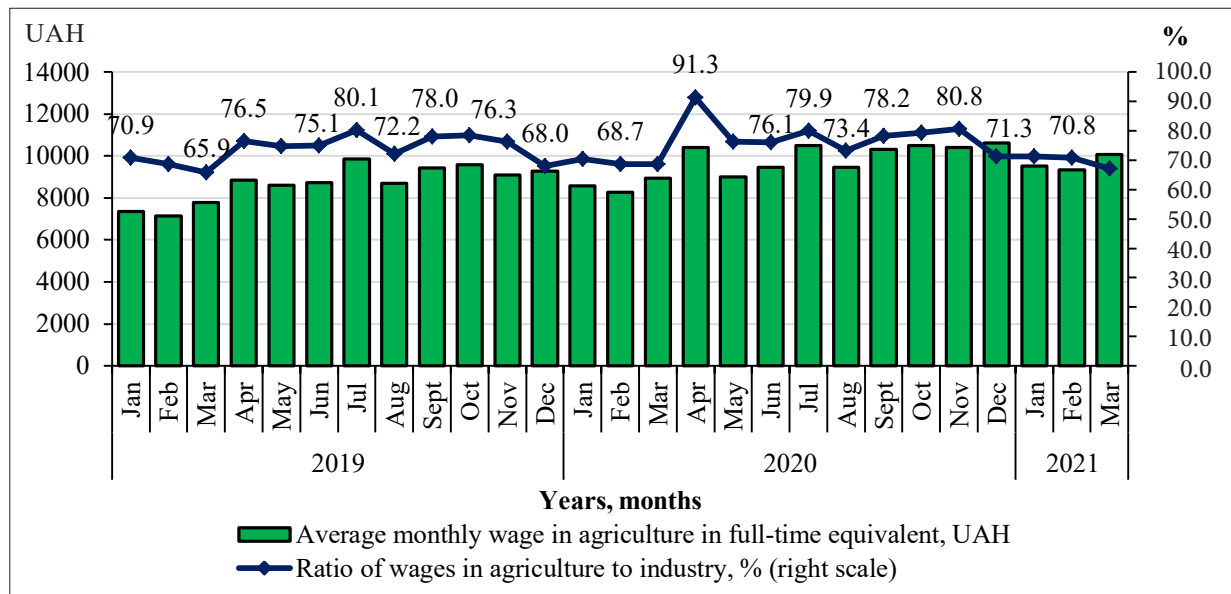


Figure 9. Dynamics of wages in agriculture of Ukraine, per full-time employee, 2019-2021

Source: formed by the authors according to the state statistics service of Ukraine [16]

According to the state statistics service of Ukraine, the share of the population whose average per capita equivalent total income per month is lower than the average level of total income in the first half of 2020 compared to the previous year increased by 0.3% points and amounted to 58.4% [16]. Similar trends are observed in relation to the intersection of the so-called "red lines" – the legally established and actual subsistence minimum, they also increased by 0.6 and 1.7% points, respectively. Total expenditures of the rural population for the analysed period 2019-2021 increased by 18.0%. In the total expenditures of rural households, food and non – alcoholic beverages account for 38.4%, utilities – 19.5%, and healthcare – 5.7% (Table 1).

Trends in the development of entrepreneurial activity in agriculture in Ukraine. It is worth noting that the spread of COVID-19 has affected the activities of the agricultural

business, namely – on the activity and efficiency of enterprises. In accordance with the dynamics of statistical estimates of the number of economic formations, we note their decrease in 2020 compared to 2019, while in previous years there was an increase. In particular, according to the results of 2020, the number of enterprises engaged in agricultural activities decreased by 981 units or by 2%. Of these, the number of farms decreased by 601 units (Table 1).

The analysis showed that the state of agriculture in Ukraine in 2020 conditioned upon quarantine restrictions showed a deterioration in structural, economic and financial indicators. In particular, net profit for 2020 decreased by 12.8% compared to 2019. The level of profitability of operating activities decreased by 0.8% points to 19.0%, and the profitability of all activities of agricultural enterprises – by 2.7% points to 13.9% (Table 1, Fig. 10).

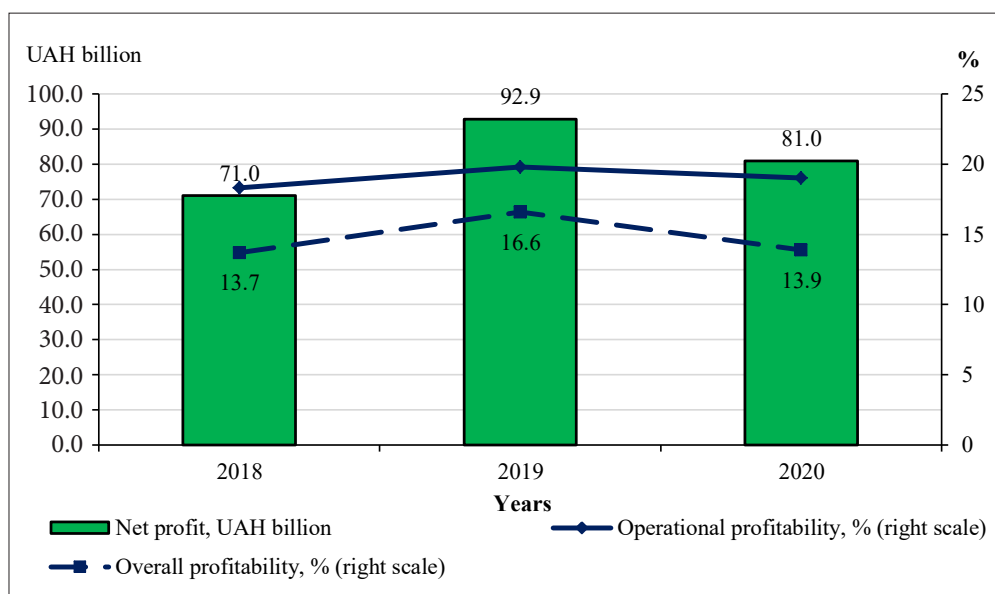


Figure 10. Results of agricultural enterprises' activities in Ukraine, 2018-2020

Source: formed by the authors according to the state statistics service of Ukraine [16]

In 2020, under the influence of quarantine restrictions, the resulting resource usage indicators significantly worsened compared to the previous year 2019. We believe that the largest losses, both financial and image, were suffered by micro-, small and medium-sized agricultural assets of farmers who are focused on the production of niche products. Experience shows that almost half of the products (45.6% in 2019 and 46.1% in 2020) are produced by private farms (OSG) and small producers (44.1% and 44.9% of crop production, 51.0% and 50.2% of livestock production, respectively). However, these products are mainly aimed at the domestic consumer, whom they generally satisfy in terms of “price – quality” items and are sold at local food markets, public catering establishments (restaurants, cafes). Spring and summer 2020, spring 2021 conditioned upon the introduction of restrictive measures in response to the spread of COVID-19 retail and wholesale markets, public catering establishments that are the main sales channels, especially fruit and vegetable, early berries, greens and meat and dairy products by these categories of producers, were closed in almost all regions of Ukraine. Since this happened during the period of harvesting early vegetables and herbs, in fact, the products of Ukrainian producers were forced out of the domestic market by import supplies. Ukrainian farmers suffered significant losses, and the state did not offer them appropriate compensation.

The Cabinet of Ministers of Ukraine tried to ease external pressure on businesses and households by providing some benefits and discounts, as well as minimum wage compensation for employers. In particular, the Law of Ukraine “On Amendments to the Tax Code of Ukraine and Other Laws of Ukraine Regarding Taxpayer Support for the Period of Implementation of Measures Aimed at Preventing the Occurrence and Spread of Coronavirus Disease (COVID-19)” No. 533-IX of March 17, 2020 [18], provided for the exemption of agricultural producers from paying for land in the period from March 1 to April 30, 2020 (land tax and rent for land plots of state and municipal ownership) for land plots that are owned or used, including on the terms of lease, individuals or legal entities and are used by them in economic activities. According to the Law of Ukraine [18] for the periods from March 1 to March 31 and from April 1 to April 30, 2020, members of farms were temporarily exempt from calculating, calculating and paying a single contribution to mandatory state social insurance, if they do not belong to persons subject to insurance on other grounds. This saved money in the amount of UAH 2,078.12 for each member of the farm.

The volume of tax preferences from the application of agricultural enterprises that pay a single tax of group 4 in 2020 almost tripled the corresponding indicator in 2019. In particular, in 2020, the volume of tax preferences for this category of enterprises amounted to UAH 23.04 billion against UAH 8.23 billion in 2019, while direct budget support remained almost at the same

level: UAH 4.3 and 4.0 billion, respectively [19]. The predominant amount of benefits was received by producers of crop products. Thus, explained by the opportunity to pay a single tax of Group 4, agricultural enterprises received tax “savings” in the amount of more than UAH 17.5 billion only for three crops – wheat, corn and sunflower, which are the most common in cultivation (18.2%, 20.3 and 19.1% of crop production, respectively) [16]. These opportunities were mainly used by medium and large companies. Measures to support the vital activity of small and medium-sized agricultural businesses in the context of the coronavirus pandemic were insufficient.

CONCLUSIONS

Based on the results of the study it is advisable to draw the following conclusions:

1. In economics and practice, there is currently no scientifically based and methodologically verified approach to measuring the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector. It is proved that the methodological basis of the study can be an approach that includes institutional norms for the introduction of quarantine measures by the state on the territory of Ukraine during the COVID-19 pandemic, as well as indicators for determining complex (general) and partial (personalised) indicators.

2. It is proved that from the standpoint of an integrated approach, all indicators that are a measure of the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector should be considered in two planes: at the macro and micro levels. The methodological design of the study of the impact of the spread of COVID-19 and restrictive quarantine measures on the development of the agricultural sector of Ukraine in the study is built in accordance with the target segments of the assessment of changes, in particular: macroeconomic trends in business efficiency; entrepreneurial activity; foreign economic activity; social and labour relations; finance and investment, state support, etc.

3. The analysis showed that the progressive development of Agriculture in Ukraine during 2020 explained by quarantine restrictions demonstrated the structural, economic and financial effects of the descending plan. In particular, agricultural GDP, expressed in constant prices in 2016, decreased in 2020 p. by 11.5% compared to 2019. There was a significant decrease in agricultural production – by 9.1%, labour productivity decreased by 7.8%. The volume of imports of final consumption goods increased by 13.3%. Total capital investment in agriculture for the period 2019-2020 decreased by 34.5%, foreign direct investment decreased by 24.2%.

As a result of the introduction of two All-Ukrainian lockdowns in 2020-2021, the number of employed rural population decreased by 7%. The unemployment rate for this period also increased by 1.7% points, or to 11.5%. The number of people employed directly in agriculture

in Ukraine decreased by 9.6% for the period 2019-2020. There is a significant differentiation of incomes between rural and non-rural population, increasing poverty and social insecurity of self-employed. As a result, the general well-being of rural households has deteriorated, poverty has increased, and the problem of food affordability has worsened for some groups of population.

4. It should be noted, however, that there is no reason to claim that such a deterioration in the performance of the agricultural sector is due solely to the spread of the COVID-19 pandemic and related restrictive measures. After all, 2020 turned out to be a difficult year for agricultural producers. The crisis situation coincided in time and space with unfavorable weather: a low-snow winter,

cold and rainless spring, which slowed down the growing season of plants, the need to re-sow; the transfer of the harvest period to later periods; the drought, which led to a decrease in yield and even to a complete loss of crops in the southern regions of Ukraine.

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Аграрний сектор України в умовах поширення COVID-19 та обмежувальних карантинних заходів: методологічні засади емпіричного оцінювання

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Анотація. Внаслідок негативного впливу пандемічних обмежень через поширення захворювання COVID-19 відбувається спад світової економіки, що спричинило наявність реальних ризиків і загроз розвитку українського аграрного сектору. Визначення цих ризиків і загроз, оцінювання впливу чинників поширення пандемії COVID-19 та запроваджених у відповідь карантинних заходів на аграрний сектор є важливою проблемою аграрної політики, що потребує спрямування максимуму зусиль на своє вирішення. Метою статті є узагальнити методологічні основи оцінювання впливу обмежувальних карантинних заходів 2020–2021 рр., пов'язаних з поширенням пандемії COVID-19, для аграрного сектору економіки України, обґрунтувати засади визначення критеріїв та індикаторів впливу та здійснити їх емпіричне вимірювання. При узагальненні теоретичних і методичних аспектів дослідження використано аналіз і синтез, індукцію й дедукцію, аналогію та порівняння. З метою діагностики динаміки економічних показників в аналітичних дослідженнях застосовано економіко-статистичні методи. Низка прийомів абстрактно-логічного інструментарію дозволили сформулювати проміжні й прикінцеві висновки. Удосконалено методологічні засади, науково-методичні та практичні підходи до оцінювання впливу обмежувальних карантинних заходів 2020–2021 рр., пов'язаних з поширенням пандемії COVID-19, для аграрного сектору економіки України шляхом обґрунтування оптимального інструментарію дослідження, виокремлення найінформативніших показників та індикаторів. Обґрунтовано, що з позицій комплексного підходу всі показники, які є мірилом впливу поширення COVID-19 та обмежувальних карантинних заходів на розвиток аграрного сектору, доцільно розглядати у відповідності до цільових сегментів оцінки змін на макро- і мікрорівнях. Зокрема: макроекономічні тенденції ефективності господарювання; підприємницька активність; зовнішньоекономічна діяльність; соціально-трудова відносина; фінанси та інвестиції, державна підтримка тощо. Проведений аналіз показав, що поступальний розвиток сільського господарства України протягом 2020 р. у зв'язку з карантинними обмеженнями демонстрував структурні, економічні й фінансові ефекти (результати) низхідного характеру. Перспективними напрямками подальших наукових розвідок у цьому напрямі слід вказати розробку комплексу стратегічних заходів щодо мінімізації ризиків для аграрного сектору України під час та після завершення пандемії COVID-19

Ключові слова: аграрний сектор, пандемія COVID-19, карантинні обмежувальні заходи, зовнішні шоки, внутрішні чинники впливу, метод оцінювання
