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TURBULENCE IN THE DEVELOPMENT OF UKRAINE AND RUSSIAN AGGRESSION AS A DESTROYER OF THE AGRICULTURAL SECTOR

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SUMMARY

Turbulence acts as a key characteristic of the development of systems, processes, and structures of various natures, and when it increases, their destruction or self-organization occurs at a new level, resulting in transitions from disorder to order and vice versa. Stochastic systems have a state determined by a random combination of its components, both internal

and external, at different times, and the final result cannot be clearly predicted or precisely predicted. Therefore, the key problem of modern times is to ensure sustainable development of socio-economic and other multi-sectoral systems under the conditions of increased turbulence. An extremely powerful source of turbulence is the Russian-Ukrainian war, which arose suddenly and avalanche-like destroyed and continues to destroy the existing order and is accompanied by unpredictable and catastrophic consequences. The devastating consequences of military operations on Ukrainian territory caused and continue to cause significant damage to the national economy, including and the agricultural sector, and its restoration requires significant financial, material and human resources and a long time.

Key words: turbulence, agrarian and economic systems, crises and disasters, direct and indirect losses, risks, Russian aggression

Introduction. Under the today's conditions, unpredictability and chaos, arising from turbulence, are important characteristics of the development of various systems. The behavior of economic systems under the conditions of a spontaneous combination of various phenomena that progress and cannot be assessed indicates that the stability of such formations will decrease, and the level of chaos and unpredictability will increase. The unsystematic and chaotic emergence of new phenomena and their conflicting impact on functioning entities becomes an obstacle for reliable forecasting of the behavior of socio-economic systems of various nature. It also makes it impossible to implement at least some elements of predictability. Unpredictability in relation to any factors and multi-sectoral systems, in particular agrarian and economic, is especially evident in the conditions of war, when specific military actions of both the victim and the aggressor, as well as their destructive consequences, are practically impossible to predict even for a short period of time.

Methodological basis of the research. The development of systems, processes and structures of various nature under the conditions of increased turbulence, chaos and unpredictability and their forecasting for the future is extremely problematic and requires the development of new scientific approaches. Turbulence has become a constant "companion" in all spheres - living and non-living nature and society (civil society). On the basis of generalizations of a number of scientific and methodical provisions on the problems of turbulence published in various publications, it was possible to systematize and highlight the components and factors of the turbulent approach, which must be taken into account in the study and analysis of complex systems, as well as to formulate prerequisites and mediating factors and phenomena that cause it application. It is necessary to take into account that these systems are unstable - their structures are subject not only to external influences, but also to internal transformations and, depending on the possible combinations of elements, their role as a result of triggering the reactivity of the action in general will have different development scenarios.

Results. The development of science and technology in all periods took place in a spiral, but with each of its turns there was a transition to a higher level and even further horizons were opened, which required a more thorough understanding of the phenomena and processes of a new nature.

For a long period of time in the field of view of scientists from many countries there are questions, the source of which was the intensification of turbulence in

animate and inanimate nature. In a concentrated form in the national economy, researchers understand the manifestation of the relative velocities of the elements of the economic system as turbulence [1, p.91].

In civil society (Society), there are various phenomena and processes that are not very or not at all predictable for a long period of time. At the same time, the peculiarities of the development of society at certain periods of time carry out not only a diverse, but often contradictory influence on other aspects of its functioning. We are talking about the economy, finance, the social sphere, the population and the forms of its settlement, the public order in the country, the defense sector of the state, etc. Each side of each state formation develops according to its own scenario, but to varying degrees is subjected to both internal transformations and external influences - and not only from society, but also from outside, that is, the whole world.

We are talking about global upheavals in the world: local wars and terrorist attacks, natural disasters, environmental degradation, financial, economic and agrarian crises, scientific and technological revolutions (innovative, information, communication, cognitive, socio-humanitarian, conversion of bio- and nanotechnologies into NBICS- technology), the transition of the national economies of the developed countries of the world to a new cycle (short, medium, long) or phase (recession, depression, recovery, growth until the peak of recovery) of economic development, etc. Since in the era of information technology any significant changes, diverse phenomena and new processes that arise and take place at one end of the world can quickly become the subject of discussion and thus influence the adoption of important decisions at the other end or in other countries, everything in this world has become both interconnected and mutually related.

Practice has shown that even small events in chaotic systems can lead to the "butterfly effect", that is, the emergence of large-scale events in a different place and at a different time from small changes. Often, social networks, online media and print media play a specific role as a catalyst for future events, spreading this or that information, contribute to the formation of appropriate moods in society, various large-scale changes and provoke the emergence of crisis phenomena. Consequently, the Society, as well as animate and inanimate Nature, is in constant motion, and relative calm or order in one part of the country and the world can coexist with disorder and chaos in another. In addition, sooner or later the situation can unfold exactly the opposite.

For the current conditions, it has become obvious that practically any system, depending on the "turbulence intensity level", is in a state of permanent instability. But when certain threshold values are reached, the system is faced with a choice: further intensification of turbulence will contribute to an increase in the probability of approaching its bifurcation point (i.e., a branching point along one of the possible development paths) or its destruction altogether. In fact, we are talking about replacing the existing order, within which the system previously developed, with a new one, which will be formed under the influence of increased internal and external turbulence, in order to give a completely new system greater stability. Thus, in a systemic form, turbulence is understood as a very common phenomenon of self-organization, which results in regular or irregular (chaotic) transitions from disorder to order and vice versa [2, p. 24]. This term has penetrated not only the natural sciences, but also medicine, economics, finance, social life, etc. This is explained by the fact that unpredictability, as a key characteristic of the behavior of systems, processes or structures, i.e. a certain environment, which is influenced not only by internal changes, but also by external influences that were, are and will be inherent in different branches of science and areas of practical activity. For example, in the second half of the last century, this term began to be actively used to characterize multi-vector, and often contradictory, unsystematic and chaotic changes in the capital markets, consumer goods, price dynamics, demand for loans and other financial resources. Thus, we are talking about the stochastic (random) nature of the development of civil society, the national economy, the agricultural, financial and other sectors in conditions of uncertainty, unpredictability and chaos. According to scientists, the development of such systems is probabilistic.

Stochastic systems can have a state determined randomly, or a random combination of its components. We are talking not only about a random set of factors, but also about the random, unpredictable nature of their combinations, as well as both internal and external factors. Therefore, the final result of the functioning of any system cannot be clearly predicted or accurately foreseen. This is explained by the fact that they are under the influence of endogenous and exogenous factors acting with different strength and in different places of the system, as well as in different periods of time. And at each individual moment of time in the system, one combination of these factors can take place, at the next - a completely different one, and in subsequent periods of time - not like any of the previous ones. Since the mentioned combinations of factors will constantly change, the turbulence of systems of different nature (physical, biological, social, economic, etc.) at each individual moment of time will be characterized by a different set of parameters inherent to it. Thus, under the influence of the turbulence of various factors, the formation of changeable, unpredictable and even chaotic conditions for the functioning of economic systems occurs, and this contributes to an increase in entropy in it (Greek - turning inward), that is, the degree of uncertainty (disorder, chaos). Entropy is a key characteristic of the

development (increase or decrease in uncertainty) of complex systems of different nature. An increase in turbulence contributes to an increase in entropy, consequently a decrease in the stability of the system and, thereby, a decrease in the possibilities and range of predicting their further behavior. The more formed an open system is, the less entropy it will have and vice versa. Entropy approaches zero in closed systems, but if such systems exist, they are theoretically formed as models for research.

On the basis of generalizations of a number of scientific and methodological provisions on the problems of turbulence published in various publications, it was possible to systematize and identify the components and factors of the **turbulent approach**, which must be taken into account when studying and analyzing complex economic systems, as well as to formulate the prerequisites and mediating factors and phenomena that allow its use is:

- 1) it is advisable to use it (turbulent approach) in the case when the level of environmental uncertainty increases uncontrollably under the influence of the functioning of the economic system itself;

- 2) the environment in which the economic system functions becomes difficult to predict and unpredictable, and in a short period of time a significant number of destructive factors arise that affect its stability;

- 3) it (the turbulent approach) should be used only when the environment in which the economic system operates is really turbulent, since unstable processes are not always turbulent, and turbulent processes are not always defined as unstable and chaotic;

- 4) there are no opportunities for planning and forecasting the future behavior of a complex economic system and its environment;

- 5) the presence of such turbulent processes that cannot be changed or not implemented. The mechanism of their control can only be adapted to them and it would be logical to assume that preparations are underway for the implementation of various scenarios for further actions. The increase in turbulence in the economy at the moment cannot be avoided, one can only strive to adapt to it to a greater or lesser extent;

- 6) it is impossible to influence turbulent processes with the help of economic regulation by state authorities, which in most cases are not exclusively economic in nature, and political, natural, social, mental and psychological factors play a significant role in the process of forming the necessary tools and safeguards [3, p. 14].

Turbulence has become a constant "companion" in all areas - it anticipates, accompanies and mediates the development of systems (structures, processes) of various nature. Therefore, the application of the turbulent method to the study of the behavior of economic systems in the context of the activation of sporadic (spontaneous, unsystematic) occurrence and unpredictable combination of phenomena that are rapidly progressing and cannot be assessed and foreseen makes it possible to realize the logical conclusion that the stability of such formations will decrease, and the level of entropy (disorder, chaos) - to increase. Under the conditions of the unsystematic and

chaotic emergence of new phenomena and their influence on functioning formations in different places and at different periods of time, it is difficult or even impossible to provide a reliable prediction of the further behavior of systems of different nature. This also makes it impossible to search for and introduce at least some elements of predictability.

It is appropriate to draw attention to new fundamental factors of uncertainty and structural changes in the world economy, namely: 1) a significant share of the income of leading countries in the service sector and, above all, in the financial sector compared to the real sector of the economy (60-70%); 2) increasing the role of the intellectual factor in the economy, the implementation of which is accompanied by a progressive scaling of both traditional and emerging new increasingly complex conditions for the flow of business processes; 3) increasing the market influence of large transnational companies on the development of the world economy and the emergence of new forms of global communications in business; 4) lowering the efficiency of conventional macro- and microregulators of the economy (subsidies, interventions, protections, tax and credit benefits, price transfers, etc.) [4, p. 336].

What has been stated theoretically concerns external influences on systems. But these systems themselves are unstable - their structures are also subject to internal transformations and, depending on the possible combinations of elements, their role as a result of the triggering of the reactivity of the action in the most general form will have the following key development scenarios, namely:

a) the functioning of a structural formation as a whole will have a turbulent (unpredictable) effect on the external (environment) environment and, to varying degrees, enhance its chaotic nature;

b) the structural formation as a whole will maintain the balance of entropy due to the mutual cancellation of opposite processes, that is, its increase with a decrease in the degree of stability of the system through dissipation (release) of energy into the external environment and a decrease in the level of entropy with an increase in the degree of stability of such a structure. Consequently, the impact of internal changes in structural formation on the external environment will be minimal or insignificant;

c) structural formation will reduce the impact on the external environment as a result of an increase in the imbalance of the system, which will be accompanied by a landslide drop in stability and an increase in the level of entropy. So, the end result of such a scenario will be the following: the destruction of the structure or its comprehensive and radical transformation on fundamentally new principles, that is, the emergence of a new systemic formation.

It should be noted that the above theoretical calculations regarding both the internal transformation of complex systems and their influence on the external environment in practical terms largely depend not only on the scale of existing structural formations, but also on the "filling" and intensity of turbulent phenomena and processes directly in the external environment. In this regard, one of the key practical problems of the current

stage of the development of society is the following - it is necessary to ensure the sustainable development of socio-economic and other diversified systems in the face of increasing turbulence.

Turbulence arises due to the fact that economic, social, natural, physical, chemical and other processes are carried out at different speeds in different periods of time, however, it affects heterogeneous objects and components: population, economy, natural and material resources, financial processes, natural and climatic conditions, relations between countries, relations between business entities, etc. In this regard, the agrarian sector is extremely sensitive both to external challenges and influences, and to internal transformations, the functioning of which is associated with the development of agrarian-economic systems of various product specialization. Agrarian-economic (agro-eco-) systems are quite complex biosocio-spatial structures, the functioning of which is based on a combination of both parallel and sequential, and with a certain delay in time and a gap in space, the inclusion of a number of natural, material, labor, energy and other resources in multi-vector processes and factors. The functioning of these systems is based on the joint use of many components, in particular: agricultural land; genetic resources of plant and animal origin; moving and stationary mechanisms, tools, agrochemical and organic fertilizers, plant and animal protection products to ensure the cultivation of biomass; refrigeration and storage facilities for temporary storage of food raw materials and final food products; specialized facilities for processing raw materials into finished products; transport departments and trade enterprises; qualified personnel for maintenance of technological processes and mechanisms. These systems cover several processes:

- the processes of production of food raw materials (from the creation of genetic resources and the cultivation of food raw materials), which is associated with the use of natural, material, labor resources and climatic conditions, but is in a complex dependence on the specifics of local conditions;

- processes for the production of finished food products, which is associated with the harvesting of ripe food raw materials, preliminary refinement, storage until processing, processing and manufacture of finished products, their movement to the distribution network and sale to consumers;

- financial and economic processes that objectively accompany the transfer of ownership of raw materials, finished products, material and energy resources (purchase and sale transactions) with the execution of relevant transactions in the banking sector.

The above three key subsystems together constitute a single agrarian-economic system, which should ensure the country's food security and satisfy the population's needs for food products. However, in each of the subsystems, many different short and long, basic, additional and auxiliary production chains exist and are included in various reproduction processes at certain periods of time, which provide support, maintain the achieved position, and also advance towards the timely achievement and implementation of the key goal -

obtaining raw materials or finished products. It should be noted that in the conditions of a planned economy, in the presence of a mass of low-employed and semi-unemployed rural population, and, moreover, in the implementation of the bulk of production processes and operations manually, all this made it possible to quickly resolve the problem of their consistent and timely implementation. However, the mass migration of the rural population to the cities, with a significant lag in the processes of mechanization and electrification of agriculture from the rate of reduction of the labor force in the countryside, created a significant shortage of labor, which for a certain period of time was repaid by the direction of industrial workers for agricultural work. Under the conditions of the transitional economy, the levers of planned influence on the solution of these problems were completely eliminated, and therefore the permanent gaps between the time rationally necessary for the start and completion of work and the real time became longer, and this created additional turbulence. This became especially noticeable during the occurrence of extreme natural and climatic disasters: dust storms, droughts, frosts, hail, temperature rise, which led to a shift in the boundaries of natural and climatic zones (Steppe, Semi-steppe, Polissya) by 200 km to the North, etc. the cataclysms were supplemented by disproportions in the transition from a planned to a market economy, and all this combined increased turbulence in the agricultural sector.

According to the estimates of leading economists, "the era of turbulent alternating states of chaos and order in the economy began at the end of the last century and embraced the new millennium. Therefore, there really is a "turbulence time" that can mature for decades, but at the same time it always arises unexpectedly, like an

avalanche, with unpredictable consequences [2, p. 24]". Turbulence in the agricultural sector demonstrates particular specificity. On the one hand, this is due to the multi-layered nature and we include completely heterogeneous objects and resources in the production processes at different times, and as a result of the impossibility of their clear matching, additional prerequisites for the appearance of turbulence are created. On the other hand, the close interweaving of natural and biological processes with mechanical ones (plowing, sowing, maintenance of crops, harvesting, processing, temporary storage and transportation of crops) in the event of a very noticeable gap in the performance of successive operations (actually artificially) creates additional turbulence. Over the past 20-30 years, the frequency of occurrence of natural and artificial problems has increased by 3-4 times. Thus, turbulence has become a permanent component of the agrarian economy. Theorists argue that it is practically impossible for business entities to avoid turbulence, however, as an option, it is advisable to prepare for this in advance.

According to J. A. Caslione [5], who developed the problem of turbulence from the systemic positions from the end of the last century to the present, he was the first to form a very successful system of measures, the implementation of which will allow not only to reduce losses from turbulence, but using innovative approaches to reduce possible losses and damages, as well as increase the real income of the company. First of all, it is necessary to proactively conduct qualified training of managers to make independent decisions based on creative approaches, as well as taking into account forecasts for the future development of the situation (Table 1).

Table 1. Periodization of behavior and activities that need to be implemented by the company, taking into account the influence of environmental turbulence*

PERIODIZATION OF A COMPANY'S STAY IN A TURBULENT ENVIRONMENT		
<i>1. Entry into turbulence</i>	<i>2. Turbulence Confrontation</i>	<i>3. Getting out of turbulence</i>
I. TRADITIONAL DUAL-SCENARIO APPROACH		
- using an overly optimistic approach; - minimization of potential turbulent flow; reducing threats to workers; - development of a wait-and-see approach until structural changes are made;	- aggressive measures to reduce costs in all areas, incl. staff reduction; - cancellation of new projects; - refusal to conduct research on new products and bring them to the market; - Cancellation of acquisition agreements;	- compensation for errors of previous periods, disaggregation in order to increase profitability; - attempts to rebuild the business, incl. Raise the morale of employees, customers and other stakeholders.
II. CHAOTICS APPROACH (CHAOTICS-MANAGEMENT)		
- use of new strategic approaches in key services and core activities; - protection of core business and key markets; - the last steady increase due to weaker, less prepared competitors;	- building up own resource base for development; - attracting strategic partners to increase the likelihood of success; - acquisition of competitors' businesses, search for new talented employees and resources; - ensuring and strengthening the business, which provides the main share of production growth;	- maintaining the set rates of sustainable and reliable production growth; - a thoughtful and balanced movement aimed at increasing production against the backdrop of a weak competitive environment.

* Source: adapted by D.F. Krysanov based on [4, p. 15].

The practice of successful firms that creatively applied the Chaotix approach testified to the following. When preparing a company for work in a turbulent state of the business environment, as well as during the chaos that may arise in the future, the main burdens are placed on line managers and company management. They must form their own vision of the directions of manifestation and the level of turbulence, the possibility of its intensification in the future and the onset of chaos. Based on the possible options for the development of turbulence, managers develop strategies for "survival", and also determine the necessary prerequisites for ensuring the sustainable development of the company in a turbulent business environment in the short and long term. Recently, the key characteristic of turbulences has become their global nature (COVID-19), and the consequences are of worldwide significance. Therefore, humanity has yet to learn how to survive in an unpredictable and uncontrollable turbulent environment.

At the current stage of the world's global development, the most significant and extremely destructive factor was the full-scale aggression of Moscow (the Russian Federation) into Ukraine. It began on February 24, 2021 and comprehensively and radically changed the situation not only in our state, but also significantly affected the internal situation in European countries and even in many countries of the world. At the same time, this aggression rallied 50 countries of different continents in the struggle for the freedom and independence of Ukraine and actually ensured the development of an aggressive Russian-Ukrainian war into a full-scale war for the establishment of high universal moral norms and values and equal relations between the peoples of the world.

War is the genesis of chaos and crisis phenomena, and catastrophe is the result of the moral, organizational and material destruction of all components of the social system (civil society, society). under such extreme conditions, the state's efforts are aimed to preventing a crisis, and even more so a catastrophe, with the involvement of all possible and available means and effective tools. And it arises when the consequences of the crisis exceed the threshold of stability of the systemic organization of society. At the same time, with the threat of such a situation, society is forced to actively eliminate the consequences of aggression and will eliminate its sources in order to prevent further destruction and catastrophe.

As a result of Moscow's full-scale aggression, the national economy suffered significant losses and destruction in most regions of Ukraine. In general, industrial production decreased by 36.9% over the past year, including in the food industry - by 22.1%, and losses in agriculture - are shown below (Table 2). Regarding the assessment of direct losses of agriculture as a result of the military aggression of Moscow, the direct losses caused to assets used in agriculture are estimated: agricultural machinery, granaries, animal husbandry (livestock), perennial plantations, factors of production, manufactured products. Due to the occupation [6, with. 5, 10] it has become impossible to carry out agricultural activities in large areas, because

they are under constant shelling or mined. In addition, in the lands where active hostilities were conducted, agricultural lands were adversely affected, the quality of which has significantly deteriorated and in the future, significant funds will be required for their reclamation (in particular, demining) in order to return to active agricultural cultivation. On the other hand, the enemy's objects of destruction are not only military targets, but also granaries, food warehouses, logistics infrastructure, and agricultural machinery. Such activities of the aggressor are aimed both at making it impossible to conduct agricultural production in Ukraine, and at worsening the state's food security, at forming and spreading negative expectations regarding the lack of food among the country's population.

A significant increase in the prices of fuel and lubricants and fertilizers, along with other additional costs and transport services, was accompanied by an increase in the cost of agricultural production and led to an increase in food prices (the consumer price index in December 2022 to December of the previous year was: bread and bread products - 130.3%, pasta products - 127.9%, meat and meat products - 124.6%, fish and fish products - 145.8%, milk - 118.7%, hard cheese and cottage cheese - 125%, eggs - 176.6%, butter - 128.9%, sunflower oil - 114.5%, fruits - 173.8%, vegetables - 151.8%, sugar - 131%). This led to a decrease in the economic availability of food products and an increase in the share of total food costs in the total sum of total household costs [6, p. 21].

The level of criticality of the situation threatening Ukraine at the beginning of the aggressor's invasion required the maximum concentration of own resources and the search for external support in order to prevent a catastrophe. The parties (40 participating countries) agreed on the main efforts, in particular regarding the search for partners and the organization of the new "Advisory Group on the Defense of Ukraine" at the first meeting on April 22, 2022, which was held at the American Ramstein Air Base in Germany, and it was already the 11th the meeting of the Advisory Group was held on 04/21/2023, in which more than 50 countries of the world took part. As a result, more than 50 billion dollars were raised. military assistance from foreign partners and this became one of the key factors, along with the highly organized and experienced Armed Forces of Ukraine, which ensured the stopping of the offensive actions of the aggressor and the deoccupation of part of the territory. Therefore, the acquired experience has convincingly demonstrated that the accumulation of external military and internal material, financial and human resources and their direction to achieve victory in the fight against the Russian aggressor are able to ensure the complete liberation of the occupied part of the territory of Ukraine and the return of the civilian population (refugees) to their settlements.

The war in Ukraine has been going on for the second year already. Repeated assessments of the losses of the aggressor and the victim from Russian aggression have already been carried out in various dimensions: human, material, military, moral, financial, transport, reputational, etc., as well as for individual regions, cities,

industries and natural zones. Note that the World Bank estimated Ukraine's need for funds for recovery and reconstruction as of March 23, 2023 at \$411 billion. As

for the agricultural sector, as of September 15, 2022, its direct losses are estimated at 6.6 billion dollars. [7], and in general - more than 40 billion dollars [8], (Table 2).

Table 2. Damages caused to the agricultural sector of Ukraine and emergence of new risks for its functioning as a result of full-scale Russian aggression* in 2022.

№	The name of the type of loss	Million dollars	%
1	2	3	4
	Cumulative losses (direct+indirect)	40859,2	x
	I. Direct losses	6626,5	100,0
1	Over 84,000 units of machinery and equipment were completely or partially destroyed	2885,4	44,0
2	Produced products destroyed or stolen (2.8 million tons of grain and 1.2 million tons of oil crops from last year's harvest)	1872,0	28,0
3	Repair of damaged or destroyed grain storage facilities with a total capacity of 9.4 million tons	1062,5	16,0
4	Death of almost 400,000 bee colonies, 95,000 goats and sheep, 212,000 cattle, 507,000 pigs and almost 11.7 million birds	362,5	5,4
5	More than 14.3 thousand hectares of perennial plantations were destroyed	348,7	5,2
6	Destruction and appropriation of fuel, mineral fertilizers and plant protection products	95,4	1,4
	II. Indirect losses	34232,7	100,0
1	A decrease in yields of annual crops, among them: the yield of barley fell by 38.8%, wheat - by 33.3% (loss of \$2.5 billion), sunflower - by 30.9% (loss of \$3 billion), corn - by 18, 3% This is caused by two key factors: a) a reduction in harvested areas, as a significant proportion of these plants are grown in war-torn areas; b) yield reduction due to the simplification of production technology, in particular, due to the increase in the cost of production factors and low liquidity of agricultural producers, there is a decrease in the application of fertilizers and plant protection products	11200	32,7
2	Due to a decrease in the production of winter wheat next year, another \$2.4 billion will be lost, winter rapeseed and barley - \$318 million and \$312 million	3000	8,8
3	Losses from the production of perennial crops are estimated at \$322 million, of which \$59.2 million is the result of a reduction in grain production, \$89.5 million - berry crops, and \$173.4 million - stone crops	322	0,9
4	Indirect losses from the drop in production of livestock products up to 10%, but higher in some sectors: milk - 31%, pig farming - 29%, and eggs - 21%	348,7	1,0
5	An increase in fuel prices due to the increase in the cost of energy carriers	485	1,4
6	The increase in fertilizer costs due to the increase in the cost of energy carriers	377	1,2
7	Losses due to the disruption of logistics chains caused by the war: a decrease in domestic prices for export-oriented crops - wheat, corn, barley, sunflower; restructuring of logistics chains, reorientation from sea exports to railways, river ports and trucks, which led to an increase in the cost of delivery from \$30 to somewhere around \$170-200 per ton of products; due to a decrease in throughput, the volume of exports in the first months of a full-scale invasion decreased fivefold; in September, domestic prices for the main export-oriented crops remained 61% lower than before the war. With the signing of the grain agreement, the situation has improved somewhat, but current export opportunities do not meet the needs of exporters, and transportation costs remain high. Although the grain export corridor is open, it can hardly be called reliable in view of the unstable behavior of the Russian Federation, and it did not lead to an increase in domestic prices for the main crops	18500	54,0
	III. The main risks for the functioning of the agrarian sector of the economy		
1	As a result of the armed aggression of the Russian Federation, 2,653 economic entities of the agricultural sector suffered losses: arable land decreased by 1.9 million hectares, perennial plantations decreased by 9 thousand hectares. In addition, the territory of about 1 million hectares needs to be examined for the presence of explosive objects		
2	In 2022, compared to 2021, the total cultivated area was reduced by 20% due to the fact that they are either occupied, under constant fire, or mined		
3	Agricultural lands, where military operations were conducted, were adversely affected, and this will require the allocation of significant funds for their return to active use. The significant scale of military pollution will lead to the withdrawal of large areas of land from cultivation for an indefinite period. At present, a third of Ukrainian land has become a zone of risky agriculture		

4	Domestic consumption of nitrogen fertilizers in 2022 decreased by 40-55% - from 4.75 million tons to 2-2.9 million tons
5	According to FAO, more than 150,000 farmers/food workers have been directly affected by the war and/or forced to migrate. The prospect of resuming their economic activity on their own lands is uncertain, which may lead to their withdrawal from agrarian business or a change in specialization. In a difficult situation, small-scale producers who grew seasonal products played an important role in ensuring employment and income of the rural population
6	According to experts' estimates, 84,200 units of machinery and equipment (11% available until February 24, 2022) are completely or partially damaged
7	According to experts, the existing deficit of storage capacities (10–15 million tons) due to the destruction of granaries and food warehouses has increased to 20 million tons
8	Before the aggression of the Russian Federation, more than 90% of grain and oil crops were exported by sea. Due to the blockade of Ukrainian Black Sea ports, export deliveries of agricultural products became extremely difficult, but the organization of the "grain corridor" for the period of validity of the relevant agreements under the auspices of the UN reduced the logistical tension, but this cannot be a guarantee for the future
9	The increase in the cost of agricultural products and the difficulty of their sale caused a change in the structure of production in favor of highly profitable crops (in 2023, the area sown under oilseeds: rapeseed, soybean, sunflower, and will decrease - under wheat), as well as the refusal of agricultural producers to grow labor-intensive crops (primarily, borscht set, early seasonal products), which will have a negative impact on their supply to the country's population.
10	In the livestock sector, the situation is difficult due to the reduction of the number of animals in households, the increase in production costs, and the lack of financial resources among farmers for the reconstruction of destroyed livestock premises and the purchase of young animals.
11	In case of continuation of hostilities, export deliveries of Ukrainian grain abroad will decrease. The record harvest of agricultural crops in 2021 (more than 108 million tons of grain) ensured significant volumes of its export in 2022. Last year, the total harvest of agricultural crops decreased to 67 million tons, and it is predicted to decrease in the current year. And as a result of the reorientation of the structure of cultivated areas in favor of oil crops, the production of cereals will decrease.

* Developed and adapted using sources: [7; 8].

The total (estimated) amount of financing for the needs of the restoration of the agrarian sector is UAH 1,683.4 billion. for a period of 10.5 years, and in the average annual calculation - UAH 160.3 billion. This is almost three times higher than the capital investments in primary production, which were financed in the average annual calculation for the last 2017-2021 - UAH 57.8 billion. The main sources of financing will be the state budget, international loans and EU donor aid.

A detailed list of key works in the agrarian sector within the framework of the Recovery Plan of Ukraine and specific terms of project implementation are disclosed in the Recovery Plan under the direction of "New Agrarian Policy" [9].

The plan for the recovery of Ukraine under the direction of "New Agrarian Policy" is diversified according to two strategic goals (Economic transformation of agro-industrial complex and Development of agricultural infrastructure) and 14 projects and covers three stages of implementation: June - December 2022; January 2023 - December 2025; January 2026 - December 2032

The first stage of the implementation of the Plan for the Recovery of Ukraine in the direction of "New Agrarian Policy" has already passed. The main goal that had to be achieved was to ensure the preservation of the existing economic potential of the industry. But the aggravation of the military conflict and the destruction of agrarian resource potential in combat zones and on the front-line territories, further mining and chemical pollution and the destruction of the fertile layer of agricultural lands, the destruction of logistics chains, the

bankruptcy of a number of agricultural enterprises, the lack of available financing, became an obstacle to the realization of this goal, limited credit resources, etc. With the end of the war and the liberation of the occupied territories from the aggressor, the work on preserving the existing and increasing the agrarian resource potential of agriculture on an innovative and technological basis will be significantly intensified.

Conclusion. Studies have shown that during the last half century, turbulence has tended to increase significantly, and this causes an increase in chaos and uncertainty. Almost any system, depending on the degree of turbulence intensity, is in a state of permanent instability. At the same time, when certain threshold values are reached, the system is faced with a choice: further strengthening of turbulence will increase the probability of approaching the branching point (random selection of one of the possible options for development) or its destruction altogether. It is about replacing the previously existing order with a second one, which will be formed under the influence of increased internal and external turbulence, to give a completely new system greater stability.

Agricultural and economic systems are especially vulnerable in this respect. Such systems are formed on the basis of the union of three different types of environments (natural-biological, technical-distributive, financial-banking) and provide for the observance of a certain sequence in the performance of various technological processes and types of work and in the implementation of production, trade and banking operations. These environments or subsystems are under

the influence of turbulent processes and phenomena that occur directly in themselves, as well as when they are affected by zones of turbulence that have covered key components of the external environment (international economy, agricultural sector, banking system). In this regard, the internal imbalance of the functioning of various subsystems, as well as the destructive effects of external turbulence ultimately reduce the stability of agrarian and economic systems, and in extreme cases - can lead to its destruction and catastrophe (crises, droughts, military operations, etc.) .

The full-scale Russian-Ukrainian war was accompanied by numerous destructions in industry,

industrial and social infrastructure, the agricultural sector of Ukraine and losses of human potential. The restoration of the agricultural resource potential is connected with the conduct of military operations to de-occupy the territories of the Ukrainian state captured by the Russian aggressor and return to the state of 1991, humanitarian demining of contaminated agricultural lands and soil reclamation of those affected by hostilities, localization and bringing to a safe condition of ecologically dangerous land plots, restoration of infrastructure facilities for storage and primary processing of products, reproduction of agriculture in de-occupied regions, etc.

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