УДК 339.5:330.3 DOI: https://doi.org/10.32680/2409-9260-2024-3-4-316-317-176-182

THE WORLD GRAIN TRADE AND SEA LOGISTICS' RISKS: CURRENT STATE AND DYNAMICS

Olha Husenko, senior lecturer at the International Economic Relations's Department, Odesa National Economic University, Odesa, Ukraine
e-mail: olgagusenko@ukr.net
ORCID ID: 0000-0003-4605-2605

Abstract. *The paper's aim is to analyze the world grain trade's current state and dynamics and assess the impact of sea logistics risks. The full-scale russian invasion came at a bad time for global food markets, as food prices were already high due to complications in seaborne grain logistics caused by the COVID-19 pandemic, high global demand and low harvests in some countries. If the russian aggression continues beyond 2024, the global food crisis will worsen, creating a challenge for many countries, especially those that rely on food imports, such as the countries of the Middle East and North Africa.*
The paper analyzes world grain prices before and after signing the agreement on the Black Sea Grain Initiative. In July 2023, russia withdrew from the Black Sea Grain Initiative. Until that time, 40% of Ukrainian grain was transported through Black Sea ports, and 60% went overland through the "solidarity lanes". After russia's withdrawal from the Initiative, exports from Ukraine decreased again, and prices increased. A positive forecast of the world harvest is currently stabilizing prices. But the world's food supply remains precarious, as the war and Russia's blockade of Black Sea ports significantly reduce Ukraine's ability to export grain and food products to the world market.
The global production of grain crops by world region is analyzed. The current state and dynamics of the global export and import of grain crops are determined. The geographical structure of world grain trade is analyzed.
The impact of sea logistics risks in the export of grain crops is evaluated. Recent Houthi attacks on commercial vessels in the Red Sea have severely affected shipping through the Suez Canal. The Red Sea crisis compounds the ongoing disruptions in the Black Sea due to the war in Ukraine, which have resulted in shifts of grain trade routes and altered established patterns.
Keywords: *world grain trade, global food security, COVID-19, russian full-scale invasion, the Black Sea Grain Initiative, world grain prices, sea logistics, attacks of the houthi rebels on vessels.*

СВІТОВА ТОРГІВЛІ ЗЕРНОВИМИ КУЛЬТУРАМИ ТА РИЗИКИ МОРСЬКОЇ ЛОГІСТИКИ: СУЧАСНИЙ СТАН ТА ДИНАМІКА

Гусенко О.С., старший викладач кафедри міжнародних економічних відносин, Одеський національний економічний університет, м. Одеса, Україна
e-mail: mokrisova@ismpo.sk
ORCID ID: 0009-0007-8817-2614

Анотація. *Метою статті є аналіз сучасного стану та динаміки світової торгівлі зерновими культурами та оцінка впливу ризиків морської логістики. Зазначається, що повномасштабне російське вторгнення почалося у невдалий час для світових продовольчих ринків, оскільки ціни на продовольство вже були високими через процеси ускладнення морської логістики зернових культур, спричинених пандемією COVID-19, високим світовим попитом та низькими врожаями в деяких країнах. У статті аналізуються світові ціні на зернові культури до та після укладання угоди про Чорноморську зернову ініціативу. Аналізується світове виробництво зернових культур за регіонами світу. Визначається сучасний стан та динаміка світового експорту та імпорту зернових культур. Аналізується географічна структура світової торгівлі зерном. Оцінюється вплив ризиків морської логістики при експорті зернових культур.*
Ключові слова: *світова торгівля зерновими культурами, глобальна продовольча безпека, COVID-19, російське повномасштабне вторгнення, Чорноморська зернова ініціатива, світові ціни на зерно, морська логістика, атаки повстанців-хуситів на комерційні судна.*

JEL Classification: F190, F290, Q170.

Formulation of the problem. From the early days of February 24, 2022, a full-scale russian invasion has various negative socio-economic consequences that are currently affecting global trade, production and grains consumption, keeping agricultural commodity prices high until 2024 and threatening global food security. If the war continues beyond 2024, the global food crisis will worsen, creating a challenge for many countries, especially those that rely on food imports, such as the countries of the Middle East and North Africa. It should be noted that russian aggression began at a hard time for world food markets, as food prices were already high due to the complications of international grain logistics caused by the COVID-19 pandemic, high global demand and low harvests in some countries.

Analysis of recent research and publications. Many domestic and foreign scientists, in particular: A. Nechiporuk, M. Kotova, D. Kochubey, S. An, D. Kim, S. Steinbach and others, are currently paying attention to the development problems of grain crops' world trade and the existing maritime logistics risks. Thus, A. Nechiporuk, M. Kotova and D. Kochubey, researching the export of Ukraine under martial law, note that "currently, the products of the agro-industrial complex are the basis of Ukrainian exports. As a result of the action of the Black Sea Grain Initiative, the main amount of agricultural goods was exported through Ukrainian ports, and its termination poses a threat to foreign trade" [1]. The above-mentioned scientists also indicate the need to "search for new logistics routes with the possibility of using railway, road, ferry and sea modes of transport, which will make it possible to reach the necessary volumes of exports of goods of the agro-industrial complex and reduce the risks that have formed in conditions of instability" [1] . In their research, foreign scientists S. Ahn, D. Kim, and S. Steinbach [2] conducted an analysis of the impact of a full-scale Russian invasion on trade in grain crops and determined that "the russian-Ukrainian war caused a significant trade diversion, mainly in favor of North American countries and Europe" [2]. The scholars' analysis shows that the hostilities had significant trade consequences for the countries directly involved, but only limited for global grain markets in terms of trade volumes.

The unresolved parts of the overall problem. This paper emphasizes that the war led to immediate and far-reaching consequences for the global grain market: Ukrainian exports were significantly reduced, mobilization and displacement of the population caused labor shortages, access to fertilizers became limited, and the volume of future grain crops cannot be predicted due to the temporary occupation by russia of the available cultivated areas, their pollution and the destruction of the grain infrastructure. Since Ukraine is one of the leading exporters of grain crops, in particular wheat, corn and barley, the relevance of a theoretical and practical study of the current state and prospects for improving the export of grain crops in the conditions of the complication of sea logistics is beyond doubt.

The paper's aim. The main paper's aim is to analyze the current state and dynamics of word grain trade and sea logistics' risks.

The basic material. Since the middle of 2020, global prices for grain crops and food have started to rise as a result of the COVID-19 pandemic. Russia's unprovoked and unjustified aggression against Ukraine increased prices even more. As a result of the war, Ukraine, one of the leading exporters of grain crops, experienced a sharp drop in its exports, by almost 30%. This has led to serious food security problems for millions of people around the world. Actions by the EU and the UN have helped to stop the price rising, but the outlook still remains quite difficult. Before the war, about 90% of Ukraine's agricultural exports were transported by sea. After the start of the war, the russian military blockaded the Ukrainian Black Sea ports and brought about a virtual halt to exports. Following actions taken by the EU to introduce alternative transport routes (so-called "solidarity lanes"), as well as by the UN and Turkey to unblock ports (the "Black Sea Grain Initiative"), exports increased and food prices steadily decreased. However, in July 2023, russia withdrew from the Black Sea Grain Initiative. Until that time, 40% of Ukrainian grain was transported through Black Sea ports, and 60% went overland through the "solidarity lanes". After russia's withdrawal from the Initiative, exports from Ukraine decreased again, and prices increased. A positive forecast of the world harvest is currently stabilizing prices. But the world's food supply remains precarious, as the war and Russia's blockade of Black Sea ports significantly reduce Ukraine's ability to export grain and food products to the world market.

Since 2011, the International Grains Council has introduced a world price index for grains and oilseeds aimed at taking into account broad underlying trends in key markets. The Council monitors information on a wide range of grain and oilseeds, cash and futures markets as part of efforts to promote greater transparency in world markets. The Grains and Oilseeds Index is a trade-weighted index of international price movements for seven major commodities—wheat, corn, barley, sorghum, rice, soybeans, and canola.

The general price index of grain and oil crops and the sub-index of wheat prices starting from January 2021 are displayed in fig. 1. As can be seen from the following data in figure, the price index of grain and oil crops and the sub-index of wheat prices show a significant increase in March 2022. Wheat prices are 58% higher and grain prices are 34% higher than in March 2021. However, since May 2022, there has been a sharp fall in both indices, when the so-called "solidarity lanes" were established. Since the implementation of the Black Sea Grain Initiative in July 2022, prices have fallen further. In September and October 2022, due to uncertainty about the future of the Black Sea Grain Initiative, prices started to rise again, but decreased in November and December 2022. Since then, prices have continued to decline gradually with some fluctuations. But when russia announced its step out of the Initiative in July 2023, prices rose again.

According to preliminary forecasts of the Food and Agricultural Organization of the United Nations (FAO), the world production of cereals in 2023 is 2,819 million metric tons, which is 0.9% (26 million tons) more compared to the result of the previous year [3].

The specific weight of the regions of the world in the global production of grain crops is reflected in fig. 2. So, in 2023, Asian countries produced the biggest volume grain crops in the world - 1,265.9 million tons. The second position is occupied by European countries - 511.2 million tons.

World wheat production in 2023 is forecast at 785.1 million tons, which is 2.2% (18 million tons) below the level of last year [3]. FAO has revised its production forecasts for the European Union and Kazakhstan, where prolonged periods of adverse weather at the end of the season have resulted in lower yields than previously forecast.

Fig. 1.: World prices for grain crops from January 2021

Source: [4]

These cuts offset increased production forecasts in Iraq and the United States, reflecting higher harvest estimates. World feed grain production in 2023 is estimated at 1,510 million tons, which is 2.7% (38.8 million tons) higher than last year. FAO's forecast for world rice production in 2023/24 is now 523.9 million metric tons, up 0.8% from 2022/23.

Global grain consumption is forecast to reach 2,810 million tons in 2023/24, which is 1% higher than in 2022/23. The forecast for total wheat consumption in 2023/24 was increased by 6.3 million tons, mainly due to an expected increase in feed wheat use in China, raising the global forecast to 789 million tons, above the 2022/23 level by 1.4%. As for rice, the forecast for world rice consumption in 2023/24 is 522.0 million tons [3].

Global grain consumption is forecast to reach 2,810 million tons in 2023/24, which is 1% higher than in 2022/23. The forecast for total wheat consumption in 2023/24 was increased by 6.3 million tons, mainly due to an expected increase in feed wheat use in China, raising the global forecast to 789 million tons, above the 2022/23 level by 1.4%. As for rice, the forecast for world rice consumption in 2023/24 is 522.0 million tons [3].

The FAO forecast for world grain trade in 2023/2024 is 469 million tons (see table 1). Due to the table, the leading exporters of grain crops in 2023 were the USA - 78 million tons, Brazil - 57.9 million tons, and russia - 57.4 million tons. The leading importers of grain crops in 2023 are

China - 56.8 million tons, Mexico - 24.4 million tons, Japan - 23.1 million tons. As for world trade in grain crops by species, feed wheat will take the largest share in 2023 − 222 million tons from 469.2; the second place is occupied by wheat − 194.4 million tons [5].

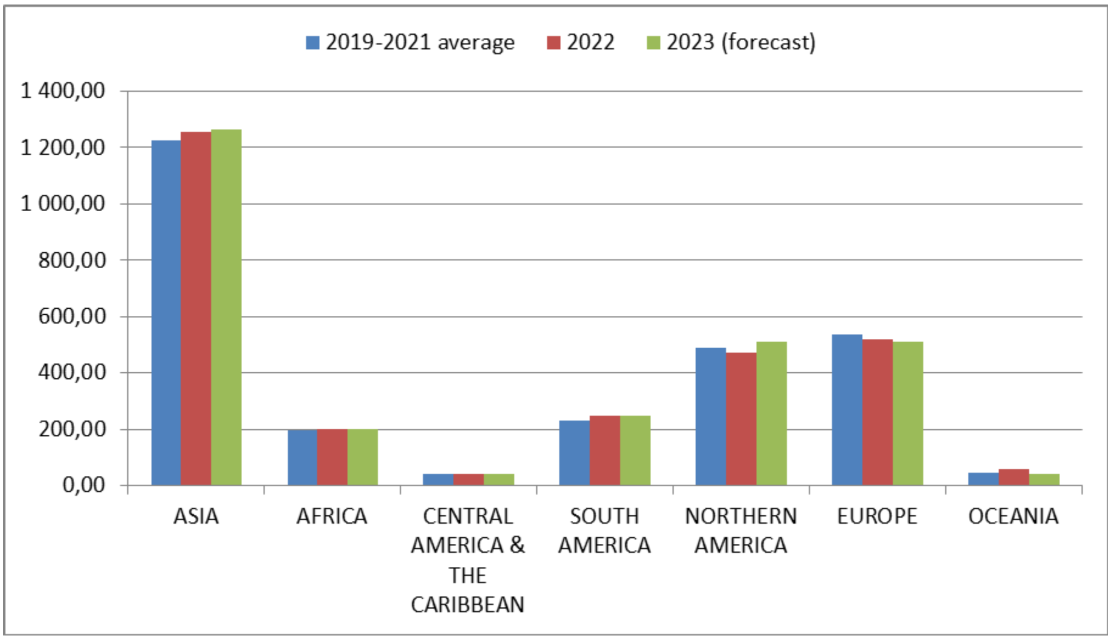

Fig. 2. World production of grain crops in 2019-2023 by region (in million metric tons)

Source: compiled by the author due to [5].

Table 1.

World trade grain crops volumes in 2019-2023 (in million tons)

	Import			Export		
	2019-2021 on average	2022	2023 forecast	2019-2021 on average	2022	2023 forecast
ASIA	253.1	253.7	248.2	70.5	73.1	73.7
Bangladesh	10.1	7.7	8.4	0.1	-	-
China	56.3	56.3	56.8	2.8	2.4	2.7
India	0.3	0.3	0.3	26.9	24.9	21.3
Indonesia	12.2	13.7	12.7	0.1	0.2	0.2
Iran	17.5	16.1	15.6	0.1	0.1	0.1
Iraq	4.3	5.8	4.9	-	-	-
Japan	23.1	22.5	23.1	0.3	0.3	0.3
Kazakhstan	1.3	1.0	1.0	8.7	10.3	9.8
Myanmar	0.5	0.4	0.4	3.6	3.4	4.2
Pakistan	2.1	2.7	2.2	4.7	4.6	5.8
Philippines	10.0	10.3	11.3	0.1	0.1	0.1
Republic of Korea	16.4	16.6	17.1	0.1	0.1	0.1
Saudi Arabia	14.6	14.2	13.2	-	-	-
Thailand	5.6	4.9	4.7	6.6	8.4	9.4
Turkey	14.6	18.2	12.9	4.9	5.6	7.6

Vietnam	16.7	15.1	15.8	7.2	8.6	7.6
AFRICA	96.8	91.1	95.2	7.4	7.1	6.7
Algeria	12.8	12.8	13.5	-	-	-
Egypt	22.7	19.0	20.3	0.3	0.1	0.1
Ethiopia	2.0	2.0	2.2	1.3	1.2	1.1
Morocco	8.5	8.3	8.3	0.1	0.1	0.1
Nigeria	7.9	8.3	8.4	-	-	-
South Africa	2.8	2.5	2.7	2.7	3.8	3.7
Sudan	2.4	2.4	2.7	0.1	0.2	0.1
CENTRAL AMERICA AND THE CARIBBEAN	37.2	37.3	38.1	1.7	1.3	1.3
Mexico	24.0	24.4	24.4	1.5	1.2	1.2
SOUTH AMERICA	34.0	31.6	32.9	96.3	96.7	110.5
Argentina	0.1	0.1	0.1	56.3	36.1	46.4
Brazil	10.2	8.8	8.9	34.3	52.6	57.9
Chile	4.1	3.7	4.0	0.0	-	0.1
Colombia	8.6	8.8	8.9	-	-	-
Peru	6.2	5.5	5.9	0.1	0.1	0.1
Venezuela	2.5	2.3	2.4	-	-	-
NORTH AMERICA	10.1	10.2	10.1	120.9	103.6	106.2
Canada	4.1	3.3	2.9	27.9	33.0	28.3
United States	6.0	6.8	7.2	93.0	70.6	78.0
EUROPE	32.5	50.7	42.4	145.2	151.6	141.9
European Union	24.7	42.2	33.7	45.1	44.5	46.5
russian federation	0.6	0.6	0.7	43.9	52.1	57.4
Ukraine	0.2	0.2	0.2	49.9	49.3	32.8
OCEANIA	2.4	2.1	2.3	26.1	43.5	28.9
Australia	0.6	0.2	0.3	26.1	43.5	28.8
WORLD	466.1	476.9	469.2	468.0	476.9	469.2

Source: [5].

On world grain trade affect several sea logistics risks, such as []:
- russia's ongoing military aggression;
- houthi attacks on commercial vessels in the Red Sea.

Indeed, in the context of globalized agricultural markets and the war between russia and Ukraine (the two major players in the global grain market), the ongoing conflict raises widespread concerns about global food security. Despite their limited role in the global economy, with only approximately 2-2.2% of global GDP combined, russia and Ukraine are considered the "breadbasket of the world" and are important producers and exporters of vital agricultural raw materials, minerals, fertilizers and energy.

In the grains and oilseeds markets, the mid-July 2023 cessation of the Black Sea Grain Initiative – the four-way agreement that enabled shipments from Ukraine's deep sea ports – had a negative impact. While a new seaborne corridor was established by the Ukrainian authorities shortly after, business via the new channel is reportedly restricted by elevated freight rates and conflict-related security concerns.

Recent Houthi attacks on commercial vessels in the Red Sea have severely affected shipping through the Suez Canal. The Red Sea crisis compounds the ongoing disruptions in the Black Sea due to the war in Ukraine, which have resulted in shifts in oil and grain trade routes and altered established patterns [6,7].

There are dangers posed by a prolonged interruption to the Suez gateway, particularly in container shipping. These pose a direct threat to global supply chains, potentially leading to delayed deliveries, heightened costs and inflation. While current container freight rates are approximately half the peak recorded during the Covid crisis, sustained increases in shipping costs can drive up inflation (consumer prices) as shown during the 2021–2022 logistics logjam [8].

The crisis is also reverberating in global food prices, with longer distances and higher freight rates potentially cascading into increased costs. Disruptions in grain shipments from the russian federation, Ukraine and Europe pose risks to global food security, affecting consumers and lowering the prices paid to producers. The war in Ukraine had already shown the impact of longer distances and freight rates on food prices.

Conclusions. The war in Ukraine since 2022, the situation with the Panama Canal, and now also the aggravation of the situation in the Red Sea after the attacks of the houthi rebels on vessels [9], made significant adjustments to the sea logistics of many global shipping companies, affected the insurance market, the geography of trade and many others.

The pressure on freight rates from the Black Sea was exerted by the decrease in the activity of Ukrainian grain exports, which has been observed since the beginning of 2024, and the global situation of commodity markets plus the correction of the global freight market after the boom at the end of 2023. It is also important to note that at the moment, with the accumulation of successful experience of ships passing through Ukrainian Black Sea ports, there are still enough ship owners on the market who are ready to enter Ukraine. But, given that the situation in the Red Sea will in any case sooner or later cause a decrease in tonnage supply to the regions of the Mediterranean and Black Seas, in the event of an intensification of trade (including Romania, Bulgaria, the russian federation), it is possible to expect a sharp rise in rates due to a shortage of tonnage in the region both in general and for Ukrainian exports in particular..

References

1. Nechyporuk A., Kotova M., Kochubei D. (2023) Eksport Ukrainy v umovakh voiennoho stanu [Exports of Ukraine under martial law]. Zovnishnia torhivlia: ekonomika, finansy, pravo. № 5. S. 18-32. Seriia. Ekonomichni nauky. Retrieved from: https://journals.indexcopernicus.com/api/file/viewByFileId/1855025 [In Ukrainian].
2. Ahn, Soojung, Dongin Kim, and Sandro Steinbach (2023). The impact of the Russian invasion of Ukraine on grain and oilseed trade. Agribusiness, 39.1, 291-299. Retrieved from: https://onlinelibrary.wiley.com/doi/10.1002/agr.21794 (accessed 25.02.2024)
3. FAO Cereal Supply and Demand Brief. Retrieved from: https://www.fao.org/worldfoodsituation/csdb/en/ (accessed 25.02.2024)
4. How the Russian invasion of Ukraine has further aggravated the global food crisis. Retrieved from: https://www.consilium.europa.eu/en/infographics/how-the-russian-invasion-of-ukraine-has-further-aggravated-the-global-food-crisis/ (accessed 25.02.2024)
5. FAO. 2023. Food Outlook – Biannual report on global food markets. Food Outlook, November 2023. Retrieved from: https://www.fao.org/3/cc8589en/cc8589en.pdf (accessed 26.02.2024)
6. Aktualni problemy morskoi lohistyky: Monohrafiia (2023) [Actual problems of maritime logistics: Monograph]. Za zahalnoiu redaktsiieiu prof. M.Ia. Postana ta prof. O.O. Balobanova. Odesa: ONMU. Retrieved from: http://visnyk.onmu.odessa.ua/up/mn1.pdf (accessed 27.02.2024) [In Ukrainian]
7. Lohistyka maibutnoho: efektyvni rishennia dlia torhivli (2023). [Logistics of the future: effective solutions for trade]. Tezy dop. Mizhnar. nauk.-prakt. internet-konf. (Kyiv, 20 kvit. 2023 r.) / vidp. red. N. B. Ilchenko. – Kyiv: Derzh. torh.-ekon. un-t. 239 s. Retrieved from: https://knute.edu.ua/file/MzEyMQ==/070aaa1a3dddd01c87014c1ec2fb41f7.pdf (accessed 29.02.2024)

[In Ukrainian]
8. Navigating troubled waters: Impact to global trade of disruption of shipping routes in the Red Sea, Black Sea and Panama Canal. Retrieved from: https://unctad.org/system/files/official-document/osginf2024d2_en.pdf (accessed 24.02.2024)
9. Iemenski khusyty vbyvaiut torhivliu. Chym zahrozhuie konflikt u Chervonomu mori? [The Yemeni Houthis are killing trade. What threatens the conflict in the Red Sea?] Retrieved from: https://www.epravda.com.ua/publications/2024/01/15/708730/ (accessed 01.03.2024) [In Ukrainian]

Стаття надійшла до редакції 12.04.2024
Прийнята до публікації 15.04.2024