

*Електронний журнал «Ефективна економіка» включено до переліку наукових фахових видань України з питань економіки (Категорія «Б», Наказ Міністерства освіти і науки України № 975 від 11.07.2019). Спеціальності – 051, 071, 072, 073, 075, 076, 292.*

*Ефективна економіка. 2025. № 1.*

**DOI: <http://doi.org/10.32702/2307-2105.2025.1.62>**

**УДК 339.5**

*I. Miniailenko,*

*PhD, Associate Professor, Associate Professor of the Department of Economics, Entrepreneurship and Marketing, Educational and Research Institute of Finance, Economics, Management and Law,*

*National University "Yuri Kondratyuk Poltava Polytechnic"*

*ORCID ID: <https://orcid.org/0000-0002-0388-6199>*

*A. Arkhipova,*

*Master's student, National University "Yuri Kondratyuk Poltava Polytechnic"*

*ORCID ID: <https://orcid.org/0000-0002-8632-705X>*

*A. Chorniak,*

*Master's student, National University "Yuri Kondratyuk Poltava Polytechnic"*

*ORCID ID: <https://orcid.org/0009-0005-0325-7762>*

## **ANALYSIS OF THE INTERNATIONAL AGRICULTURAL MARKET: THE IMPACT OF THE WAR IN UKRAINE**

*I. V. Miniylenko,*

*к. е. н., доцент, доцент кафедри економіки, підприємництва та маркетингу Навчально-наукового інституту фінансів, економіки, управління та права, Національний університет «Полтавська політехніка імені Юрія Кондратюка»*

*A. I. Arkhipova,*

*магістрант, Національний університет*

*«Полтавська політехніка імені Юрія Кондратюка»*

*A. S. Chorniyak,*

*магістрант, Національний університет*

*«Полтавська політехніка імені Юрія Кондратюка»*

## **АНАЛІЗ МІЖНАРОДНОГО АГРАРНОГО РИНКУ: ВПЛИВ ВІЙНИ В УКРАЇНІ**

*The article provides a comprehensive analysis of the complex interrelationships between geopolitical events, agricultural markets and global food security, with a focus on the ongoing war between Russia and Ukraine. The authors examine how this armed conflict has had a profound impact on international relations, supply chains and economic stability, especially in the agricultural sector. One of the significant consequences highlighted in the article is the change in land use dynamics that has affected 42 million hectares of agricultural land in Ukraine. This shift has not only increased geopolitical tensions, but has also created significant risks for the global agricultural sector.*

*In addition, the article focuses on the implications for Ukraine's agricultural sector, including loss of land, production disruptions, labour, equipment, fuel and finance shortages. These challenges have led to a significant decline in Ukrainian food exports, exacerbating global food security. The result is a significant impact on the supply of grains and oilseed products to Eurasian countries. This has led to shortages and higher prices in countries that are heavily dependent on Ukrainian exports, such as the Netherlands, Belgium and Turkey.*

*The article also emphasises the importance of the Food Security Index (FSI) in assessing food availability and stability, especially in times of crisis. The decline in the FSI in all countries in 2022 indicates a deepening food crisis that requires urgent attention from policy makers and international organisations. The sharp rise in the Global Food Price Index (FPI) in 2022 to an all-time high reflects the immediate economic shock of the Russian invasion and highlights the serious impact of the war on global food security and availability.*

*To mitigate the negative effects of food insecurity in the European Union and beyond, the authors propose several strategic measures. These include the use of renewable energy sources to reduce the cost of agricultural production, setting energy price ceilings, pursuing consistent monetary and fiscal policies, and avoiding export restrictions to protect the EU unified market. Furthermore, addressing the political fallout and ensuring adequate food aid is crucial to maintaining social stability.*

*In conclusion, the authors advocate for joint efforts by stakeholders to address the multifaceted challenges posed by war, pandemic and climate change to ensure global food security and resilience. The article serves as a timely call to action for policymakers, governments and researchers to develop effective strategies to help navigate the complexities of the current food landscape. Through concerted international efforts and strategic policy responses, the global community can work towards a more stable and resistant food system that can withstand geopolitical shocks and ensure food security for all.*

*Стаття надає всебічний аналіз складних взаємозв'язків між геополітичними подіями, аграрними ринками та глобальною продовольчою безпекою, з особливим акцентом на триваючу війну між росією та Україною. Автори досліджують, як глибоко цей збройний конфлікт вплинув на міжнародні відносини, ланцюги поставок та економічну стабільність, особливо в аграрному секторі. Одним зі значних наслідків, висвітлених у статті, є зміна динаміки використання земель, що зачепила 42 мільйони гектарів сільськогосподарських угідь в Україні. Це зрушення не лише посилює геополітичну напругу, але й створило значні ризики для світового аграрного сектору.*

*Крім того, стаття зосереджується на наслідках для аграрного сектору України, включаючи втрату земель, порушення виробництва, нестачу робочої сили, обладнання, палива та фінансів. Ці виклики призвели до значного зниження українського експорту продовольства, посилюючи глобальну продовольчу небезпеку. Наслідком є значний вплив на постачання зернових та олійних культур до країн Євразії. Це призвело до дефіциту та підвищення цін у країнах, які сильно залежать від українського експорту, таких як Нідерланди, Бельгія та Туреччина.*

*Стаття також наголошує на важливості Індексу продовольчої безпеки (FSI) у оцінці доступності та стабільності продовольства, особливо у кризові часи. Зниження FSI у всіх країнах у 2022 році свідчить про заглиблення продовольчої кризи, що вимагає негайної уваги від політиків та міжнародних*

організацій. Різке зростання Індексу глобальних цін на продовольство (FPI) у 2022 році до історичного максимуму відображає значний економічний шок від російського вторгнення і підкреслює серйозний вплив війни на глобальну продовольчу безпеку та доступність продовольства.

Для пом'якшення негативних наслідків продовольчої небезпеки в Європейському Союзі та за його межами, автори пропонують кілька стратегічних заходів. Вони включають використання відновлюваних джерел енергії для зниження вартості сільськогосподарського виробництва, встановлення граничних цін на енергію, проведення послідовної монетарної та фіскальної політики, а також уникнення експортних обмежень для захисту єдиного ринку ЄС. Крім того, вирішення політичних наслідків та забезпечення належної продовольчої допомоги є важливими для підтримки соціальної стабільності.

На завершення, автори закликають до спільних зусиль усіх зацікавлених сторін для вирішення багатогранних викликів, спричинених війною, пандемією та зміною клімату, щоб забезпечити глобальну продовольчу безпеку та стійкість. Стаття служить своєчасним закликком до дії для політиків, урядів та дослідників з метою розробки ефективних стратегій подолання складнощів сучасного продовольчого ландшафту. Завдяки скоординованим міжнародним зусиллям та стратегічним політичним заходам світова спільнота може працювати над створенням більш стабільної та стійкої продовольчої системи, здатної протистояти геополітичним потрясінням та забезпечити продовольчу безпеку для всіх.

**Keywords:** *international economy, agricultural sector, russian-ukrainian war, global food security, world trade.*

**Ключові слова:** *міжнародна економіка, аграрний сектор, російсько-українська війна, глобальна продовольча безпека, світова торгівля.*

**Formulation of the problem.** In the dynamic landscape of the modern global economy, the multifaceted issue of food security remains a critical concern,

necessitating continuous scrutiny and adaptive strategies. Despite significant strides in science and technology, the intricacy of this issue is exacerbated by external factors such as climate change, the lingering impact of the COVID-19 pandemic, and, most notably, the ongoing war between Russia and Ukraine. This article examines the complex connection between geopolitical events, agricultural markets and global food security, exploring the far-reaching impact of the Russian-Ukrainian war on the complex web of international relations, supply chains and economic stability.

*Analysis of recent research and publications.* Recent research and publications have extensively addressed the multifaceted impact of the Russian-Ukrainian war on global food security. Researchers such as M. Negray, A. Taranenko, and I. Kostenko have explored the challenges and prospects of Ukraine's agricultural sector amid the conflict. D. Fedorovych delved into the consequences of the war for Ukrainian agricultural production and its impact on food security. R. Agakerimova focused on the broader implications of the war for both national and global food security.

Additionally, the study by P.-C. Chen et al. and M. F. Rabbi et al. reassessed the Global Food Security Index, highlighting its relevance in evaluating the evolving dynamics of food security. Continued analysis of damages, losses and needs in agriculture (Centre for Food and Land Use Research) and insights from BBC News Ukraine further contribute to the ongoing discourse, emphasising the urgent need for comprehensive strategies in the face of the complex interplay of geopolitical factors. As the situation unfolds, there remains a critical need for further research to deepen our understanding of the new challenges and contribute to developing effective strategies to ensure global food security.

*The aim of the article* is to analyse the impact of the Russian-Ukrainian war on international relations, supply chains and economic stability, particularly within the context of agricultural markets.

*The main part.* The Russian-Ukrainian war is an armed conflict between Russia and Ukraine that began in 2014. It has a long history, dating back to the times of Kyivan Rus' and continuing to the present day. It has many complex aspects, such as politics, economics, culture, national identity and others.

One of the key factors that led to the escalation of the conflict was the Revolution of Dignity in Ukraine in 2014. It resulted in a change of the Ukrainian government and deterioration of relations with Russia due to the country's commitment to strengthening cooperation with the European Union and European integration. At that time, Russia occupied Crimea and a part of eastern Ukraine, and on 24 February 2022, started a full-scale invasion of Ukraine, which continues as of the middle of 2024.

Around 42 million hectares, or 70 percent of Ukraine's total land area, are designated for agricultural use. It is noteworthy that the rich Ukrainian chernozems and kastanozems constitute one-third of the world's black soil reserves.

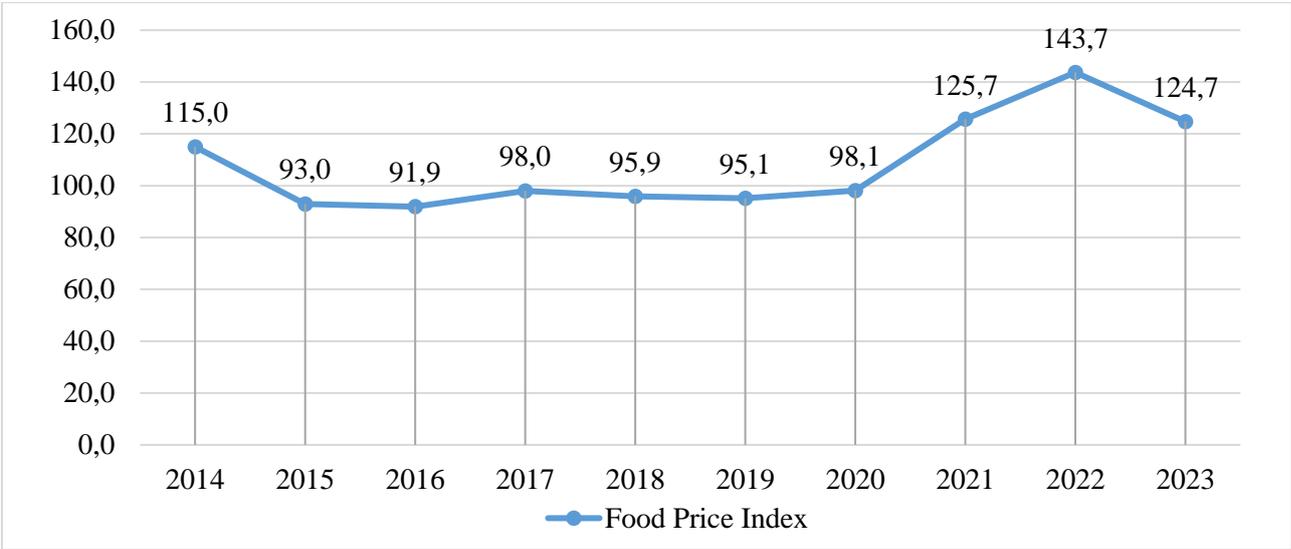
European countries, the United States and the United Kingdom are imposing more and more sanctions on Russia, which eventually affects the global economy. However, according to statistics [1], the aggressor country still finds the resources to maintain its position in certain markets, including the agricultural market. This indicates the need for more effective and decisive actions that would reduce Russian influence on the global economy and facilitate their further surrender in the war.

In Ukraine, especially in the areas where active hostilities are ongoing, the agricultural sector has suffered from land loss (sown areas have decreased by 3,5 million hectares), production disruptions, shortages of labour, equipment, fuel, finance and the destruction of logistics routes. The situation is identical in many de-occupied territories [1].

In 2021, Ukraine held the position as the second-largest contributor of grains to the European Union (EU) and emerged as a significant food provider for nations with low and middle-income levels in Asia and Africa. Throughout that year, Ukraine supplied agricultural products to over 180 countries globally, with EU countries receiving nearly 30% of these exports. The primary importers of Ukrainian grain included China, Egypt, Indonesia, Spain, the Netherlands, Turkey, Tunisia, Bangladesh, South Korea and Libya. According to the European Commission, Ukraine's influence extends to 10% of the world wheat market, 15% of the corn market and 13% of the barley market [2].

Likewise, Ukraine is one of the world's leading exporters of sunflower and other oilseeds. Dominating more than 50% of global trade, almost 6 million tons of oil have been exported in 2021. However, the outbreak of the war had a serious impact on the global oilseeds market: prices rose sharply and supplies decreased significantly [3].

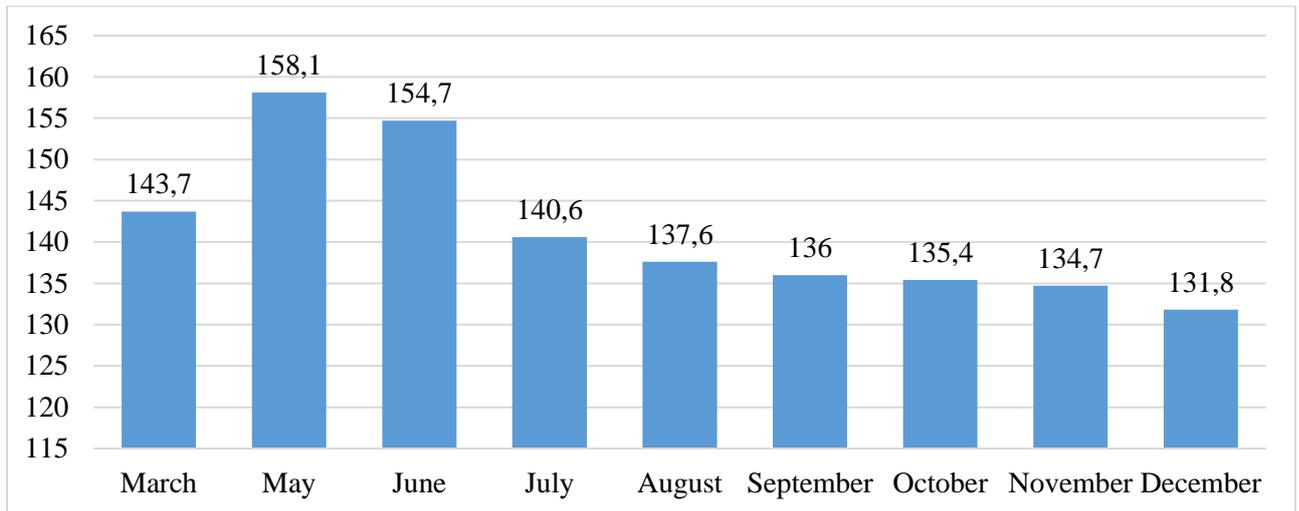
When talking about raising prices, it is necessary to mention the Global Food Price Index (FPI). In March 2022, the Food and Agriculture Organisation (FAO) reported that the index had reached a historic high after steady growth in recent years. On the graph 1, the changes of annual FPI during the period 2014-2023 is displayed.



**Graph 1. Global Food Price Index dynamic**

*Source: compiled on materials [4]*

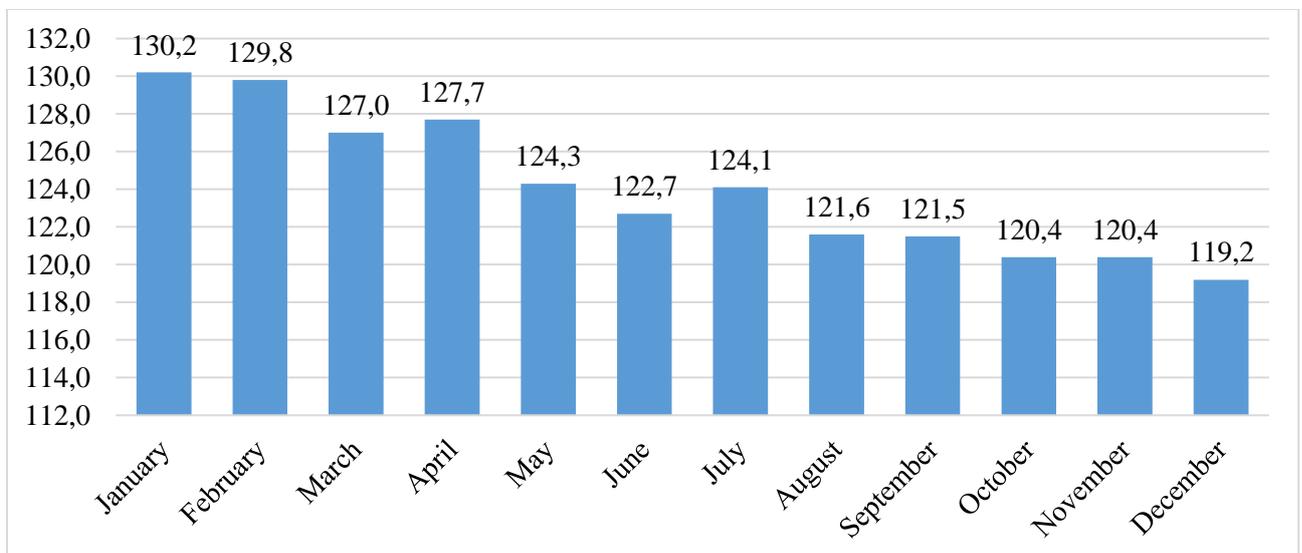
As can be seen, after a drop in 2015 relative to 2014, the index remained roughly at the same level until a sharp rise in 2021 and reaching 143,7 in early 2022. Since March 2022, the index has been monitored on a monthly basis. This allows to see that the real historical maximum was reached in May of that year, when the index was 158,1. After that, by the end of the year, there was a gradual decline to 131,8 in December. This dynamic is illustrated on the graph 2.



**Graph 2. Dynamic of the Global Food Price Index in 2022**

*Source: compiled on materials [4]*

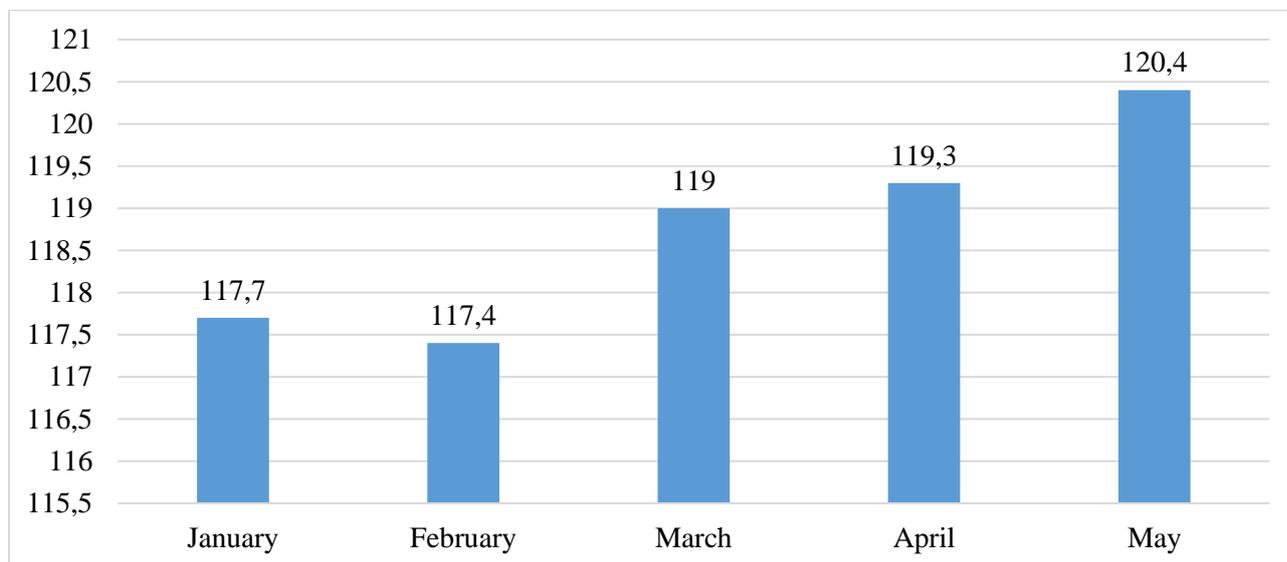
In May 2023, the FAO reported a significant drop in the global FPI, which was supported by a decline in the price indices for vegetable oil, cereals and dairy products, although there was still an increase in the indices for meat and sugar products. Thus, in December, it equalled 119,2, which is about 24,6% less than in May 2022. These changes are reflected in the graph 3.



**Graph 3. Dynamic of the Global Food Price Index in 2023**

*Source: compiled on materials [4]*

As of the middle of 2024, the FPI is fluctuating slightly, but remains at relatively the same level as at the end of 2023 (graph 4).



**Graph 4. Dynamic of the Global Food Price Index in 2024**

*Source: compiled on materials [4]*

Now Ukraine is exporting 30% less food than before the invasion [5]. According to UN experts, the number of people facing food insecurity around the world could reach the highest level in 15 years due to the effects of war, the COVID-19 pandemic and the impact of climate change.

For instance, as a result of the invasion, Eurasian countries have faced oil shortages. The Netherlands and Belgium, among others, experienced a shortage of sunflower oil, as two-thirds of the product was usually purchased from Ukraine. Prices for this product also increased in Turkey by 30%, leading to massive stockpiling. The Indian market also suffered heavy losses, with 85% of its oil imports coming from Ukraine in the last four months before the war.

Based on this, the Food Security Index (FSI) should also be taken into account in the context of this topic. FSI is a measure that reflects the level of food availability and stability in a particular country or region. The index takes into account factors such as food affordability, price sustainability, nutritional quality and other indicators that determine the extent to which people can afford the food they need to live a healthy and active life.

A decline in the index may indicate a deterioration in the access to food or the stability of food supplies in a given area. It may indicate an increased risk of hunger, inadequate income and an aggravation in living standards. This can be the result of a variety of factors, such as rising food prices, low yields, economic instability, conflict

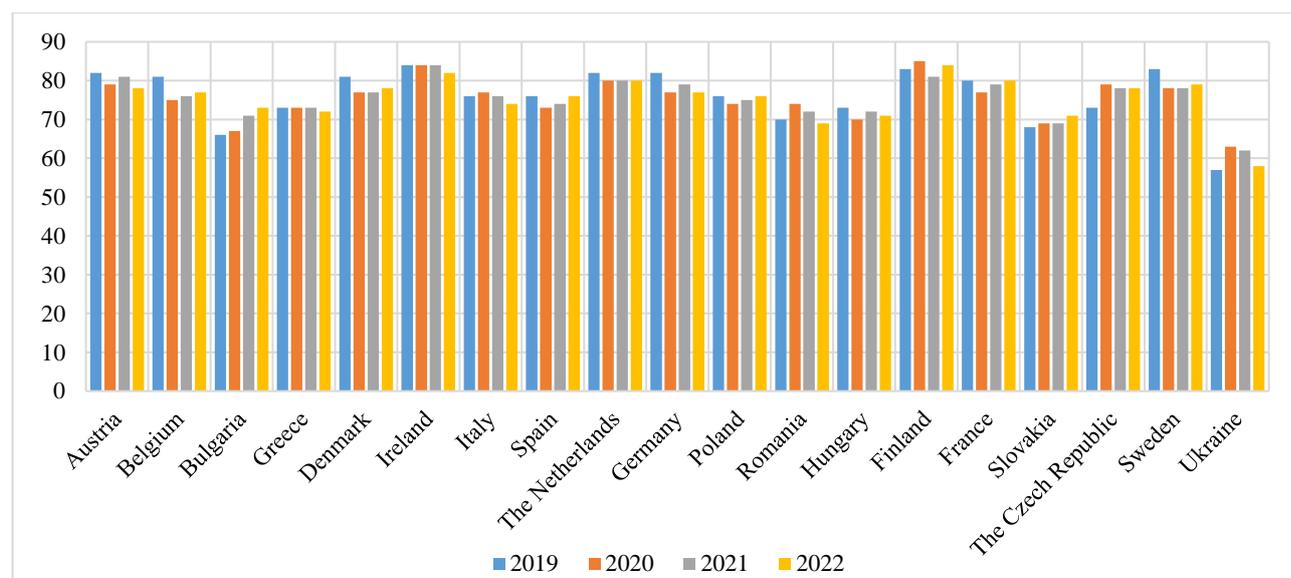
or natural disasters. Such trends often require the attention of the authorities and international institutions to develop strategies and measures aimed at improving the food situation in a particular region [6].

According to the data provided by the Economist Impact, by which the index was developed [7], changes of this indicator during 2019-2022 are displayed in a table 1 and graph 5. The ranking consists of 113 countries. Some European Union countries and Ukraine were selected for comparison.

**Table 1. Dynamic of the Global Food Security Index in 2019-2022**

Year/Country	Austria	Belgium	Bulgaria	Greece	Denmark	Ireland	Italy	Spain	The Netherlands	Germany	Poland	Romania	Hungary	Finland	France	Slovakia	The Czech Republic	Sweden	Ukraine
	<b>Global Food Security Index</b>																		
2019	82	81	66	73	81	84	76	76	82	82	76	70	73	83	80	68	73	83	57
2020	79	75	67	73	77	84	77	73	80	77	74	74	70	85	77	69	79	78	63
2021	81	76	71	73	77	84	76	74	80	79	75	72	72	81	79	69	78	78	62
2022	78	77	73	72	78	82	74	76	80	77	76	69	71	84	80	71	78	79	58

*Source: compiled on materials [7]*



**Graph 5. Dynamic of the Global Food Security Index in 2019-2022**

*Source: compiled on materials [7]*

It is evident that, within the context of 2022, there has been a noticeable decline in the FSI across all countries. This decline is indicative of a worsening food crisis and escalating challenges, issues and threats arising from the Russian-Ukrainian war. However, as we can see, in most EU countries, this indicator has relatively small fluctuations. In contrast, Ukraine's indicator was characterised by a fast rise between 2019 and 2020, but returned to its previous level in 2022, which is a direct consequence of the outbreak of war.

All mentioned factors require effective strategy developing in order to prevent further deterioration of the situation and dealing with existing consequences. Possible key measures to help countries reduce the impact of food insecurity in the EU:

1. The escalation in energy costs is expected to drive up food prices, necessitating the adoption of renewable energy sources by EU farmers to reduce agricultural production expenses.

2. Implementation of an energy price cap by EU governments is crucial to curb price fluctuations. An illustration is the Hungarian government's introduction of energy and food price caps in response to escalating inflation.

3. Maintaining a consistent monetary policy is essential for restoring price stability, while fiscal policy should focus on alleviating the cost-of-living pressures, ensuring it remains appropriately restrictive in alignment with monetary policy.

4. The ongoing war may lead to additional disruptions in global supply chains, heightening the complexities of international trade. To safeguard the EU single market, it is imperative to avoid imposing export restrictions and bans [8].

As an example of an importance of this factor is a current situation between Ukraine and Poland regarding grain exports. In September 2022, the European Commission lifted the ban on Ukrainian grain exports to the EU. However, Poland, Hungary and Slovakia expressed their intention to extend the embargo on Ukrainian grain imports unilaterally. The reason for this position is the decline in the value of their own agricultural products. In its turn, Ukraine filed a complaint with the World Trade Organisation against the EU countries that maintain restrictions on grain imports.

However, the conflict between Poland and Ukraine attracted the most attention after controversial statements by Andrzej Duda and Volodymyr Zelenskyy during the UN General Assembly in New York. Later, Polish transporters have blocked several checkpoints on the Polish-Ukrainian border, which resulted in a decrease in cargo turnover, contractual penalties for late delivery of goods to customers, refusal to participate in tenders due to lack of goods, cancellation, freezing or withdrawal of investments and reputational losses.

The European Commission believes that Poland's unilateral extension of the embargo on Ukrainian grain is a violation of European law. That is why Poland may now face penalties for this, but their application involves a lengthy procedure [9].

After two months of negotiations, Polish government reached some agreements with protesters at the borderline. However, terms have not been publicly disclosed.

According to the latest updates, several crossing points have been unblocked following the negotiations. However, three of them are still blocked by protesters, so the situation is not yet resolved.

5. The conflict could have political ramifications, such as increased energy costs contributing to social and political instability and violence. Consequently, EU leaders must ensure the provision of ample food aid to their citizens [8].

Moreover, the most important factor is to end the war. This requires continuing joint efforts to put global political and economic pressure on Russia, and continued military and financial support for Ukraine from Europe and the United States.

**Conclusion.** The complex interrelationships between geopolitical events, agricultural markets and global food security have been highlighted by the ongoing Russian-Ukrainian war. This armed conflict, which began in 2014 and escalated with Russia's full-scale invasion of Ukraine in 2022, has far-reaching implications for international relations, supply chains and economic stability, especially in the agricultural sector. The war has exacerbated the existing vulnerabilities of global food systems, demonstrating the deep interconnection between political stability and food security.

Ukraine, with its vast agricultural resources, plays an important role in the global food market. The disruption of Ukrainian agricultural production and exports

due to the war has led to significant shortages and price increases in various regions, with countries in Asia, Africa and some European countries that are heavily dependent on Ukrainian grains and oilseeds being particularly affected. The war has not only disrupted production but also strained supply chains, further deepening the global food crisis.

The imposition of sanctions against Russia also played a crucial role in this dynamic. Although these sanctions were intended to weaken Russia's economic capabilities, they also had an impact on the global economy. Despite the sanctions, the aggressor country continues to hold its position in certain markets, which underscores the need for faster, more effective and targeted measures.

Data from the Global Food Price Index (FPI) and the Food Security Index (FSI) highlight the serious impact of the war on global food prices and availability. The sharp rise in the FPI in 2022 to an all-time high reflects the immediate economic shock of the invasion. Despite some stabilisation, the FPI remains significantly elevated compared to pre-crisis levels. Similarly, the decline in the FSI in different countries, with a notable impact on Ukraine, points to a broader deterioration in food security and highlights the need for an urgent and coordinated response.

Several strategic measures have been proposed to mitigate the negative impacts of food insecurity in the European Union and beyond. These include the use of renewable energy sources to reduce the cost of agricultural production, energy price caps, consistent monetary and fiscal policies, and avoidance of export restrictions to protect the EU common market. Furthermore, addressing the political fallout and ensuring adequate food aid is crucial to maintaining social stability.

The ongoing dispute over grain exports between Ukraine and Poland is an example of the complexities of international trade in the face of geopolitical tensions. The European Commission's stance against unilateral embargoes highlights the challenges of balancing national interests with broader regional stability. Resolving such disputes requires diplomatic negotiation and compliance with international trade laws to prevent further disruptions to the food supply chain.

Ultimately, the most important step to resolving the food security crisis is to end the war. This requires sustained global political and economic pressure on Russia,

as well as continued military and financial support for Ukraine from Europe and the United States. Only a joint international effort can mitigate the devastating impact of the war on food security, ensuring a more stable and resilient global food system.

Consequently, the russian-ukrainian war serves as a stark reminder of the complex links between geopolitics and food security. Addressing these challenges requires a multifaceted approach that combines immediate relief measures with longer-term strategies aimed at strengthening global cooperation and stability. Lessons learned from this crisis should inform future policies aimed at building more resilient food systems that can withstand geopolitical shocks and ensure food security for all.

### Література

1. Негрей М. В., Тараненко А. А., Костенко І. С. Аграрний сектор України в умовах війни: проблеми та перспективи. *Економіка та суспільство*. 2022. №40. 9 с. DOI: <https://doi.org/10.32782/2524-0072/2022-40-38>

2. Федорович Д., Маналур В. Вплив російсько-української війни на сільськогосподарське виробництво в Україні та його наслідки для продовольчої безпеки. Збірник наукових праць "ЛОГОС" (м. Болонья, 29 верес. 2023 р.). Болонья, 2023. С. 12–18. DOI: <https://doi.org/10.36074/logos-29.09.2023.01>

3. Агакерімова, Р. Ю. Вплив війни в Україні на національну та глобальну продовольчу безпеку. *Економіка та суспільство*. 2023. №50. 7 с. DOI: <https://doi.org/10.32782/2524-0072/2023-50-53>

4. Світова продовольча ситуація. Індекс продовольчих цін Продовольчої і сільськогосподарської організації ООН (ФАО). URL: <https://www.fao.org/worldfoodsituation/foodpricesindex/en/> (дата звернення: 29.06.2024).

5. Огляд збитків, втрат та потреб від війни в с/г. Центр досліджень продовольства та землекористування Київської школи економіки. URL: <https://kse.ua/wp-content/uploads/2023/05/RDNA2.pdf> (дата звернення: 29.06.2024)

6. Чен П.-Ч., Ю М.-М., Ши Ж.-Ч., Чанг Ч.-Ч., Хсу Ш.-Х. Переоцінка Глобального індексу продовольчої безпеки за допомогою ієрархічного підходу до аналізу структури даних. *Європейський журнал операційних досліджень*. 2019. Т. 272, №2. С. 687–698. DOI: <https://doi.org/10.1016/j.ejor.2018.06.045>

7. Глобальний індекс продовольчої безпеки (GFSI). URL: <https://impact.economist.com/sustainability/project/food-security-index> (дата звернення: 29.06.2024).

8. Раббі М. Ф., Бен Хассен Т., Ель Білалі Х., Рахім Д., Рапосо А. Виклики продовольчій безпеці в Європі в контексті тривалого російсько-українського конфлікту. *Sustainability*. 2023. Т. 15, №6. URL: <https://www.mdpi.com/2071-1050/15/6/4745>

9. Чому українське зерно стало проблемою для Європи та України. Пояснюємо причини та наслідки (19 квітня, 2023). URL: <https://www.bbc.com/ukrainian/articles/cg31j1g4l4do> (дата звернення: 01.07.2024).

## References

1. Negray, M., Taranenko, A. and Kostenko, I. (2022), "The agricultural sector of Ukraine in the conditions of war: Problems and prospects", *Economy and Society*, [Online], vol. 40. <https://doi.org/10.32782/2524-0072/2022-40-38>.

2. Fedorovych, D. (2023), "Impact of Russian-Ukraine war on agricultural production in Ukraine and its implications on food security", *IV International Scientific and Practical Conference "RICERCHE SCIENTIFICHE E METODI DELLA LORO REALIZZAZIONE: ESPERIENZA MONDIALE E REALTÀ DOMESTICHE"*, Bologna, Italy, 29 September 2023. <https://doi.org/10.36074/logos-29.09.2023.01>

3. Agakerimova, R. (2023). "The impact of the war in Ukraine on national and global food security", *Economy and Society*, [Online], vol. 50. <https://doi.org/10.32782/2524-0072/2023-50-53>.

4. Official website of the Food and Agriculture Organisation of the United Nations (FAO) (2024), "World food situation. FAO Food Price Index", available at:

<https://www.fao.org/worldfoodsituation/foodpricesindex/en/> (Accessed 29 June 2024).

5. Centre for Food and Land Use Research, Kyiv School of Economics (2022), "Overview of damages, losses and needs from the war in agriculture", available at: <https://kse.ua/wp-content/uploads/2023/05/RDNA2.pdf> (Accessed 29 June 2024).

6. Chen, P.-C., Yu, M.-M., Shih, J.-C., Chang, C.-C. and Hsu, S.-H. (2019), "A reassessment of the Global Food Security Index by using a hierarchical data envelopment analysis approach", *European Journal of Operational Research*, [Online], vol. 272 (2), pp. 687–698. <https://doi.org/10.1016/j.ejor.2018.06.045>.

7. Economist Impact (2023), "Global Food Security Index (GFSI)", available at: <https://impact.economist.com/sustainability/project/food-security-index> (Accessed 29 June 2024).

8. Rabbi, M. F., Ben Hassen, T., El Bilali, H., Raheem, D. and Raposo, A. (2023), "Food Security Challenges in Europe in the Context of the Prolonged Russian–Ukrainian Conflict", *Sustainability*, [Online], vol. 15 (6), available at: <https://www.mdpi.com/2071-1050/15/6/4745> (Accessed 29 June 2024).

9. BBC News Ukraine (2023), "Why Ukrainian grain has become a problem for Europe and Ukraine. We explain the causes and consequences", available at: <https://www.bbc.com/ukrainian/articles/cg31j1g4l4do> (Accessed 01 July 2024).

*Стаття надійшла до редакції 29.12.2024 р.*