

**Impact of the Russian-Ukrainian war on grain exports,
port and maritime operations.**

How were these cargoes exported?

How were operations managed in port and at sea?

**Bachelor Project submitted for the degree of
Bachelor of Science HES in International Business Management**

by

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Executive Summary

This thesis investigates how Ukraine sustained grain exports during the war despite extreme operational disruption. The objective was to understand how the Russian invasion affected port operations, maritime logistics, and trade flows but also how Ukraine adapted its export system under wartime pressure. Unlike other works focused on economic consequences, this research analyses the operational and logistical mechanics of wartime exports, including the role of deep-sea ports, fallback strategies, and maritime frameworks and insurance.

Based on statistical and fleet data, reports and news articles, along with interviews of grain trader, port operator, and shipping experts, the study highlights the centrality of maritime infrastructure.

Prior to 2022, Ukraine's grain trade was highly concentrated through three Black Sea ports. When these ports became inoperable, export volumes collapsed. Emergency redirection allowed for continuity, but these routes proved logistically constrained. While they offered a short-term solution, they could not replace deep-sea ports.

The Black Sea Grain Initiative (BSGI), brokered in mid-2022, allowed temporary recovery, but faced constant delays and political interference. Its collapse in July 2023 underscored the need for sovereignty-based corridors. The unilateral Ukrainian corridor launched thereafter restored deep-sea export volumes. However, even as Ukraine returned to pre-war levels in tonnage, it lost market share in key regions such as Egypt and China, revealing a permanent shift in global trade dynamics.

The research concludes that export resilience during conflict depends not only on infrastructure, but also on financial tools, political autonomy, and operational design. Future corridor models must include enforceable frameworks, credible and adaptive insurance, and long-term port strategies focused on resilience rather than throughput. Ensuring continuous access to deep-sea ports will also require targeted investments in infrastructure, surveillance, and risk-sharing mechanisms adapted to conflict conditions.

Through the case of Ukraine, this project illustrates how wartime trade depends on a complex alignment of logistics, finance, and geopolitics. The findings serve as a blueprint for designing export systems that remain functional and adaptable, under extreme conditions.

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
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1. Introduction

Since the full-scale Russian invasion of Ukraine on February 24, 2022, the global agricultural market has faced one of its most significant disruptions in recent history. Ukraine, a key supplier of wheat, maize, barley, and sunflower oil, plays a pivotal role in feeding some of the world's most vulnerable populations. In the years prior to the conflict, million tons of Ukrainian agricultural commodities were exported annually, primarily through a highly centralized network of deep-sea ports located along the northwestern Black Sea coast.

The war radically altered this landscape. Missile strikes, naval blockades, and the classification of Ukrainian waters as war-risk zones led to the paralysis of maritime logistics. Export flows collapsed, and global grain prices surged, putting millions at risk of food insecurity. Amid these conditions, new logistics models were improvised, leveraging alternative river ports, land-based corridors, and eventually, multilateral diplomatic solutions.

This thesis explores how Ukrainian grain exports logistics were maintained and restructured during wartime, despite operational chaos and geopolitical uncertainty.

More specifically, the research explores how were grain cargoes exported from Ukraine during the war and how were port and maritime operations managed to sustain agricultural export volumes.

Unless otherwise specified the term grain used by the author refers specifically to wheat, corn also called maize, and barley, which are the three principal cereals that dominate Ukraine's agricultural exports.

To answer these questions, the study is organized around three interconnected analytical pillars:

1. **Port Operations:** How infrastructure at Ukrainian ports was damaged and adapted; how capacity shifted to alternative locations such as Danube ports; and how logistical models evolved across each export phase.
2. **Maritime Operations:** How vessel traffic was managed during the war, from the initial paralysis to the implementation of the Black Sea Grain Initiative (BSGI), and finally to Ukrainian Unilateral Grain Corridor.
3. **Global Market:** How international grain markets responded to the disruption; and how war-risk management evolved to enable continued exports.

These dimensions are analyzed chronologically across five major phases:

- **Pre-War Operations**
- **Impact of the War on Grain Exports (Feb - June 2022)**
- **The Black Sea Grain Initiative (BSGI) (July 2022 - July 2023)**
- **Post-BSGI operations and alternative strategies**
- **The Ukrainian Grain Corridor (Aug 2023 - Present)**

Beyond the operational dimension, the consequences of the war on Ukraine's grain exports extended to the global level, disrupting food markets, reshaping trade flows, and prompting reflections on future resilience. These wider implications are explored through two complementary perspectives:

- **Global Market cases**
- **Future Outlooks and strategic lessons**

Research Context

The study is conducted in collaboration with academic and industry partners active in commodity trading and maritime logistics. It draws upon a combination of statistical data, institutional reports, policy documents, and three interviews with professionals involved in port operations, shipping, and agricultural trade. This mixed-methods approach enabled a comprehensive view of logistical infrastructure, real-world operations and market dynamics.

Structure of the Report

The thesis is divided into six chapters:

- **Chapter 1:** Introduces research questions, context, and structure.
- **Chapter 2:** Presents a literature review of port operations, maritime logistics, and global market responses during wartime.
- **Chapter 3:** Outlines the methods used, including data sources and interview protocols.
- **Chapter 4:** Summarizes the results obtained from data analysis and field research.
- **Chapter 5:** Discusses these findings across the three thematic pillars, providing a critical evaluation of Ukraine's export system under duress.
- **Chapter 6:** Concludes with a synthesis of lessons learned and reflections on the broader implications for global food security and trade resilience.

2. Literature review

This literature review surveys academic, institutional, and policy research on how Ukraine's grain export logistics were reconfigured during wartime. It explores three major themes preceded by a brief introduction:

- 2.1 Introduction to the literature review
- 2.2 Port operations
- 2.3 Maritime operations
- 2.4 Global market impacts

2.1 Literature review introduction

Introduction to the literature review

Ukraine has been at war with the Russian Federation since 2014, when Russia annexed Crimea. This conflict escalated on February 24, 2022, with the launch of a full-scale invasion of Ukrainian territory. As one of the world's largest exporters of wheat, corn, barley, and oilseeds, Ukraine has traditionally played a critical role in global food supply, particularly for import-dependent countries across Africa, the Middle East, and Asia (USDA, 2022; European Council, 2024).

Before the war, around 75% of Ukraine's agricultural exports were shipped through deep-sea ports located in the northwestern coast of the Black Sea.

Key Ukrainian export hubs such as Odessa, Chornomorsk, Pivdennyi, Nikolayev and Kherson are situated along the northwestern coast as shown on Figure 1 (CSIS, 2023; European Parliament, 2022).



Figure 1 - Map of Black Sea Ports

However, the full-scale invasion of Ukraine triggered a naval blockade and repeated strikes on port infrastructures. From the beginning of 2022, key ports such as Odessa, Chornomorsk and Pivdennyi became military targets. Missile attacks have damaged grain terminals, silos and vessels. These attacks disrupted storage and loading capacity but also execution of contracts (Lloyd's List, 2022; Walker, 2023).

Ukrainian grain exports fell, driving up international prices and complicating supply to vulnerable countries. This decline was not only due to damaged infrastructure but also to the high operational insecurity and insurance costs associated with war-zone shipping (IFRPI, 2024). Overland alternatives, by rail, truck, or barge via the Danube ports such as Reni, Izmil or Ust-Dunaïsk and EU's Solidarity Lanes, mitigated some shortfalls but lacked the capacity and efficiency of deep-sea trade.

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In response to mounting food insecurity, the United Nations and Turkey brokered the Black Sea Grain Initiative (BSGI) in July 2022. The BSGI was a diplomatic achievement brokered in this context of growing international concern over global food security, especially in developing countries which are heavily reliant on Ukrainian grain. It was not a peace or a ceasefire agreement. It focused exclusively on facilitating the safe maritime export of grain and foodstuffs from Ukrainian ports that remained operational but constrained by the war.

The agreement has been negotiated thanks to the United Nations, Turkey and the participation from Ukraine and Russian Federation. On July 22, 2022, the agreement has been signed by all the parties in Istanbul. The political urgency of the agreement was heightened by the rise in world prices and the risk of famine in countries such as Ethiopia, Somalia and Yemen, which depended on Ukrainian wheat imports (UN, 2022; UNCTAD, 2022).

The legal framework of the initiative was enshrined in two separate but interconnected deals: one between the UN and Russia, and the other between the UN and Ukraine. This format allowed the parties to avoid direct negotiations between belligerents while still ensuring commitments (UN, 2022).

The BSGI aimed to restore grain exports and designated a safe humanitarian maritime corridor (black dots on Figure 2) in the northwestern Black Sea, allowing commercial vessels to safely enter and exit the ports of Odesa, Chornomorsk, and Pivdennyi. It remained operational for 12 months and is discussed in more detail in Section 2.3.

Following the suspension of the BSGI in July 2023, Ukraine launched a unilateral “humanitarian corridor” (blue dot on Figure 2) along its coastal waters in August 2023, backed by improved military defense and a new war-risk insurance facility. This corridor enabled Ukrainian exports to gradually recover, though at continued operational risk.



Figure 2 - Grain corridors from Ukraine

2.2 Port Operations

Pre-war conditions and structural limitations

Prior to the outbreak of war in February 2022, Ukraine’s agricultural export model was deeply dependent on deep-sea ports located along the Black Sea coast. The ports of Odesa, Mykolaiv, Chornomorsk, and Pivdennyi collectively facilitated more than 90% of the country’s seaborne agricultural exports, particularly wheat, maize, barley, and sunflower oil (World Trade Institute, 2023; Kormych et al., 2024). In 2021 alone, these ports handled 153.3 million tons of total cargo, of which 49.5 million tons were grain, indicating the country’s central role in global food supply chains (Kormych et al., 2024).

Despite this impressive flow, systemic inefficiencies existed within the pre-war port infrastructure. Reports from the European Parliament (2022) identified critical gaps: notably outdated railway networks linking interior production areas to port facilities, limited portside automation, and a chronic shortage of high-capacity handling equipment. These issues led to congestion during peak export seasons and restricted Ukraine’s

ability to scale export operations rapidly. Furthermore, port resilience was undermined by a high concentration: Ukraine had no significant alternative for maritime exports beyond the Black Sea, leaving the system vulnerable to disruption.

Immediate collapse and wartime damages / February – April 2022

The Russian full-scale invasion on February 24, 2022, brought Ukrainian port operations to an immediate halt. Missile attacks and naval aggression along the southern coast disrupted maritime traffic and caused direct physical damage to port infrastructure and vessels. Among the earliest incidents, the *Namura Queen* (IMO 9841299) and *Yasa Jupiter* (IMO 9848132), both commercial vessels anchored near Pivdennyi, were hit by missiles within the first two days of hostilities (Lloyd's List, 2022). These attacks set a precedent that rendered all Ukrainian seaborne traffic unsafe.

By April, major port cities such as Mariupol and Berdyansk were either under Russian occupation or under continuous siege, while Odesa and Chornomorsk, though remaining under Ukrainian control, were effectively immobilized. The Ukrainian Sea Ports Authority (USPA) suspended all commercial navigation in Ukrainian territorial waters and refocused operations toward emergency logistics and national defense coordination (UN, 2023). Port labor was reassigned to critical national tasks, electricity supplies were restricted, and customs operations were suspended. The blockade quickly cut Ukraine off from its sea routes, with repercussions for world food markets.

Danube Port surge and emergency rerouting / February – July 2022

In response to the blockade, Ukraine shifted part of its export strategy to Danube River ports, which provided access to the European Union via Romania. Previously minor or underutilized, the ports of Reni, Izmail, and Ust-Dunaisk became central to the wartime exports logistics. Their total throughput jumped from 5.5 million tons in 2021 to 16.5 million tons in 2022 (Kolishnichenko, 2023). This increase underlines both their usefulness during this period and their strategic location, as they are located close to the Romanian border. It also demonstrates the urgent need to identify safe corridors to maintain exports flow.

However, the pivot to Danube ports introduced new logistical constraints. First, the ports' physical infrastructure was extremely limited: shallow drafts made it impossible for large vessels to dock. Grain was brought by rail or road and loaded in barges for further transport. Second, customs and inspection capacity, especially on the Moldovan and Romanian sides, was insufficient for the sudden flow of volume. Articles reported long queues of trucks, delayed cargo clearance, and inadequate storage facilities, particularly during harvest months. Nevertheless, the Danube Corridor played a vital subsidiary role during the most critical phase of the crisis, helping Ukraine to maintain a base of cereal exports to avoid global shortages (RFI, 2022).

Reopening: The Black Sea Grain Initiative (BSGI) / July 2022 – July 2023

From July 2022, the BSGI re-enabled operations at Odesa, Chornomorsk, and Pivdennyi under a secure corridor arrangement monitored by the Joint Coordination Centre (JCC) in Istanbul. The JCC was established to supervise the operations and staffed by representatives from Ukraine, Russia, Turkey, and the United Nations. Its purpose was to oversee vessel registration, clearance, monitoring, and inspection procedures (UN, 2022). Port scheduling and access were synchronized with JCC inspection calendars, and vessels had to submit documentation, undergo pre-departure vetting, and navigate designated corridors with military coordination.

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The initiative was immediately impactful. Ukrainian ports resumed 24/7 loading, not without some restrictions such as daylight-only navigation and limited tug escort capacity (NorthStandard, 2024). Over the following 12 months, 32.9 million tons of grain were exported through BSGI ports, restoring Ukraine's presence in international food markets (UN, 2023).

Yet, a major operational challenge persisted, Russian interference at the inspection level led to long vessel queues at the Bosphorus. Inspection capacity often fell short of demand, and delays extended turnaround times by several days, if not weeks (CSIS, 2023). The fragility of the BSGI was underscored in October 2022 when Russia temporarily suspended its participation following attacks on its naval assets, and again in July 2023 when it permanently exited the agreement.

Post-BSGI reorganization and port resilience / August 2023 – Present

In response to Russia's withdrawal from the BSGI, Ukraine launched a unilateral export corridor on August 10, 2023. This new corridor relied entirely on Ukrainian coordination, supported by naval intelligence and NATO-adjacent routing paths near Romanian and Bulgarian waters. Ukrainian port authorities restructured entry-clearance systems and relied heavily on pre-approved vessel plans to maintain throughput without multilateral mediation (Eurogal, 2024).

From August 2023 to August 2024, this corridor facilitated the export of 64 million tons of cargo, of which 43.5 million tons were agricultural products (Eurogal, 2024). This demonstrated not only the robustness of Ukraine's port institutions but also their ability to quickly adapt under duress. The reorganization also marked a shift in control, from diplomatic, multilateral mechanisms to autonomous, defense-informed logistics governance.

Romanian partnership and Danube modernization

Romania, especially through the port of Constanta, emerged as a key strategic partner. Constanta handled over 14 million tons of Ukrainian grain in 2023 alone (Reuters, 2024). A bilateral agreement signed in August 2023 included EU funding for rail and canal upgrades, aimed at doubling Danube capacity to 4 million tons/month. Sulina was identified as a primary access point, with traffic coordination, pilot scheduling, and night navigation rules revised to accommodate increased traffic (PBS, 2023; Eurogal, 2024).

Additionally, Romania, Bulgaria, and Turkey launched a demining effort to clear maritime corridors and reduce insurance costs for civilian shipping (Associated Press, 2024).

2.3 Maritime Operations

Initial maritime collapse and isolation / February – July 2022

At the beginning of Russia's full-scale invasion, Ukraine's maritime operations were rendered inoperable. The Russian Navy blockaded the entire northern Black Sea, while missile strikes, floating mines, and naval sabotage created an unsafe environment. Over 90 merchant vessels were stranded in Ukrainian waters, some damaged, others abandoned (UNCTAD, 2022). The International Maritime Organisation (IMO) transmitted a letter from the Embassy of Ukraine in the United Kingdom raising maritime threat levels to MARSEC 3, which is the highest of the three levels concerning security threats. MARSEC 3 applies when there is credible information of a probable or imminent security incident (IMO, 2022). The Joint War Committee (JWC) classified all Ukrainian waters as

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war-risk zones (NorthStandard, 2024). The consequences were immediate: insurers withdrew coverage, charterers rerouted ships, and crewing agencies refused deployments.

This collapse severed Ukraine's access to the sea, immobilizing tens of millions of tons of food cargo. The maritime blockade had cascading effects: storage facilities became overloaded, domestic transport blocked, and global grain prices soared (WTI, 2023).

The Black Sea Grain Initiative (BSGI): Maritime governance and operational mechanics / July 2022 – July 2023

The BSGI goal was to re-establish safe exporting routes through a designated corridor in the northwestern Black Sea. The corridor enabled commercial vessels to sail into and out of three specific Ukrainian ports, Odesa, Chornomorsk, and Pivdennyi, while avoiding mined areas and conflict zones.

The framework imposed several security-related conditions. Vessels intending to participate had to:

- Submit full voyage and cargo declarations to the Joint Coordination Centre (JCC)
- Operate only during daylight hours
- Activate Automatic Identification System (AIS) tracking throughout their route
- Avoid any military cargo or personnel
- Sail within a strictly defined corridor, buffered by 10 nautical miles of exclusion zone on either side (UN, 2022; JCC, 2022)

Vessels were inspected at departure and arrival by joint teams in Turkish waters. The inspection, made in defined areas near the Bosphorus had to ensure compliance with cargo restrictions and prevent illicit transport of military equipment. These inspections were crucial to maintain Russia's participation to the deal, given Moscow's insistence on monitoring potential arms dissimulation under the guise of humanitarian trade (CSIS, 2023).

Despite its strong procedural design, the BSGI encountered significant operational inefficiencies. The JCC's inspection capacity was a major issue. With a limited number of teams and often complex bureaucratic routines, the centre was frequently unable to meet the demand. By the fourth quarter of 2022, it was common for more than 100 vessels to queue in Turkish anchorage zones awaiting inspection, with average delays ranging from 9 to 15 days (CSIS, 2023; UN, 2023).

Moreover, the politicization of inspection scheduling undermined the initiative's efficiency. Ukraine accused Russia of deliberately delaying approvals or blocking certain vessels from proceeding, especially when tensions rose in other areas of the war. For example, following a drone attack on Russia's Black Sea Fleet in October 2022, Moscow temporarily withdrew from the initiative, stopping ship traffic for three days (Euractiv, 2022). Even after rejoining, Russian delegates in the JCC were slow to process requests and rejected several outbound cargoes without detailed justification, according to reports from governmental agencies of Ukraine (Ministry for Communities, Territories and Infrastructure Development of Ukraine, 2023).

Despite these challenges, the BSGI remained operational for 12 months, enabling the export of over 32 million tons of grain and foodstuffs. It provided a vital lifeline for

Ukrainian agriculture, stabilized global markets, and created a functional, albeit fragile, model of maritime governance under wartime conditions. Its suspension in July 2023 by Russia marked not only the end of a multilateral shipping regime but also a turning point in Ukraine's strategy, leading to the development of a unilateral humanitarian corridor, addressed in the next section.

The Humanitarian Corridor: A Ukrainian maritime strategy / August 2023 – Present

With the BSGI terminated, Ukraine inaugurated its own corridor in August 2023. This model departed from multilateral supervision and shifted toward nationalized control. Coordination was handled by Ukraine's coordination center, with support from Armed Forces, Navy and Coast Guard. Vessels submitted voyage plans and adhered to strict operational rules, including AIS suppression in certain zones, radio silence during departure, and full compliance with updated navigational charts (Eurogal, 2024).

Critically, this corridor's success was made possible by Ukraine's enhanced naval posture. The widespread use of uncrewed sea drones, combined with long-range missile strikes, forced Russia's Black Sea Fleet to retreat eastward, away from key export lanes (BBC, 2023). These deterrents, coupled with strategic navigation near North Atlantic Treaty Organisation (NATO) borders, rendered the corridor navigable despite its lack of Russian guarantees.

2.4 Global Markets

Global market disruption and substitution attempts

The war in Ukraine has shaken global grain markets by suddenly removing a key player in agricultural exports from the trading map. Before the invasion, Ukraine ranked among the world's top exporters of wheat (5th), maize (4th), and sunflower oil (1st), contributing up to 10% of global wheat exports and over 40% of global sunflower oil shipments (MATs, 2024). The country's Black Sea ports allowed export of more than 50 million tons of agricultural commodities per year. With the disruption of maritime routes, mostly between February and July 2022, grain prices surged on international exchanges. Wheat futures peaked at over \$500/ton following the invasion and over \$400/ton in May 2022 on the Chicago Board of Trade, over 50% above pre-war levels, while maize prices followed a similar trend (Glauber & Laborde, 2022).

Import-dependent countries, especially in the Middle East and North Africa (MENA), felt the impact. Egypt, Lebanon and Yemen, relied on Ukraine for up to 40% of their wheat imports (UNCTAD, 2022; FAO, 2022). The interruption of supplies immediately raised fears of famine, civil unrest, and economic instability. The BSGI's activation in July 2022 helped to partially restore confidence and reduce volatility. Over 32.9 million tons of grain were exported through the corridor during its one-year operation, and global food prices dropped significantly in the second half of 2022 (UN, 2023).

Nonetheless, the collapse of the BSGI in July 2023 revived tensions. Although Ukraine launched a unilateral corridor that maintained exports at relatively high levels, its lack of international guarantees and limited vessel coverage meant that structural gaps remained in the global supply system. As a result, the global market turned into alternative exporters to fill the void.

For some countries Russia quickly emerged as the principal substitute for wheat. Benefiting from a record 2022 harvest and uninterrupted port access, Russian wheat

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exports reached 45 million tons in 2023 (WTI, 2024). Many of Ukraine's former clients, including Egypt, and Turkey, shifted their sourcing to Russian terminals.

Brazil and Argentina ramped up maize and soybean exports. Brazil recorded historic volumes thanks to an expanded harvest and improved infrastructure in their main ports, respectively Santos and Paranaguá. However, the long shipping distances to MENA and Asia limited the reactivity of South American grain in emergency contexts (WTI, 2023). The United States, while capable of supplying both wheat and corn, redirected part of its production to domestic consumption and long-term trade agreements, leaving only moderate flexibility for emergency demand from new clients.

India briefly became a visible actor on the wheat market, increasing exports after the war's outbreak. However, a nationwide export ban in May 2022, triggered by drought and domestic inflation, illustrated the fragility of relying on suppliers without consistent export policies. Other smaller producers, such as Kazakhstan or Romania, increased their regional deliveries but lacked the scale to impact global pricing (Reuters, 2022).

While substitution efforts mitigated the worst-case scenarios, they failed to offer a full and quick replacement for Ukraine's agricultural exports, which combined high volume, low shipping costs, and proximity to key markets. This forced buyers to adjust procurement strategies and elevated the role of logistics and risk management in international food trade.

Marine Insurance, risk mitigation, and corridor reinsurance mechanisms

Marine insurance underwent deep restructuring during the war. From February 2022, the Joint War Committee classified the entire northern Black Sea and all Ukrainian territorial waters as "war-risk zones" (NorthStandard, 2024). As a result, insurers withdrew standard coverage, premiums spiked above 5-10% of hull or cargo value, and many owners refused to call at Ukrainian ports, even when technically navigable conducting to prohibitive war-risk premiums.

However, new guarantee schemes, which were supported by the European Bank for Reconstruction and Development (EBRD) and private insurers like Marsh McLennan, allowed insurers to underwrite voyages again under specific routing conditions (Kakabadze, 2023). Classification societies also redefined compliance benchmarks, accepting MARSEC Level 3 navigation as insurable, provided vessels adhered to corridor protocols and maintained communications with Ukrainian naval forces (UN, 2023). This evolving insurance regime enabled hundreds of vessels to re-enter the Ukrainian corridor, restoring a crucial export channel amid wartime.

Under the BSGI framework, the United Nations and the Turkish government negotiated conditional insurance packages for vessels participating in the corridor. Lloyd's underwriters reintroduced coverage under strict conditions: adherence to the JCC's routing, daylight-only navigation, and full pre-clearance of documentation. These guarantees restored partial confidence but remained limited in scale, especially when Russia began delaying inspections or threatened to withdraw from the agreement, as occurred for a few days in October 2022 and definitively in July 2023 (Dodd, E., Welsh, C. and Glauber, J., 2024; Euractiv, 2022).

Following the BSGI's termination, Ukraine launched the "Unity Facility" in November 2023, a public-private insurance mechanism covering up to \$50 million per voyage, backed by letters of credit from Ukrainian state banks and confirmed by DZ Bank Frankfurt. This scheme, structured through first-loss guarantees from the Ukrainian

Export Credit Agency (EKA), attracted major underwriters from the London market as Lloyd's and reduced war premiums from over 3% to 0.75% of the insured sum by early 2024 (GET, 2024).

This insurance breakthrough played a pivotal role in the continued success of the unilateral corridor. Over 1,100 vessels used the new route between August 2023 and March 2024, carrying more than 30 million tons of agricultural goods (GET, 2024). Reinsurers and classification societies adapted risk models to accept MARSEC Level 3 conditions, provided vessels adhered to operational guidelines and maintained communication with Ukrainian naval escorts.

Additionally, regional cooperation among Romania, Bulgaria, and Turkey contributed to a demining effort launched in October 2023. This program enhanced route safety and helped reduce insurers' exposure to explosive or mechanical hazards. The result was a more resilient, nationally coordinated export strategy, where insurance, risk protocols, and corridor design were reconfigured independently of any Russian guarantees (Associated Press, 2024).

3. Methods

This research uses qualitative and documentary approach, in line with the complexity of the subject studied: the export of Ukrainian grain during the war. Given the sensitivity of the subject, the political aspects and the involvement of various governmental, institutional and private stakeholders, a purely quantitative approach would have been complicated and insufficient due to the confidentiality of the data.

3.1 Secondary sources and documentary analysis

The chosen methodology combines news articles, document analysis, statistical interpretation, and expert interviews. The objective being to understand and reconstruct the operational, logistical and global framework that allowed grain exports to continue despite the military conflict and disruptions in maritime operations.

A huge number of secondary sources were consulted for this research. These included agreement documents such as the text of the Black Sea Grain Initiative (BSGI), the official shipping procedures published by the Joint Coordination Centre (JCC), as well as numerous reports published by the United Nations, the World Food Program (WFP), the Food and Agriculture Organization (FAO), independent institutions and newspaper articles. These sources were essential to understand the legal, operational and humanitarian aspects of the BSGI, the Ukrainian grain corridor and alternative routes.

In addition to the legal and institutional documentation, the author relied heavily on the detailed export data published via the BSGI reports, including cargo volumes, types, destinations, and vessel counts. These were complemented by figures from Trade Data Monitor, AXS Marine and Vessel Finder. Special attention was paid to Ukrainian exports of wheat, corn, and barley, which represent the country's three main cereal crops, as well as to the monthly evolution of volumes and movement of vessels across different transport routes (Black Sea Grain Initiative and Ukrainian Grain Corridor). This base allowed the author to map the evolution of grain flows over the 2022-2024 period, and to link observed trends with key political events such as the collapse of the BSGI in July 2023 or the launch of the unilateral Ukrainian corridor in August 2023.

3.2 Data processing and cross-check

To conduct the analysis, several datasets were manually compiled and cross-referenced. The BSGI voyage and IMO numbers of vessels were matched with information from AXS Marine and Vessel Finder in order to determine the build year and type of vessels involved in the initiative. This enabled a reconstruction of the composition and evolution of the fleet operating under BSGI. Given the high number of vessels involved, this process was partially automated using AI-powered system research and matching. IMO numbers were submitted in successive batches of approximately 10 entries each. To enhance accuracy and credibility of the results given by AI systems, between two and four IMO numbers were randomly picked and manually verified against maritime databases. In addition to these batch-level checks, a separate random sample representing 5% of the database (37 vessels) was manually reviewed at the end. During the process, two batches returned incorrect outputs, representing an error rate of approximately 2.8%, while the final random sample review had a 97.7% accuracy rate.

Furthermore, public news articles, institutional reports, and official communications from Ukrainian authorities were compiled and compared to estimate the number of vessels using the unilateral Ukrainian corridor, in the absence of centralized reporting.

3.3 Russian grain data estimation

Data related to Russian grain exports were provided in USD value. By combining this financial data with international wheat price references (IndexMundi) and US average export prices (USDA), the author was able to have a rough estimate of Russian export volumes across the conflict timeline. Although these figures remain broad estimates due to transparency, market variability, product quality differences, and currency fluctuations, they nonetheless help illustrate the general evolution of Russian exports such as increase, decline, or stabilization. Figures were also matched with data provided from importing countries through UN Comtrade.

3.4 Interviews and insights

To complement this documentary work and enrich it with first-hand operational perspectives, the author conducted three structured interviews or discussions with professionals directly involved in the sectors of port logistics, shipping, and grain trading. The first interview was conducted with an executive manager of terminal operations in the Odessa area. This conversation provided insights into the practical functioning of grain terminals during the war, the management of loading capacities under alert conditions, and the protection of personnel and assets during bombardments.

The second interview was conducted with two professionals from the maritime sector, one working in operational shipping and another engaged in research for a shipbroking firm. Their contributions were essential to understand how vessels were selected, how shipowners assessed and mitigated risks, and what was the feeling of the market during the different phases.

The third interview took place with a grain trader working for a Swiss-based trading house. His testimony made it possible to understand how trading desks based in Switzerland managed their contracts, risk models and supply chains in the face of extreme uncertainty. He provided information on contractual structuring, impacts of insurance and risks, and how traders adjusted their logistical choices when the risks became uninsurable or unbearable for the company. Although no quantitative data could be shared due to confidentiality, the qualitative inputs proved crucial to validate and nuance the institutional narratives.

These interviews were not intended to produce statistically representative results but to reveal operational constraints and market dynamics that would not appear in official reports. Although they were insightful, access to potential participants was limited by the political and commercial sensitivity of the subject. Given ongoing sanctions, reputational risk, and strategic discretion within trading companies, many professionals didn't reply to interview requests or preferred off-record discussions. Therefore, the testimonies collected, while rich, remain anecdotal and cannot be generalized without caution. A broader interview base would have helped assess whether the market perceptions and risk responses described by these individuals were shared more widely across the sector.

3.5 Triangulation and analytical structure

The triangulation of qualitative interviews, institutional documentation and time-series statistical data has made it possible to reconstruct a coherent picture of the conditions under which Ukrainian grain exports were maintained or reconfigured.

The analysis follows a chronological structure, tracing the evolution of Ukrainian grain exports from the pre-war context through to the year 2024. Each phase of the conflict, from the outbreak of war and the initial blockades in early 2022, to the implementation of the BSGI, its suspension in mid-2023, and the alternative of the unilateral Ukrainian corridor, is examined in detail.

Within each of these temporal phases, the analysis integrates the three dimensions: port operations, maritime operations, and global market. Their level of depth depends on the degree to which each dimension was affected and the availability of reliable data. Port operations are examined more closely during the periods of direct attacks or logistical restructuring, while maritime dynamics are emphasized during the implementation and dismantling of international corridors. On another hand, in phases where documentary sources or shipping data were limited, the analysis relies more on testimonial and qualitative insight. This time-based approach allows to understand how each pillar of the export logistical chain evolved and interacted in response to changing conditions throughout the war.

3.6 Limitations

Despite difficulties in accessing comprehensive data and difficulties in contacting industry players due to the sensitivity of the subject, the methodological approach based on the comparison and triangulation of multiple datasets and sources has enabled the reconstruction of a relatively accurate picture of the Ukrainian grain trade over the period 2022-2024. This approach allowed a better understanding of fleet composition, operational constraints and trade dynamics within the BSGI and related export routes.

4. Results

Classification of destination countries: scope and limitations

For the purpose of analyzing destination markets of Ukrainian grain exports, countries were classified according to the United Nations' development status: “Developed,” “Developing,” and “In Transition.” A few minor territories, such as the British Virgin Islands, were not listed by the UN and represented less than 0.6% of annual exports (under 350,000 metric tons across all years observed). These were excluded from the comparative charts for clarity and consistency with other reporting formats, such as those used by the Black Sea Grain Initiative (BSGI), which only differentiates between exports to developed and developing countries.

Quantities exported

Export volumes of wheat, corn, and barley from Ukraine were primarily obtained from Trade Data Monitor (TDM) and UN Comtrade databases. The TDM figures were selected as the primary reference due to greater internal consistency across the 2022-2024 timeline. A full summary of annual exports by crop is provided in Appendix 2.

Period	Trade Flow	Reporter	Partenaire	2nd Partner	Customs Desc	Transport Mode	Commodity Code	Trade Value (US\$)	Net Weight(kg)	Gross Weight	Qty Unit	Qty	Alternate Quantity unit	Alternate Quantity
202410	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1001	\$318,518,645	1,643,715,377	0	kg	1,643,715,377	kg	1,643,715,377
202410	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1003	\$65,150,442	376,480,230	0	kg	376,480,230	kg	376,480,230
202410	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1005	\$363,597,315	1,916,513,440	0	kg	1,916,513,440	kg	1,916,513,440
202411	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1001	\$440,754,710	2,130,247,197	0	kg	2,130,247,197	kg	2,130,247,197
202411	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1003	\$51,237,272	277,137,070	0	kg	277,137,070	kg	277,137,070
202411	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1005	\$1,044,265,416	5,173,295,470	0	kg	5,173,295,470	kg	5,173,295,470
202412	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1001	\$440,754,710	2,130,247,197	0	kg	2,130,247,197	kg	2,130,247,197
202412	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1003	\$51,237,272	277,137,070	0	kg	277,137,070	kg	277,137,070
202412	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1005	\$1,044,265,416	5,173,295,470	0	kg	5,173,295,470	kg	5,173,295,470
202501	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1001	\$188,064,419	891,179,996	0	kg	891,179,996	kg	891,179,996
202501	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1003	\$12,403,672	65,029,416	0	kg	65,029,416	kg	65,029,416
202501	X	Ukraine	World	World	TOTAL CPC	TOTAL MOT	1005	\$520,939,050	2,485,566,417	0	kg	2,485,566,417	kg	2,485,566,417

Table 1 - UN Comtrade exports figures (October 2024 - January 2025)

Monthly export data from UN Comtrade for Ukraine in 2024 shows an anomaly: identical figures for wheat, corn, and barley exports in both November and December, totaling 7.58 million metric tons for each month as shown in Table 1. This duplication strongly suggests a reporting error, such as double-counting or an undivided aggregate total. The combined value for these two months is inconsistent with adjacent months (October 2024 and January 2025), reinforcing the error hypothesis.

As shown in Table 2, a cross-verification with Trade Data Monitor revealed a discrepancy of 7.57 million metric tons between the annual totals of the two sources, nearly equivalent to the questionable November–December entries in UN Comtrade. When one of the duplicate months is excluded, the difference drops to just 8,103 metric tons (0.015%), confirming the likelihood of a duplicated record. Due to this uncertainty, November and December 2024 data from UN Comtrade were excluded from the analysis.

Numbers in Metric Tons	UN Comtrade Data	Trade Data Monitor LCC
Wheat	22 795 066	20 664 816
Corn (Maize)	34 796 960	29 631 700
Barley	3 654 174	3 377 106
Total 2024	61 246 200	53 673 622
Difference:		7 572 578

Table 2 - Data differences between UN Comtrade and Trade Data Monitor

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
How were these cargoes exported?
How were operations managed in port and at sea?

Age of the fleet

A second limitation encountered in the results concerns the age of the global vessel fleet. The maritime fleet is in constant evolution due to deliveries of newbuild vessels and scrapping activity. Historical comparisons are particularly challenging as no reliable data was available on the age distribution of the fleet in 2022/2023, preventing a direct comparison with the vessels that operated under the Black Sea Grain Initiative (BSGI).

Although calculations have been made based on data from June 2025, the age of the ships involved in BSGI-related exports was calculated as if they operated in 2025 and compared to the global fleet average as of 20 June 2025. This approach offers some contextual reference but remains limited by the absence of a proper historical baseline.

5. Discussion

5.1 Pre-war Operations

5.1.1 Port concentration and geographic exposure

Ukraine's grain export system was mainly built around three deep-sea ports: Odesa, Chornomorsk, and Pivdennyi. Deep-sea ports handled over 90% of maritime grain exports (USDA, 2024). They were tailored for deep-draft vessels like Panamax and even Post-Panamax but presented a critical structural fragility: the system's effectiveness depended on uninterrupted access to just three locations, located within a 100 km stretch of coastline. Their proximity to the occupied Crimean Peninsula and to the Russian Navy's Black Sea Fleet base in Sevastopol made them strategically exposed even before the full-scale war.

Secondary ports such as Mykolaiv were important but still part of the same vulnerable coastline. Danube ports had negligible capacity carrying under 500,000 tons annually (RFI, 2022). The system lacked any credible contingency routing, which left Ukraine logistically incapacitated the moment Odesa was threatened.

5.1.2 Maritime dependence and vessel typology

Ukraine's bulk exports flowed almost entirely via deep-sea terminals capable of hosting Panamax and Supramax vessels, which require drafts exceeding 12 meters. These ships allowed transportation of large volumes from 60,000 to 70,000 tons per vessel but also required specialized berths, deep water, and fast loading systems (Interview 2, 2025).

This design logic meant that Ukrainian logistics were locked into deep-sea capacity. The port-to-ship interface was highly optimized, but only for vessels that could not access most inland or shallow-draft river ports.

5.1.3 Ukraine exports destinations

Ukraine's grain supply fed the world's most food-insecure regions. In 2019-2021, between 69-81% of Ukraine's grain exports went to developing countries, with major destinations including Egypt, Yemen, Lebanon, and Bangladesh (see Figure 3).

Ukraine exported a relatively stable total tonnage each year: 56.2 million tons in 2019, 50.9 million in 2020, and 50.3 million in 2021. Exports to developing countries increased from

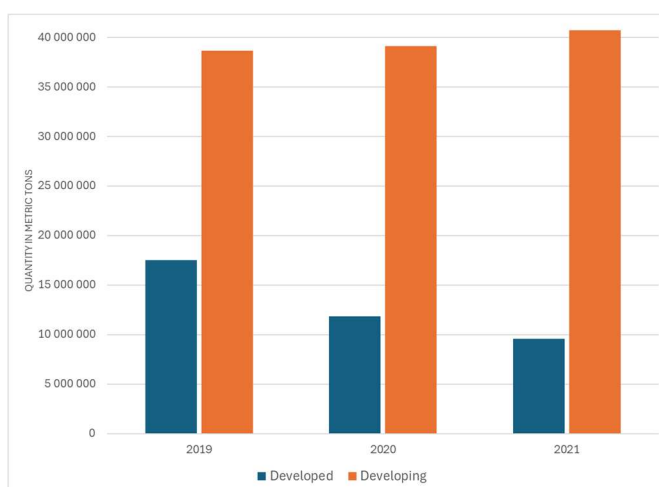


Figure 3 - Repartition of Ukrainian exports between developed and developing countries

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.

How were these cargoes exported?

How were operations managed in port and at sea?

38.7 million tons in 2019 to 40.7 million tons in 2021 (+5%), while shipments to developed markets declined from 17.5 million tons to 9.6 million tons (-45%) over the same period.

In absolute terms, developing countries continued to receive a relatively stable volume of Ukrainian grain between 2019 and 2021. However, their share increased significantly in percentage terms, primarily because exports to developed countries declined sharply. In effect, the 6 million ton drop in total exports over the period was entirely absorbed by developed countries, while volumes to developing countries remained steady and even slightly increased.

These critical flows operated on commercial terms, not humanitarian mechanisms, except for some exports made by the World Food Program (WFP). When disrupted, the system lacked logistical buffers. The assumption that Ukraine would always be a reliable exporter influenced import policy in many vulnerable countries, however that assumption ignored logistics, geography, and conflict risk.

5.2 Impact of the war on grain exports (Feb–June 2022)

5.2.1 Port collapse and inaccessibility

The invasion triggered the immediate closure of all major deep-sea ports. Not due to destruction but to operational unsafety. Vessels were immobilized, corridors mined, and maritime insurance suspended. Pivdennyi, Chornomorsk, and Odesa became physically intact but functionally unreachable nodes (Circular Letter No. 4518, 2022).

From an operational standpoint, this revealed the danger of relying on a unique corridor that could be frozen within a few days. With no vessels moving, terminal silos and railcars filled quickly, blocking upstream supply chains. The system, optimized for flow, could not cope with standstill.

5.2.2 Rerouting to the Danube and land corridors

From a maritime perspective, Ukraine was isolated within days. The Russian Navy mined sea lanes, blockaded port entries, and attacked commercial shipping in Ukrainian waters.

Terminal operators scrambled to reship flows toward inland borders (Romania, Poland, Hungary) and Danube ports like Izmail and Reni. But these alternatives were massively underdeveloped. In peacetime, deep-sea ports had dedicated terminals for specific bulk goods such as grain, oilseeds, metals, fertilizers, each optimized for product-specific logistics. During wartime rerouting, these commodities competed for the same underdeveloped corridors, with no clear prioritization framework.

This redirection was operationally impressive but constrained by infrastructure:

- Danube terminals lacked berth length and silo capacity
- No fixed conveyor systems: instead, exporters used mobile belt conveyors, floating cranes, and flat warehouses

- Vessels were limited to barges or coasters; no large vessels such as supramax or panamax-class access
- Danube flows required breaking down large Free On-Board (FOB) trades into smaller shipments, which added complexity and exposure
- The single lane road from Odesa to Reni, Ukraine's only direct link to Danube ports, crosses Moldovan territory, requiring customs formalities and causing trucks queues for kilometers.

To illustrate the scale difference a supramax vessel (around 50,000 tons) is equivalent to 30-35 barges (around 1,500 tons each)

Danube ports handled less than 1.5-2 million tons in 2021 (all commodities combined), to over 10 million tons of agricultural commodities alone in 2022. The shift was heroic but costly and not efficient enough for the long term.

"There were different kinds of cargo that were moving by the railcars, mostly it was metal products, it was iron ore, it was also coal, and they were competing with the grains".

(Yuriy Kizlevych, 2025)

Land-based export routes brought their own challenges:

- Road transport is limited due to the transport capacity of trucks and therefore requires a considerable number of vehicles
- Rail transport faced gauge mismatch: Ukrainian rail (1520mm) did not align with EU standard (1435mm), forcing either:
 - Physical trans-boarding from one railcar to another
 - Use of specialized containers transferred with cranes (limited supply)

As a scale difference supramax vessel (around 50,000 tons) is equivalent to 2,000 trucks (25t capacity each), or 550 grain railcars.

The inland logistics system was not designed for such impressive volumes of exports. Customs capacity was overwhelmed, road infrastructure deteriorated under pressure, and truck bottlenecks reduced flow velocity.

Alternative routes played a crucial role. Danube ports and other transport modes (rail, road, etc.) together accounted for 39% of Ukraine's grain and sunflower meal exports in 2022, underscoring their value as temporary but essential, logistical lifelines.

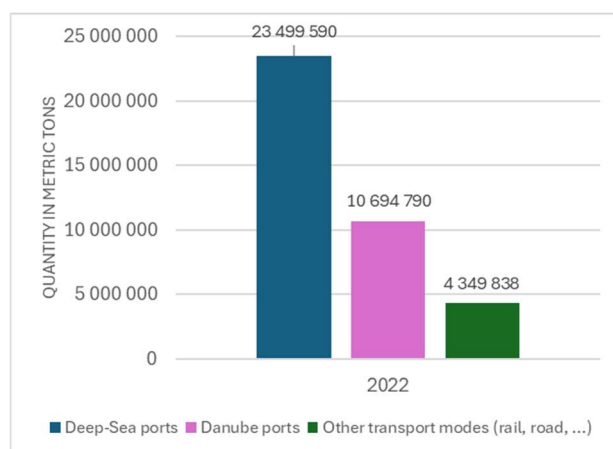


Figure 4 - 2022 exports repartition

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
 How were these cargoes exported?
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5.2.3 Air alarms and shelters

Port operations during this period were not only physically constrained, but they were also intermittently paralyzed by air alarms. Every incoming missile or drone triggered evacuations, halting crane, rail, and vessel operations. In practice this meant:

- Staff were required to evacuate to shelters upon alarm
- Buses were placed on standby to shuttle staff rapidly to safety zones

By April 2022, private terminal operators deployed mobile concrete shelters, placed adjacent to loading points. Even with these adaptations, many operating hours were lost to air alarms.

5.3 The Black Sea Grain Initiative

5.3.1 Negotiation and implementation of the corridor

The Black Sea Grain Initiative (BSGI), signed in Istanbul on July 22, 2022, was coordinated by a Joint Coordination Centre (JCC), comprising civilian and military representatives from all four parties. The JCC was tasked with regulating vessel movements, conducting inspections, and communicating vessel data to relevant military authorities to minimize accidental engagements in the corridor (JCC, 2022).

The initiative had an initial duration of 120 days, automatically renewable unless any party chose to withdraw. In practice, the initiative was renewed several times but remained politically fragile, especially as Russian cooperation became increasingly conditional. At some point Russian side even retrieved or paused the agreement.

During the lifespan of the BSGI, a total of 1,004 voyages departed Ukrainian ports.

As illustrated in Figure 5, the rate of departures grew rapidly during the first few months following the corridor's implementation, which was also due to the release of ships and stocks of goods that had been blocked since the start of the war. The peak operational pace was reached between September and December 2022, during which the corridor achieved a steady rhythm with a peak at 180 vessel departures in October.

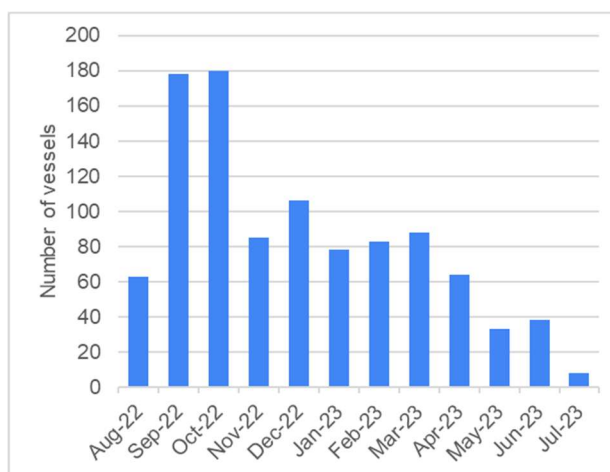


Figure 5 - Number of vessels departure under the BSGI

However, from early 2023 onwards, the number of vessels stabilized and even declined later. This slowdown correlates with the onset of increased inspection delays, limited vessel approvals by Russian representatives, and episodes of temporary withdrawal from the initiative. Although the corridor remained technically operational until July 2023, the decrease shows a gradual erosion of efficiency.

5.3.2 Operational challenges: security, inspections, and delays

The operational design of the BSGI included a multi-stage inspection process. All vessels participating in the initiative were required to undergo joint inspections by teams composed of representatives from each party (Russia, Turkey and Ukraine). These inspections took place in designated Turkish anchorage zones, mainly near Istanbul, before entry (inbound inspection) and after exit (outbound inspection) from Ukrainian ports. The inspections aimed to ensure vessels carried no unauthorized cargo or personnel and adhered to security protocols established under the initiative. However, the number of available inspection teams was limited, causing structural bottlenecks in vessel flow (UN, 2023; Kakabadze, 2023).

The Figure 6, shown below, illustrates the weekly number of vessels departing Ukrainian ports and the Figure 7 illustrates average waiting time in days for outbound inspections, from August 2022 until July 2023.

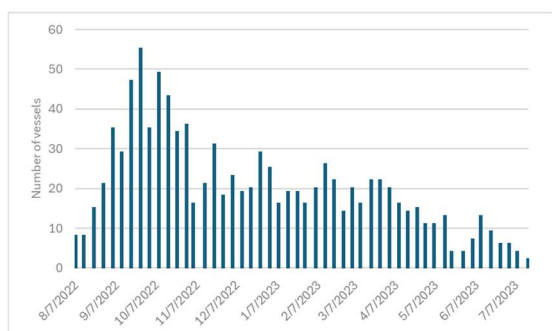


Figure 6 - Weekly number of vessels departure

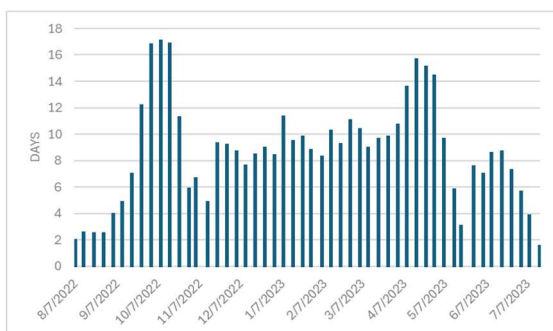


Figure 7 - Weekly average waiting time for inspections

As export volumes increased during the autumn of 2022, the inspection system quickly became overwhelmed. With 178 departures in September and 180 in October, weekly departures exceeded 30 vessels. Average waiting times for outbound inspections surged above 16 days at peak congestion. This congestion was further aggravated by Russia's temporary withdrawal from the BSGI in late October 2022, following an alleged Ukrainian drone attack on Russia's Black Sea fleet in Sevastopol (Euractiv, 2022).

The bottlenecks persisted through the BSGI's operational life but were most severe during late 2022 and early 2023 corresponding to spikes of waiting times on Figure 7. In April 2023, Russia began systematically blocking inspections, often refusing to approve daily schedules or failing to send representatives to inspection teams. According to the Ukrainian Ministry of Infrastructure, Russian representatives at the JCC unilaterally limited the number of vessels to be inspected per day, in some cases to as few as one or two outbound ships (Ministry of Infrastructure of Ukraine, 2023).

While Figure 7 illustrates waiting times for exit inspections only, it is important to note that less data exists for inbound vessel delays. However, according to industry professionals, vessels could wait weeks, if not months, in the different areas shown on Figure 8, before receiving clearance to enter Ukrainian ports.

"Due to this not efficient capacity of these inspection teams, the vessels were queuing near Bosphorus, near Marmara Sea. And even when there were more than 100 vessels, the vessels were waiting even before the Dardanelles Strait".
(Yuriy Kizlevych, 2025)

This inspection process, exploited by Russia to delay exports, became a key pressure point. Suspected to be politically motivated, Russian delegates refused sometimes to send inspection teams or unilaterally blocked vessels, directly contributing to growing queues and prolonging waiting times at the different Turkish inspection anchorages. These tactics have transformed the BSGI from a reliable export corridor into a bargaining chip and a geopolitical pressure point.

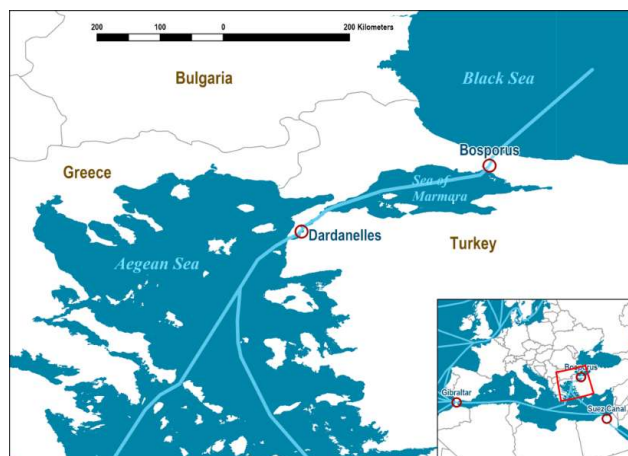


Figure 8 - Map of important location during the BSGI

The obstruction became increasingly measurable over time. According to data from the JCC, the percentage of inspections taking more than three hours rose dramatically, from 10% in January 2023 to 51% by May 2023. This surge suggests that even when inspections were formally conducted, the process was often slowed down, compounding systemic inefficiencies.

It is also important to acknowledge that non-measurable operational factors may have contributed to extended inspection times. These include incomplete or missing vessel documentation, non-compliance with technical or safety requirements, crew issues, or delays in reporting cargo manifests. Such factors, although less visible in public reporting, can affect inspection efficiency and should be considered when interpreting systemic delays.

These disruptions complicate the evaluation of the actual performance of the Initiative, both in terms of voyage volume and cargo flow, topics that are analyzed later.

5.3.3 Fleet used under the BSGI (age & type of vessels)

Age of vessels has been frequently mentioned in interviews. An analysis of the fleet composition under the BSGI reveals, as mentioned by professionals, a significant skew toward older vessels.

The global dry bulk carrier fleet comprised 12,586 ships on June 20, 2025.

As shown on Figure 9, the majority, 6,894 vessels (55% of the fleet) are between 6 and 15 years old, indicating relatively new and efficient vessels.

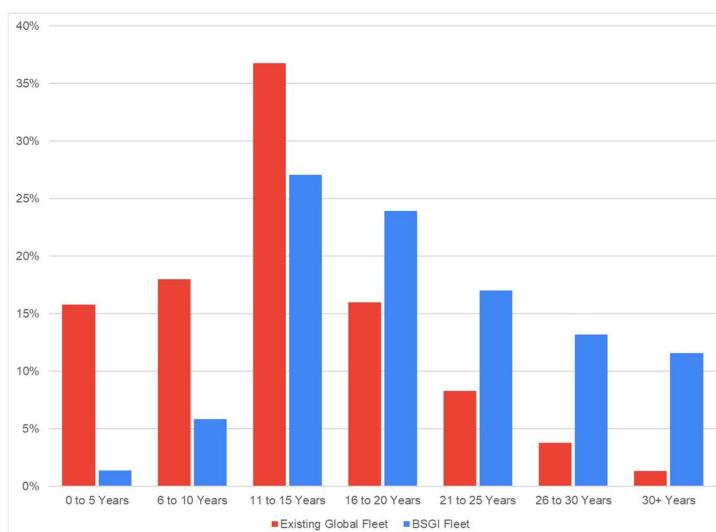


Figure 9 - Repartition of vessels by age category in the global and BSGI fleet

Only 166 vessels worldwide are over 30 years old, representing around 1%. Furthermore, only 5% of the global fleet falls into the 26+ age category, representing 644 vessels (AXS Marine).

Under the BSGI, 735 vessels participated, noting that some made multiple voyages.

85 vessels are now over 30 years old, meaning that more than half of the world's aging bulk fleet in this category was involved in this single, high-risk trade route and represented around 12% of the fleet involved in the agreement. Additionally, 25% of the "BSGI fleet" is aged 26 or over, and 51% fall into the 11-20-year age category, with less than 8% younger than 10 years (BSGI Voyages Dataset and AXS Marine, 20.06.2025).

This age bias can be due to multiple sources, but the main probability is the willingness to risk valuable assets and cost of insurance: operators preferred older, depreciated vessels to limit potential losses in the event of an incident such as a missile strike, mine damage, or port bombardment. Several operators appear to have deliberately allocated vessels that were fully or nearly depreciated in financial terms and for some probably destined to be scrapped.

The choice of sending older vessels to warzones can also be explained by insurance premiums: war risk premiums surged during the war to 5–10% of hull value and were more economically manageable on vessels with already reduced insured values (Kakabadze, 2023).

Despite being less efficient and more costly to operate, these older ships aligned well with the risk-return balance under BSGI conditions. Their lower asset value made them more acceptable for wartime deployment, especially given the low freight margins typical of bulk grain trades and the elevated war risks along the corridor. Moreover, operating in a designated war-risk zone often entitled shipowners to premium freight rates, allowing them to compensate for the vessels' inefficiencies and justify their deployment despite the operational and insurance challenges.

Non-traditional vessels

Beyond the age characteristics of the fleet, the BSGI also featured vessel types not typically associated with bulk grain trades. The presence of such non-traditional tonnage reveals how the BSGI was also used as a means to evacuate maritime assets from Ukrainian ports, rather than being focused on the efficient transportation of grain. Small shipments of corn and sunflower seeds and meal were carried on Ro-Ro (Roll-on/Roll-off) vessels, which is an unusual practice in grain shipping. Ro-Ro vessels are designed for transporting wheeled cargo such as trucks, cars, or trailers and not bulk commodities.

The vessel *Greifswald* (IMO 8311912), shown on Figure 10, is a Ro-Ro ship built in 1988, used as a Ferry that departed from Chornomorsk on September 18, 2022, carrying 492 tons of corn to Turkey.

Such a small shipment suggests that the primary objective may not have been the transport of grain itself, but rather the extraction of the vessel from a conflict zone under the cover of grain export during the BSGI.



Figure 10 - Vessel Greifswald - IMO 8311912

This interpretation is supported by several post-BSGI vessels trajectories. The *Greifswald* changed flag to Palau in 2023 and then to Russia in 2024. Another Ro-Ro vessel (*Cenk M*, IMO 7382366) changed its name to *Lerzan K* in October 2022, immediately after transiting the BSGI, and reflagged to Palau in January 2025. A third (*Kaunas*, IMO 8311924) now operates on the Tanger-Algeciras route. These patterns suggest an objective to recover, reposition or even sell vessels that had been stranded since the start of the war.

Only 4 vessels of this type were identified out of the 735 that transited under the BSGI, making it a marginal but interesting element of the early days of the initiative.

Operational Characteristics: Volume per voyage, 2022 vs. 2023

The operational evolution of grain shipments under the BSGI, measured through the distribution of cargo volumes per voyage between August-December 2022 and January-July 2023 reveals a clear improvement over time. From the launch of the initiative in August 2022 until the end of that year, 612 voyages moved 16,080,705 metric tons of agricultural products. In 2023, prior to the BSGI's collapse in July, 392 voyages transported 16,775,331 metric tons. A higher total despite fewer voyages, illustrating significant improvements in per-voyage efficiency.

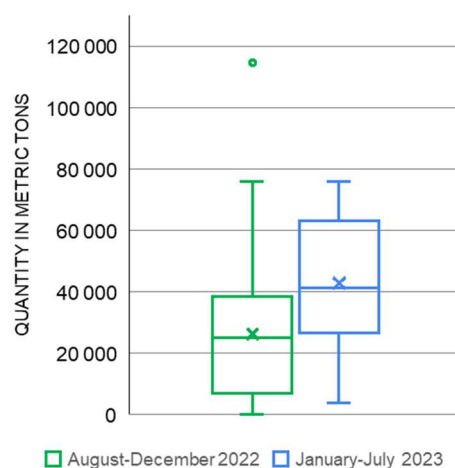


Figure 11 - Repartition of volumes per voyage during the BSGI

Figure 11 visually reinforces this shift. While 2022 data show a wide dispersion of voyage volumes, including several low-capacity shipments and one significant outlier of nearly 115,000 metric tons. This particular voyage, the 226th under the BSGI, was operated by the *Maran Excellence* (IMO 9703241), the cape size class vessel was loaded with 66,000 tons of barley, 32,600 tons of wheat and 16,000 tons of corn and headed to Spain.

The median and mean volumes were relatively low, indicating an uneven start to the initiative, likely influenced by uncertainty, constraints on port operations and eventually limited availability of large-capacity vessels. In contrast, the data for 2023 suggests normalization and optimization of export logistics. Both the mean and median increased significantly, respectively of 62.8% and 64.8%. The reduced number of low-volume voyages and absence of extreme outliers also support the conclusion that operational processes were refined over time.

Figure 12, which illustrates the frequency of voyages by cargo volume categories, highlights distinct modal patterns across the two periods:

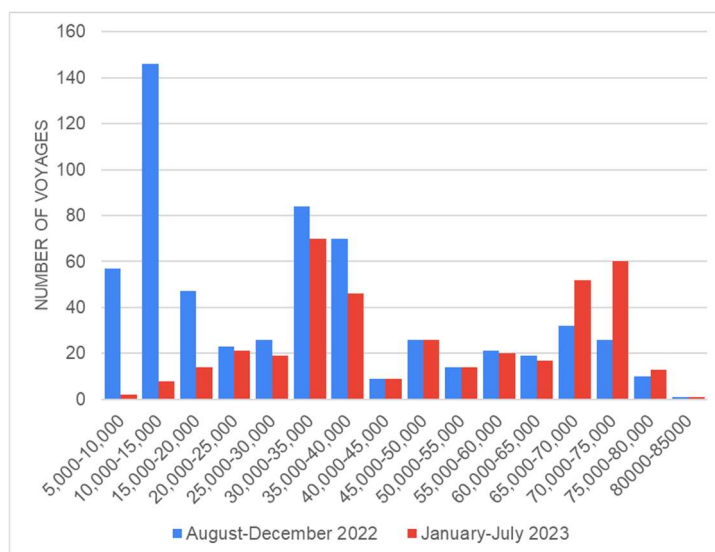


Figure 12 - Number of voyages distribution

- In 2022, the mode (the most frequently occurring voyage size) falls within the 10,000-15,000 tons bracket, with over 140 voyages. The right-skewed distribution suggests usage of smaller, older, or low-capacity vessels in the initial phase. Contributing factors include operational uncertainty, limited availability of Panamax tonnage, and a risk-averse stance among charterers and insurers. Smaller and older vessels represent lower asset values, thus minimizing financial exposure in high-risk zones. As such, early reliance on these ships also reflected a tactical choice to limit potential capital loss in case of vessel damage or detention.
- In 2023, the mode shifted to 30,000-40,000 tons, with other notable peaks between 70,000-80,000 tons. This emerging bimodal pattern likely reflects a deliberate diversification in vessel deployment and a progressive normalization of risk perceptions. The lower peak aligns with the Handymax class, which generally ranges between 30,000 and 50,000 deadweight tonnage (DWT) while the 70,000-80,000 ton range corresponds to Panamax vessels (65,000 to 82,000 DWT). Their increased presence reflects a shift toward higher-efficiency shipments.

Overall, the share of low-cargo voyages dropped significantly, while Panamax-sized voyages increased, progression is likely attributable to various factors. First, increased confidence among shipowners and insurers as the BSGI demonstrated its resilience. Second, participating ports and maritime authorities progressively refined their handling and coordination systems. The result was a more predictable, higher-volume, and ultimately more cost-effective export operation in its second semester.

5.3.4 Numbers and effectiveness in restoring exports

The BSGI served as a vital diplomatic tool to unblock Ukrainian maritime exports amid full-scale war. However, when measured by its actual volume performance, the corridor reflects a fragile mechanism, effective in restoring flows but unable to scale to Ukraine’s pre-war export capacity. The data analyzed, as presented on Figure 13, focus on the three principal cereals exported by Ukraine: wheat and meslin, corn (maize), and barley, which together account for the majority of volumes handled under the BSGI and form the backbone of Ukraine’s agricultural trade.

While the exports under the BSGI might seem impressive at first glance, they never equaled the pre-war levels. Monthly exports during the BSGI lifetime peaked at just under 5.7 million tons in March 2023 but only 3.4 million tons of these were transported under the BSGI framework, below the 6.6 million tons shipped in November 2021 when Ukrainian logistics operated without restrictions or the 6.3 million in April 2024.

The port-level analysis reinforces this picture of declining operational utility. Although Chornomorsk was the most active, the large port of Yuzhny/Pivdennyi remained underused, especially in 2023, as Russian delegates blocked ship access. Odessa’s performance was stable, but rarely dominant. In effect, Ukraine was operating its grain corridor with two-thirds of its pre-war port capacity, and even this reduced capacity was often throttled by political interferences.

The performance gap was not only due to Ukrainian port infrastructure limitations, but also to the corridor’s design and operational constraints as explained previously in the analysis.

Figure 13 shown below provides the monthly evolution from September 2021 to November 2024 of Ukrainian grain exports by all modes: sea, river, rail, and road. When analyzed it highlights two structural insights: first, the BSGI’s role as a temporary stabilizer, and second, the Ukrainian logistic capacity to adapt and recover outside of the BSGI framework (second semester 2023).

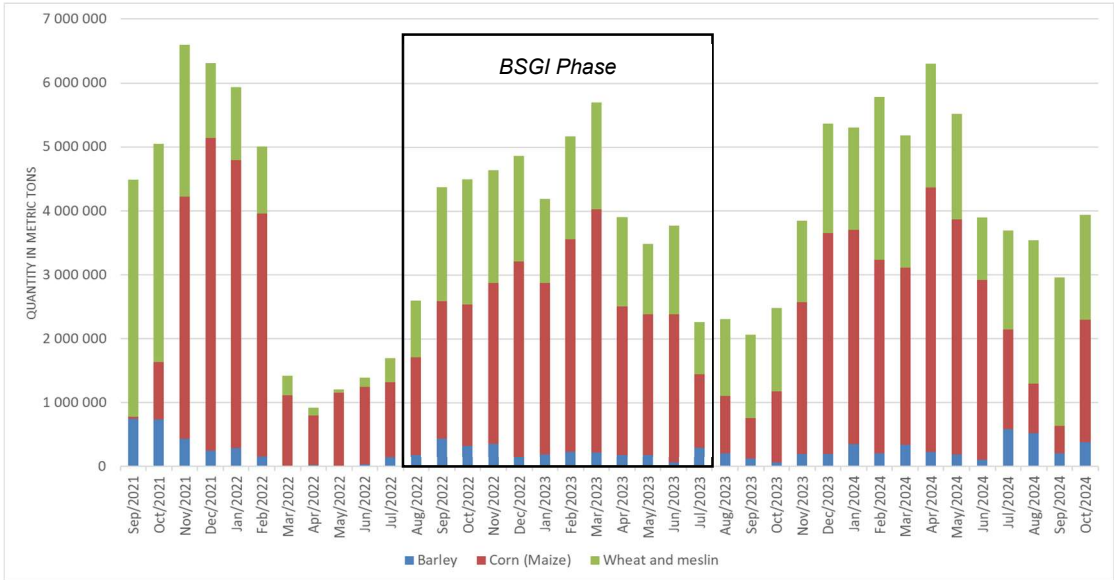


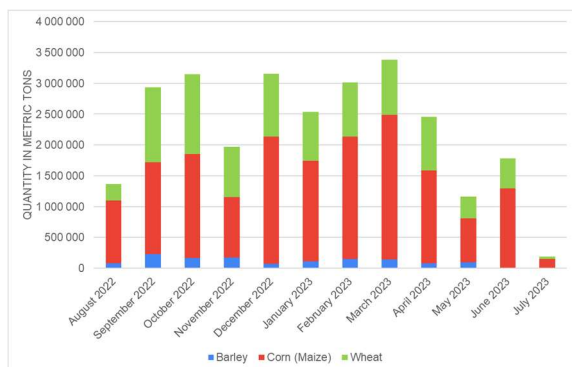
Figure 13 - Ukrainian grain exports

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
 How were these cargoes exported?
 How were operations managed in port and at sea?

The collapse in exports during March-July 2022 shows the logistical paralysis following the Russian invasion. The rebound starting in August 2022 aligns with the launch of the BSGI, which allowed a partial rehabilitation of deep-sea ports. Between September 2022 and March 2023, Ukraine regained a degree of maritime export capability, although this remained below pre-war performance.

The post-July 2023 trend shows that export volumes began to recover despite the formal termination of the BSGI. From August to December 2023, monthly exports returned to levels comparable to those achieved during the Initiative's operational peak. This suggests that the principal limiting factor under the BSGI was not Ukrainian infrastructure or storage capacity, but rather the design of the corridor itself.

When examining the export volumes carried through the BSGI, shown on Figure 14, the peak observed in October 2022 aligns with a period during which cooperation at the Joint Coordination Centre (JCC) remained relatively stable, and geopolitical interference was still limited. From December 2022 to March 2023, monthly shipments consistently ranged between 2.5 and 3.5 million metric tons, reflecting the corridor's maximum operational output under imposed constraints.



From April 2023 a downward trend becomes evident. This fall in exports cannot be explained by seasonal variation alone. Rather, the decline reflects operational friction within the inspection mechanism and BSGI framework by Russia, which progressively restricted vessel clearance at the JCC. July 2023, the final month of the BSGI, shows a complete collapse in functionality, with exports dropping below 300,000 tons.

Figure 14 - Exports figures under BSGI

Evolution of export volumes: Developed vs. developing countries (2018–2024)

Looking at export data from 2018 to 2024 (Figure 15), by countries' development status, reveals significant shifts in trade dynamics before and after the war disrupted Ukrainian exports. Between 2018 and 2021, developing countries consistently received most Ukrainian grain exports, with volumes rising from 27 million tons in 2018 to over 40 million tons by 2021. This reflects Ukraine's role as a key grain supplier to vulnerable regions in Africa, the Middle East, and parts of South Asia.

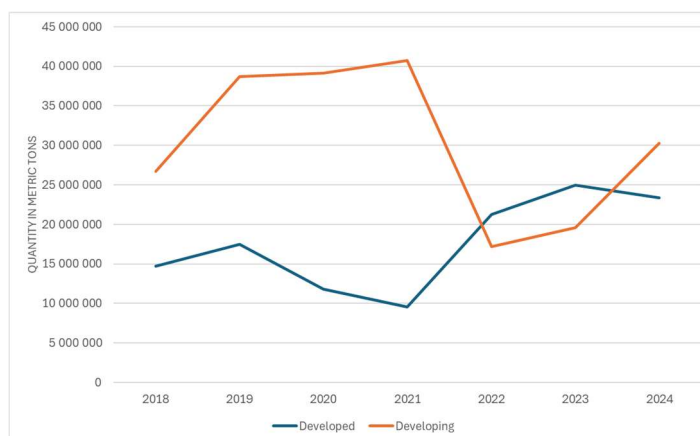


Figure 15 - Volume of exports to developed and developing countries

However, in 2022, shipments to developing countries fell drastically, while exports to developed countries, especially in the European Union, rose notably, surpassing 21 million tons. Spain played an important role in this redirection. Spanish imports of Ukrainian grain surged during the initial implementation of the BSGI, one driver might be its established infrastructure capable of rapidly absorbing redirected shipments. This redirection temporarily skewed away the distribution from food-insecure regions.

By 2023 and into 2024, data reveal a corrective trend. The recovery of shipments to developing countries and the relative stabilization of exports to developed nations indicate that the BSGI gradually fulfilled its humanitarian objective.

Distribution of exports under the BSGI

The impact of the BSGI can also be assessed through its overall distributional balance. Figure 16 shows that developing countries accounted for 56% of the total BSGI export volume, amounting to approximately 15.3 million metric tons while developed countries received almost 11.8 million tons, or 44% of the total.

The BSGI has been active in years where majority of grain shipments were destined to developed countries (55% in 2022 and 56% in 2023). Although its distribution validates the claims made by institutions such as the United Nations and the World Food Program (WFP), which advocated for prioritizing vulnerable populations during the crisis. The fact that 56% of the initiative's grain ultimately reached developing nations confirms that it achieved to a certain point its food security mandate.

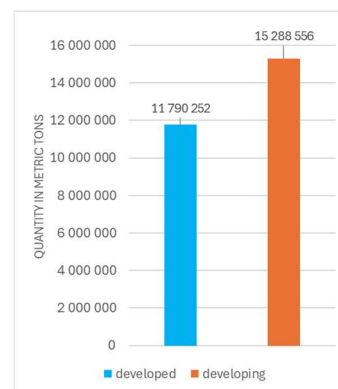


Figure 16 - Volume & share of Ukrainian exports

Furthermore, this export pattern aligns with reported humanitarian shipments conducted under the WFP framework, which included multiple deliveries to Yemen, Ethiopia, Afghanistan, and Somalia. These shipments, although modest in absolute volume compared to commercial flows, carried significant symbolic and political weight.

Vessel volume is an interesting indicator of strategic adaptation under the BSGI framework constrained conditions. To counter persistent delays and inspection bottlenecks, shipowners appear to have consolidated cargoes or opted for larger vessels. The average tonnage transported under the BSGI increased from around 24,500 tons in 2022 to nearly 40,000 in 2023, reaching 48,400 in average between June and July 2023, almost doubling. The age or built year average between these periods has very slightly changed, +/-1 year. While this shift enhanced tons-per-sailing efficiency, it ultimately could not offset the broader decline in daily vessel clearances, which dropped sharply as Russia delayed inspections, suspended participation, and created growing operational uncertainty.

If judged against the standard of a fully restored maritime export system, the BSGI fell short. But when understood as a temporary instrument operating under extraordinary political and military constraints, it performed as a critical, if imperfect, logistical bridge that kept Ukraine partially connected to the world until more autonomous export channels could emerge.

5.3.5 End of the BSGI and consequences of the Russian withdrawal

Following its exit, on July 17, 2023, Russia declared all vessels heading to Ukrainian ports as potential military targets, effectively increasing maritime insecurity. The Russian Navy attempted to stop and inspect civilian ships, while Ukrainian ports came under drone and missile attacks.

The direct consequences of Russian withdrawal were a steep drop in vessel departures and cargo volumes. According to JCC data, July saw only 13 inspections conducted under the BSGI, the lowest since the initiative began, and by August, the corridor was effectively inactive.

From a high of 3.4 million tons in March 2023, monthly volumes plummeted to just 291,000 tons in July. The consequence was visible not only in aggregate tonnage but also in departure counts, which dropped from over 80 vessels per month at peak operational efficiency to less than 15 departures in July 2023.

This interruption shows the corridor's dependency on Russian participation, and by extension, its vulnerability to political disruptions. The BSGI was never immune to manipulation; inspection delays, arbitrary rejections, and withdrawal threats were part of a calculated strategy to apply geopolitical pressure. Still, this collapse did not mark the end of Ukrainian maritime exports.

5.4 Post-BSGI Operations & Alternative export strategies

5.4.1 Use of alternative ports: The Danube infrastructure

Ukraine has consistently used its Danube ports of Reni, Izmail and Ust-Dunaisk as key logistics outlets since the start of the war. Even after the implementation of the BSGI Danube ports volume increased from 10 million tons in 2022 to 15 million tons of agricultural products in 2023. Their main advantage is geographical: their proximity to Romanian territorial waters and the port of Constanta.

Danube ports suffered from capacity and navigational constraints, including shallow drafts and congestion. Nonetheless, the Danube system effectively functioned as a "shock absorber" in Ukraine's export system, helping to prevent a complete collapse of grain outflows.

A comparative view of grain and sunflower meal export volumes via deep-sea ports and Danube ports between 2022 and 2024 as shown on Figure 17 further illustrates this shift.

In 2022, Danube ports handled around one-third of the volume processed by ports. Their share increased considerably in 2023, reflecting their role in filling the inefficiencies of the BSGI.

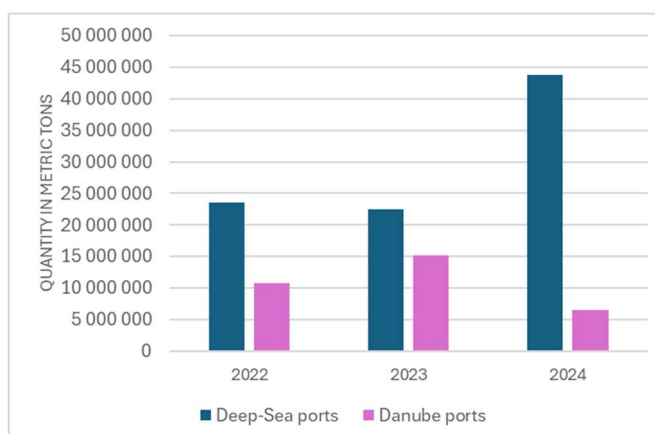


Figure 17 - Volume exported through deep-sea and Danube ports

However, by 2024, deep-sea ports recovered sharply, handling over 45 million metric tons, while Danube ports declined significantly. This reversal confirms the Danube's usefulness as an emergency route yet highlights its limited scalability as a long-term substitute. First due to the lower cargo volumes per voyage (as barges have limited capacity compared to deep-sea vessels) and secondly due to the higher per-ton logistics cost associated with inland waterway transport and transshipment operations.

Recognizing these structural limitations, Ukraine prioritized the restoration and protection of its deep-sea ports as a strategic imperative for sustaining export volumes.

5.5 The Ukrainian Grain Corridor or “Humanitarian Corridor”

5.5.1 Establishment and objectives of the corridor

The Ukrainian Unilateral Grain Corridor also called Humanitarian Corridor follows a strategic path. It hugs the western coast of the Black Sea, intentionally staying in territorial waters of NATO member states, namely Romania, Bulgaria, and Turkey. This strategy does not rely on NATO's formal protection but uses geographical proximity as a political buffer. It implicitly raises the cost and risk for Russia to interfere, knowing that any incident would lead to diplomatic consequences.

An advantage lies also in the route's relationship with Sulina in Romania. Located in Romanian territorial waters, Sulina sits only about 7 hours sailing time from Odesa, assuming a vessel cruising speed of 15 knots. This short distance allows for efficient exit and entry point to Ukrainian ports without prolonged exposure to high-risk zones.

Despite its relative safety, the corridor is not without hazards. Sea mines, airstrikes, and the threat of naval intimidation or hit remain part of the risk environment. However, Ukraine's increase in use of military deterrence, notably with the use of unmanned surface vessels (USVs), targeted strikes on Crimea, and long-range attacks, significantly reduced Russian operational capability in the northwestern Black Sea. By these intervention Ukraine has succeeded in making the Russian Black Sea Fleet shift its presence to the eastern basin, ceding control of the waters near Odesa.

This shifting balance has allowed Ukraine to operate the corridor without formal naval escorts or third-party mediation. Merchant vessels are advised to broadcast their movements using AIS and provide real-time video from onboard cameras, enhancing transparency and reducing the likelihood of mistaken targeting. Additionally, many vessels operate under flags of convenience from countries with diplomatic ties with Ukraine and Russia such as Turkey, Greece or China. This can also be seen as a tool deterring hostile action from Russia.

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
How were these cargoes exported?
How were operations managed in port and at sea?

5.5.2 Trade Terms and commercial structure

The unique risk and control environment of the corridor also triggered a shift in contract structure.

The INCOTERMS, traditional Free on Board (FOB) terms, shifted toward Cost and Freight CFR) and Cost, Insurance and Freight (CIF) arrangements.

“...The FOB exposure was no longer wanted during the war, so Ukrainian companies adapted and started offering CFR or CIF instead...”

(Respondent D, 2025)

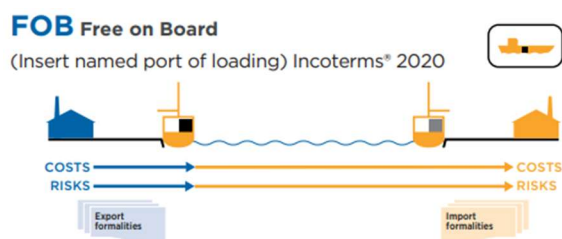


Figure 18 - Free On-Board Incoterm illustration

As illustrated in Figure 18, under FOB, the buyer is required to nominate and provide the vessel to the loading port. The risks pass once the goods are loaded on board. While standard in commodity markets, this arrangement became undesired by the buyers in wartime, where port access is unpredictable and insurance complex.

Under CFR (Cost and Freight), the seller is responsible for nominating the vessel, arranging carriage to the destination port, and paying the freight. The risk, however, still transfers to the buyer once the goods are loaded on board at the loading port.

CIF is similar to CFR, but the seller also assumes responsibility for marine insurance as shown on Figure 19.

Ukrainian companies vertically integrated that were previously delivering under FOB terms adapted to wartime conditions by offering CIF or CFR prices and taking therefore a step further down the logistical chain. Their scale, integrated operations, and access to risk management or insurance tools allowed them to absorb costs across the entire transport process, making them better positioned to operate in high-risk environments such as wartime in Ukraine. The ability to quote landed prices under CFR or CIF enabled these exporters to maintain access to markets with counterparties that were reluctant to engage in FOB terms.

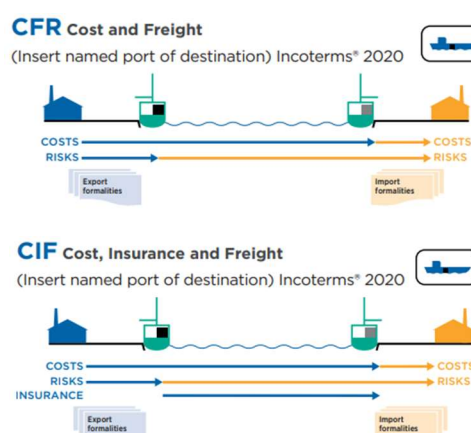


Figure 19 - Cost and Freight & Cost, Insurance and Freight Incoterm illustration

5.5.3 Export volumes and vessel's traffic analysis

As illustrated in Figure 20, the growth in vessel numbers had a relatively slow adoption pace but as of March 2024, over 1,140 ships had used the unilateral corridor. Between August 2023 and December 2024, there are over 4,500 vessels that used this route.

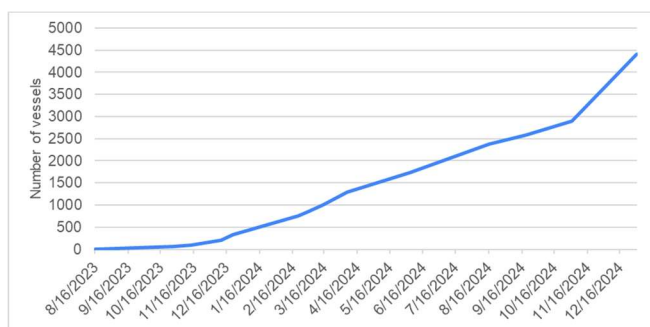


Figure 20 - Number of vessels that used the Ukrainian Grain Corridor

This slower adoption, compared to the BSGI (Figure 5, page 19), can be attributed to several key factors. First, the corridor lacked international guarantees at launch: no joint coordination center, no UN-brokered safety protocol, and no involvement from Russia. Second, insurers and shipowners were initially hesitant, facing uncertainty over safe passage, port security, and liability in case of incidents. Unlike the BSGI, the unilateral nature of the Ukrainian corridor required traders and operators to build confidence gradually. Trial voyages, accumulation of experience, and observing Ukraine's military capacity to deter Russian threats slowly increased confidence from market players.

It was not until early 2024 that traffic really began to accelerate. Helped by the creation of the Unity Facility for war insurance, growing commercial trust, and the demonstrable inability of the Russian navy to prohibit civilian shipping. By mid-2024, the corridor was well established, with usage increasing month by month as more vessels and counterparties viewed it as a viable and insurable alternative to previous routes.

Volume Performance: Recovery and eventual outperformance

It is important to note that the export volume presented in Figure 13, page 25, reflects all transport modes and not only maritime flows. The Ukrainian Grain Corridor has no centralized reporting or publicly available flows.

The initial months of the Ukrainian grain corridor were relatively low in term of volumes. From its inception in August 2023 through October 2023, Ukrainian export volumes remained modest, averaging between 2 and 2.5 million metric tons per month. This compares to the BSGI, which during its first full quarter (September to November 2022), consistently exceeded 3 million metric tons per month, with October and December 2022 peaking above 3.2 million tons (see Figure 13, page 25).

The difference in uptake is closely tied to the structural conditions under which each operated. The unilateral corridor began without third-party guarantees, and it is not only reflected in export volumes but also in the vessel data: by December 2023, less than 500 vessels had transited the corridor, compared to a bit less of 700 ships during BSGI's first six months.

Yet this slower start opened a way to a steep acceleration in early 2024. From December 2023 to May 2024, Ukrainian exports consistently delivered between 5 and 6 million tons per month as shown in Figure 21, matching and then outperforming the best months of the BSGI period. April 2024 is particularly notable, with a volume of 6.3 million tons. Although it is difficult to attribute a precise amount of cargo to the corridor alone, based on the increasing number of vessels recorded, its monthly throughput was likely not far from, if not at times over BSGI levels.

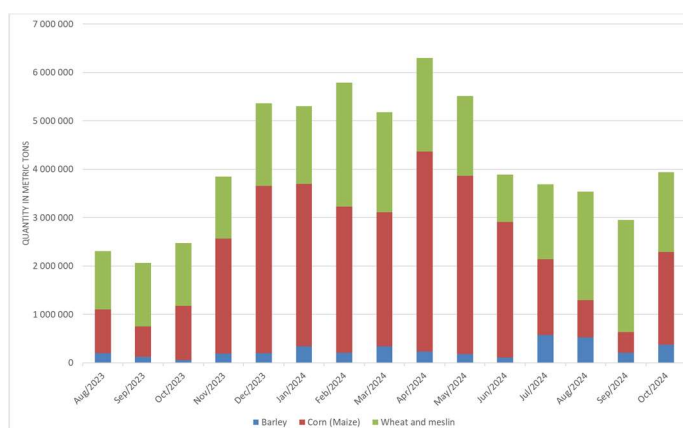


Figure 21 - Exports during Ukrainian Grain Corridor period

When placed in a longer-term historical context, the performance of the corridor period also compares favorably to pre-war maritime grain exports. From 2020 through early 2022, Ukraine averaged approximately 5 to 6 million tons of grain exports per month across all transport modes, including sea, rail, and river (Figure 13, page 25). This benchmark was once again reached in 2024.

The breakdown of commodities remained structurally consistent: corn dominated in total volume, followed by wheat and meslin, then barley. Corn accounted for the majority of exported tonnage during both the BSGI and Ukrainian corridor periods. However, the data suggests a slightly higher relative share of wheat exports during high-volume corridor months, reflecting either shifting demand or stock releases.

5.6 Global markets change due to Ukrainian war

The war radically disrupted established global grain trade flows. With market players having to take or change position due to international sanctions or political pressures. As a result, several countries had to shift their sourcing strategies. This section highlights changes in imports among key Ukrainian buyers as Egypt, China, Lebanon, and Turkey.

Ukraine's sudden loss of full maritime capacity created cascading effects across importer nations, especially in regions heavily dependent on Black Sea grain, such as Middle East and North Africa (MENA), and parts of Asia. Meanwhile, other structural factors over the world, including inflationary pressure, climate volatility, and shifting geopolitical alliances, exacerbated or shaped these realignments. By examining export volumes to key grain-importing nations, namely Egypt, Turkey, Morocco, Lebanon, Jordan, China, and Indonesia, over the period 2021 to 2024, it gives a better view how the international grain trade adapted in both the short and medium term. What emerges is a fragmented but increasingly diversified market landscape, where new patterns of reliance, substitution, and trade resilience took shape.

5.6.1 Egypt: A shift toward Russia and Brazil

Egypt's grain sourcing underwent sharp disruption in 2022. Ukrainian exports dropped by over 62% that year due to the war, reducing Ukraine's share of Egypt's imports from 13.4% to 6.4%. However, a fast recovery followed: by 2024, Ukraine regained a 13.2% share, thanks to the restoration of its maritime export capacity via the Black Sea. Russia capitalized on the initial disruption, expanding exports to over 8 million tons in 2024.

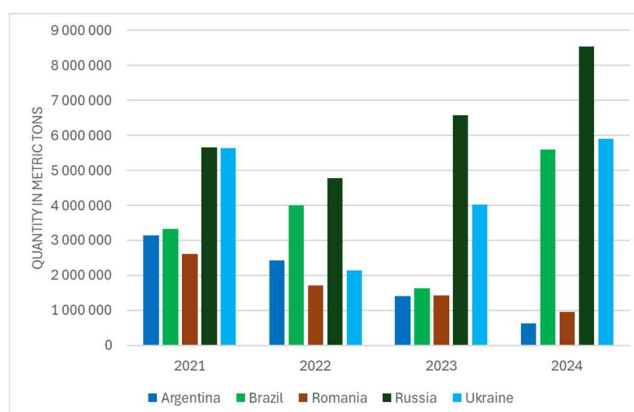


Figure 22 - Major origins of Egyptian grain imports

“...Brazil's harvest is up sharply, while Argentina has emerged from a period of drought, with good prospects for the coming season...”

(Respondent B, 2025)

Brazil entered strongly in 2022-2023, offering neutral and cost-effective alternatives. Meanwhile, Argentina's share collapsed by 80% since 2021. This decline was driven by droughts and export restrictions. Both origins might increase in the coming season, as Brazil's strong harvest continues and Argentina benefits from improved weather and export potential.

Concentration ratio of main suppliers (CR) underlines this shift: CR2 (Russia + Ukraine) fell from 53.8% in 2021 to 41.4% in 2022 but rebounded to 64.5% by 2024. CR4 (adding Brazil and Argentina) rose to 92.4% in 2024, revealing a market still highly concentrated, despite temporary diversification.

Egypt's strategy reflects pragmatism: pivoting when needed but returning to familiar partners when feasible. In the near term, Russia and Ukraine are likely to remain core suppliers, with Brazil emerging as a viable backup and Argentina potentially regaining market shares as it recovers from drought and stabilizes its export outlook.

5.6.2 Lebanon: Increasing dependence on Ukraine

Lebanon's sourcing profile reveals a strong structural dependence on Ukrainian grain throughout the conflict. Despite the war, Ukraine maintained over 56% of Lebanon's import share each year, peaking at 63% in 2024, with volumes reaching 1.25 million tons. This continuity likely reflects long-standing trade ties, attractive pricing, and Lebanon's inability to diversify during its prolonged economic crisis.

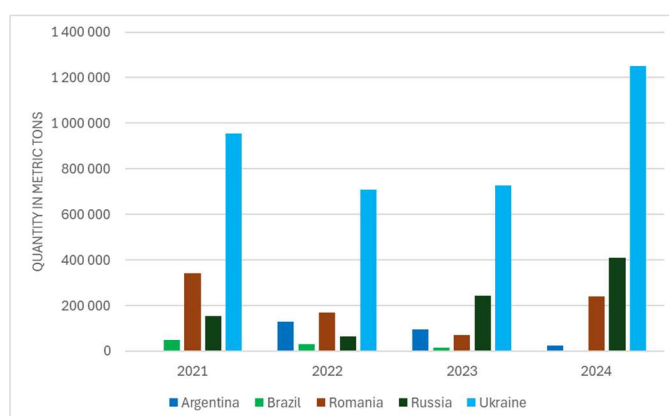


Figure 23 - Major origins of Lebanese grain imports

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
How were these cargoes exported?
How were operations managed in port and at sea?

Lebanon’s sourcing pattern is thus less about strategic choice than necessity and availability, reinforcing its exposure to future disruptions, especially if corridor access or insurance terms shift again.

5.6.3 Jordan: Romanian dominance

Jordan’s import strategy contrasts sharply. After sourcing 11% of its grain from Ukraine in 2021, volumes collapsed to below 1.5% through 2023, before rebounding to 12.8% in 2024. Instead, Romania emerged as the dominant origin, consistently supplying over 800,000 tons annually, aided by its transit infrastructure and proximity, although it began losing share to Brazil in the later years.

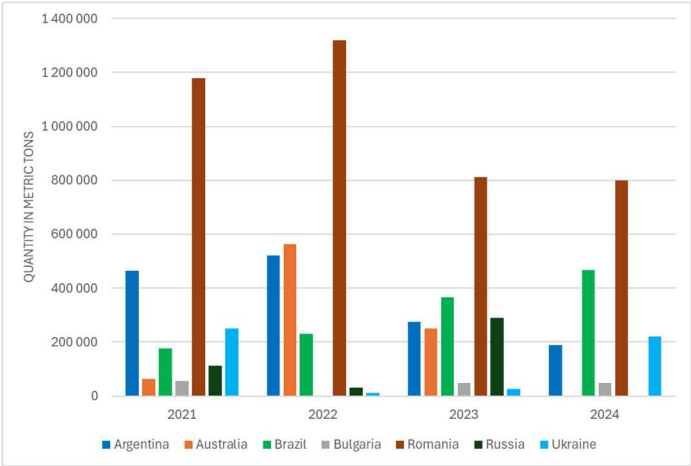


Figure 24 - Major origins of Jordanian grain imports

CR4 reached up to 97.2% in 2024, with imports dominated by Romania, Brazil, Argentina, and Ukraine. In 2022 and 2023, Australia temporarily replaced Ukraine during the height of the war. This shift highlights Jordan’s reliance on a small, rotating set of key origins, blending regional access (Romania) with global suppliers (Brazil, Argentina, Australia) depending on availability and price.

While this reflects limited diversification, Jordan’s alignment with regional flows appears strategic, focusing on logistical reliability rather than political neutrality or price arbitrage. With recent infrastructure upgrades in the port of Constanța, including loading capacity for Panamax vessels, Romania is well-positioned to remain Jordan’s primary origin.

5.6.4 Morocco: French dominance and diversification

Morocco’s grain imports reflect a significant surge in French exports in 2022, coinciding with disruptions in the Black Sea. This spike was likely triggered by drought-induced shortages in Morocco itself and the urgent need for substitute suppliers amid Ukraine’s export bottlenecks. While French dominance persisted into 2023 and 2024, other exporters such as Canada, Argentina, and Romania diversified the supply.

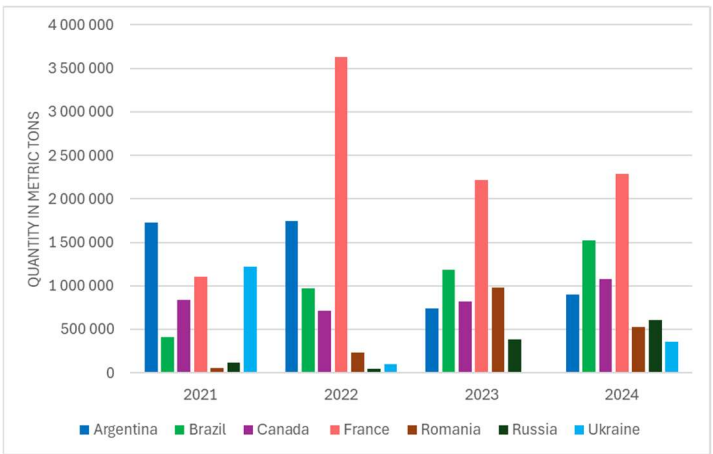


Figure 25 - Major origins of Moroccan grain imports

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
 How were these cargoes exported?
 How were operations managed in port and at sea?

Ukrainian presence declined post-2021, suggesting limited ability to resume volumes toward Morocco due to longer distances via alternative routes (Danube or EU overland corridors) and loss of advantage due to premiums. It may also reflect Morocco's strategy to diversify supply.

5.6.5 China: Volatile importer

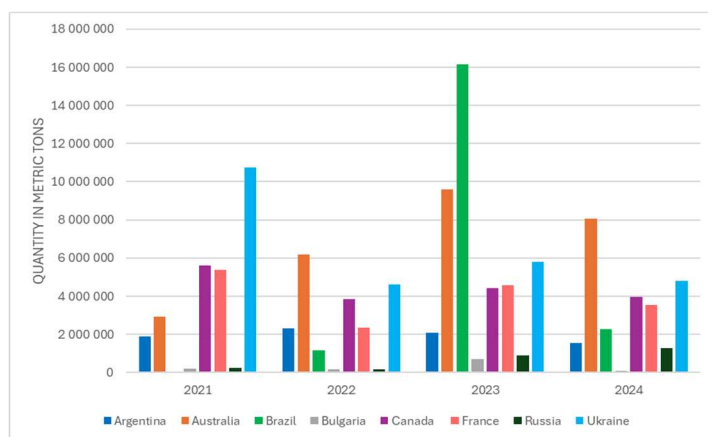


Figure 26 - Major origins of Chinese grain imports

China's grain import pattern reflects a clear strategy of diversification and risk mitigation which can be explained by the impressive imports volumes required.

In 2021, Ukraine was the top supplier, delivering 10.7 million tons, representing 40% of China's total grain imports. However, following the 2022 invasion, Ukrainian volumes dropped sharply to 4.6 million

tons, rebounded to 5.8 million in 2023 in a year that saw massive imports totaling 44 million tons overall, but fell again to 4.8 million in 2024 (19% of total imports that year).

China's CR2 ratio changed year on year, showing diversification and constant shifts. The ratio remained under 60%. Simultaneously, CR4 (Ukraine, Canada, France and Australia) accounted for 91% in 2021. In 2023 Canada left CR4, replaced by Brazil and the ratio remained around 80% from there.

Brazil, supported by favorable harvests and bilateral phytosanitary approvals, emerged as the standout substitute, surging to 16.2 million tons in 2023, while Australia also expanded sharply, exceeding 9.5 million tons in the same year.

Consistent imports from Canada and France helped stabilize China's broader portfolio, while Russia's role remained minor, with volumes rising to 1.3 million tons in 2024. Altogether, China's profile reflects a balance between volume maximization and diversification.

5.6.6 Indonesia: Australia loses share to Argentina and Canada

Indonesia had a strong reliance on Ukrainian grain, which accounted for 12.5% of imports in 2021. But volumes collapsed to just 2-3% during 2022-2023 due to shipping disruptions, freight cost surges and security risk premiums. A significant rebound occurred in 2024, with Ukrainian exports reaching 2.75 million tons, restoring a 11.4% share.

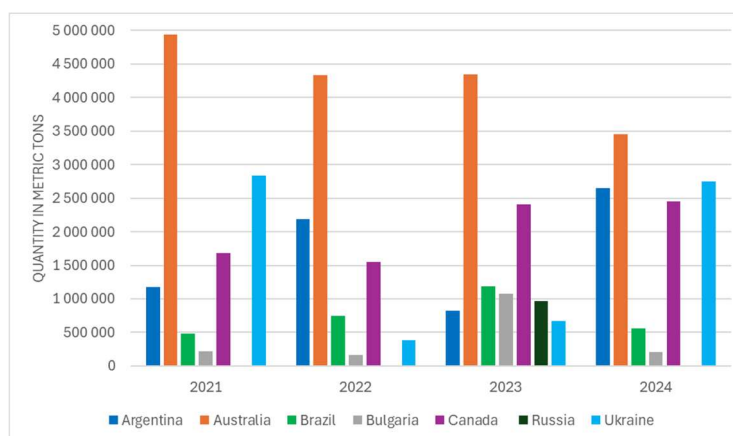


Figure 27 - Major origins of Indonesian grain imports

Indonesia's CR2 composition shifted year-on-year and ranged between 51% and 69%. However, CR4 remained stable at around 93% except in 2023 where it accounted for only 78%, showing vast diversification. However, composition constantly shifted.

During Ukraine's absence, Argentina and Canada significantly expanded their roles. Canada rose above 2.4 million tons per year by 2023-2024, and Argentina peaked at 2.65 million tons in 2024. Meanwhile, Australia's dominance declined despite being the leading supplier in earlier years, suggesting a shift toward price and policy-driven procurement flexibility.

5.6.7 Special cases: Spain and Turkey

Beyond general trade realignments, certain countries played unique roles during the crisis. Spain and Turkey stand out as special cases, Spain as a new strategic outlet for Ukrainian grain, and Turkey as both a diplomatic facilitator and a processing hub for Russian wheat and re-exporting processed goods under Turkish origin labels according to various discussions with market players. These roles offer complementary insights into how some actors adapted to and capitalized on disrupted trade dynamics.

Turkey: Dual imports strategy and a processing hub for Russian grains?

The global role of Turkey in the conflict is more nuanced. As a co-signatory to the BSGI and host of the Joint Coordination Centre (JCC) in Istanbul, Turkey played a key role in enabling the flow of Ukrainian agricultural exports through the BSGI. Turkish territorial waters, near the Bosphorus Strait, served as inspection and transit area for the initiative.

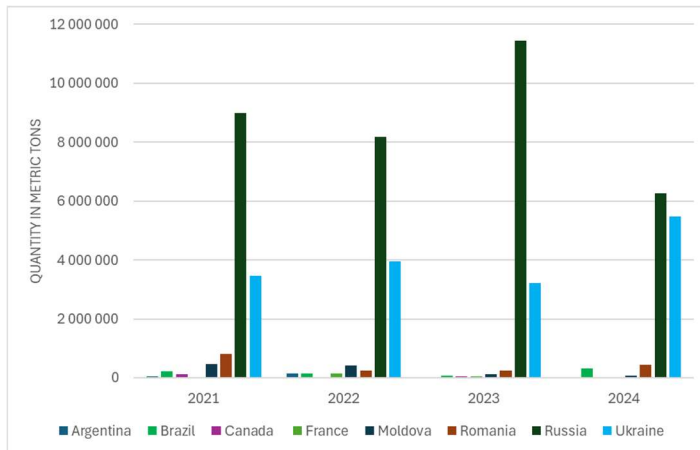


Figure 28 - Major origins of Turkish grain imports

Turkey maintained a dual-import strategy, relying on both Russia and Ukraine. While Russia remained the dominant exporter to Turkey, peaking in 2023. Ukrainian exports remained relatively stable across the years, likely due to Turkey's role as a key mediator in the BSGI and its geographic proximity.

However, the slight dip in 2023 may reflect BSGI inefficiencies and post-BSGI volatility. Turkey's position as both a

geopolitical broker and a strategic consumer allowed it to maintain supply from both belligerents, buffering it from major disruptions.

Concentration ratios confirm this strategic balance: CR2 (Russia + Ukraine) remained above 90% from 2022 onward, while CR4 (Russia, Ukraine, Romania, Brazil) reached 98.1% in 2024. Despite this high concentration, Turkey's sourcing reflects intentional strategic choices and political leverage rather than constraints.

However, beyond this high-profile diplomatic engagement, Turkey also acted as a major importer of Russian wheat. Unlike Spain, which served mainly as a receiver of raw grain, Turkey imported wheat, processed it into flour, semolina, and other derivatives, and then re-exported these value-added products under the designation of "Turkish origin" according to discussion with different market players. Under international trade rules, such a transformation is considered legally valid. Once a commodity is "substantially transformed", its country of origin becomes that of the processing country. (WTO, 1994; WCO, 2015) as such, Turkish flour and other shipments made using Russian grain can be legally sold to international buyers, including humanitarian programs and food-insecure states, without triggering origin-based sanctions or restrictions.

This trade pattern, while legal, presents a few challenges for global market transparency and ethical governance. Once milled, this wheat becomes part of Turkish export flows, with no obligation to indicate its origin. The political and ethical risks here are significant. Turkey was able to maintain trade relations with Russia without violating international norms, which led to accusations of Turkey enabling "sanction leakage", undermining efforts to isolate Russia economically while profiting from the ambiguity inherent in wartime logistics.

Spain: From secondary market to strategic buyer

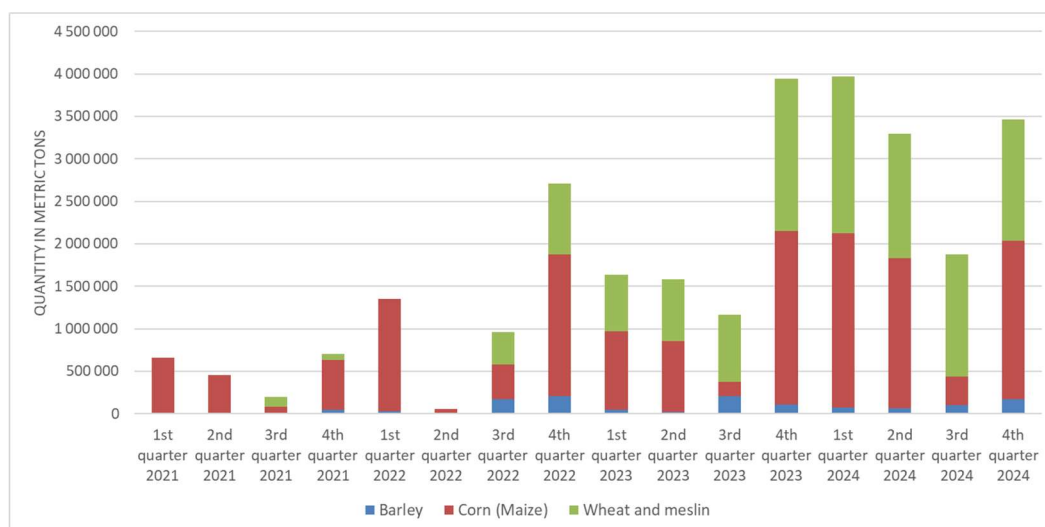


Figure 29 - Exports from Ukraine to Spain between 2021 and 2024

Prior to the war, Spain was already an European destination for Ukrainian corn, as shown on Figure 29, primarily for use in livestock feed. Ukrainian wheat, on the other hand, played only a marginal role. This changed with the onset of hostilities and the collapse of traditional Ukrainian trade relationships with buyers in North Africa and Asia. In this new context, Spain's deep-water ports, EU alignment, and commercial stability allowed it to become a major buyer of Ukrainian wheat exports.

While corn dominated in the pre-war period (2021 to early 2022), wheat volumes surged from mid-2022 onward, coinciding with the start of the BSGI. From late 2022 through 2024, wheat consistently rivaled or exceeded corn in volume. This trend continued even after Russian withdrawal from the BSGI and also under Ukrainian Unilateral corridor which suggests an increasing reliance of Ukraine on stable, politically safe EU buyers.

The reasons for this realignment are multifaceted. Spain's geographic position and port infrastructure enabled the reception of large-sized shipments from the Black Sea. Politically, as an EU member state, Spain provided a regulatory environment conducive to secure trade. Economically, Spain's domestic agricultural industry, especially in the meat and dairy sectors, required steady inputs of feed grains, making it a natural absorber of excess Ukrainian supply when other destinations were no longer accessible.

While this ensured a vital export solution for Ukrainian producers, it also meant that grain was redirected toward Europe. Although this shift is not problematic from a commercial standpoint, it raises questions about equity in global food distribution during crisis periods. Interestingly, Spanish export data indicate various wheat exports to destinations such as Tunisia and Libya in August and September 2022. While available data does not allow for definitive conclusions, this scheme may suggest that Spain served at times as an intermediate for re-exporting Ukrainian grain toward other countries. If so, this would imply the emergence of secondary redistribution routes through EU ports during the early phase of the BSGI. While it might have allowed Ukrainian grain to reach North-African countries indirectly, it also introduced additional logistical layers, time, and price markups, factors that can significantly affect food accessibility for vulnerable populations in regions experiencing acute food insecurity.

5.6.8 Fragmented but adaptive global market

The war in Ukraine led to a sudden and severe disruption of global grain flows. Ukrainian exports collapsed in key regions, while Russia's trade was complicated by sanctions and political tensions. In response, importing countries realigned their sourcing, some doubling down on traditional partners, others shifting to alternative origins.

Each country's reaction was shaped by its infrastructure, political alignment, and economic flexibility.

- High-dependency cases like Lebanon and Jordan lacked room to maneuver. Lebanon continued sourcing over 56% of its grain from Ukraine throughout the war, while Jordan relied heavily on Romania, with CR4 (Romania, Brazil, Argentina, Ukraine) reaching 97.2% in 2024. This reflected limited diversification capacity and strong regional trade links.
- Diversifiers like China, Indonesia, and Morocco actively rotated between suppliers. China replaced lost Ukrainian volumes with Brazil and Australia; Indonesia leaned on Argentina and Canada as Australia's dominance faded. Their CR2 ratios remained low (China <60%), showing deliberate hedging and procurement flexibility.
- Hybrid strategies emerged in Egypt and Turkey. Egypt pivoted rapidly to Russia and Brazil before partially returning to Ukraine as the corridor reopened. Turkey maintained high imports from both Russia and Ukraine (CR2 >90%) while also playing a diplomatic role in the BSGI and leveraging its non-alignment with sanctions.

This divergence revealed a more fragmented but increasingly adaptive market structure. Countries with flexible logistics and broader trade access, notably China and Indonesia proved better equipped to absorb shocks. Meanwhile, others became more vulnerable to corridor disruptions or price fluctuations.

Europe, especially Spain, which was highlighted in this chapter, but also Italy, and Netherlands, emerged as stabilizing importers for Ukraine. These three countries evolved from a secondary buyer to a strategic wheat and corn destination, absorbing volumes that might previously have been shipped to Egypt or Indonesia for example.

Concentration ratios confirm these patterns: markets like Lebanon or Turkey remain exposed to bilateral supply shocks, while others like China reduced supplier risk through volume spread and geopolitical hedging.

The war did not just reroute flows, it reshaped the logic of global grain trade, rewarding resilience, optionality, and neutrality. This shift is likely to persist, with multi-origin sourcing and regional fallback strategies becoming structural features of post-2022 agri-trade.

5.7 Future Outlook & Predictions

5.7.1 Reconstruction and strategic shift in port infrastructure

Ukraine's port system remains structurally impaired. While deep-sea ports like Odesa and Chornomorsk have resumed operations under specific security conditions, their future viability depends on three parallel developments: physical reconstruction of port infrastructure, continued deterrence of Russian naval threats, and financial assistance.

The Danube system, although critical during the war, is unlikely to scale beyond its current peak capacity. As shown in Chapter 5.4, its 2023 volume of 15 million tons served as a temporary relief valve, not a permanent substitute. Future investments in Izmail and Reni may enhance resilience, but cost-per-ton and transshipment inefficiencies will limit competitiveness against fully restored Black Sea hubs.

5.7.2 Evolution of deep-sea navigation and risk management

The unilateral corridor has proven durable and operationally scalable. Over 4,500 vessels used the route between August 2023 and December 2024 (see Figure 20, page 31). Yet its success rests on a delicate balance: deterrence through proximity to NATO waters and a security perimeter enforced by Ukrainian naval forces.

In the absence of a renewed multilateral agreement like the BSGI, the future of Black Sea navigation hinges on persistent threat deterrence and continued access to affordable insurance. The Unity Facility may serve as a transitional tool but lacks the scale of government-backed guarantees seen in traditional export credit mechanisms. Maritime insurers remain cautious, with war-risk premiums fluctuating based on drone strikes, naval incidents, and corridor disruptions.

A likely trend is the segmentation of the fleet: aging bulkers will remain dominant in high-risk corridors, while modern tonnage will be reserved for lower-risk origins. This division could become a structural feature of wartime or post-conflict supply chains.

5.7.3 Global grain trade

As analysed in Chapter 5.6, Ukraine's return to its pre-war export volumes has not led to a complete restoration of its previous market position. Countries like Egypt and China have diversified suppliers, with Brazil, Argentina, and Russia occupying larger shares. The CR4 remains high in most importing countries, but the composition has shifted.

Future trade patterns will likely reflect a hybrid logic: Ukraine will remain a key origin for price-sensitive buyers and close geographic partners, but its role in distant and high-volume markets may decrease unless logistical costs and political risks decline.

In the future, new market behaviours unrelated to war or logistical threats will emerge. Countries facing food insecurity will continue to demand stable access to affordable cereals, while buyers with some leeway will increasingly consider ESG criteria, traceability of origin and transport-related emissions. Ukraine's ability to align itself with this trend, through traceable logistics, green corridor certifications and digital platforms, could determine its competitive advantage over the next decade.

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
How were these cargoes exported?
How were operations managed in port and at sea?

6. Conclusion

This thesis has explored how Ukraine maintained grain exports during wartime through adaptive port strategies, evolving maritime operations, and shifts in global trade patterns. By triangulating data, vessel records, and expert interviews, the analysis reveals how a deeply centralized export system, optimized for volume, was forced to evolve into a fragmented, risk-calibrated network of corridors, insurance mechanisms, and adaptive trade routes.

Ukraine's logistics network before the war was highly centralized and efficient but structurally fragile. The overreliance on three Black Sea ports (Odesa, Chornomorsk, Pivdennyi) and the absence of redundant corridors left the export system highly exposed. When these ports were rendered inoperable, export volumes collapsed. Emergency rerouting to Danube and land corridors enabled partial recovery but revealed severe capacity and efficiency limitations.

The Black Sea Grain Initiative (BSGI) enabled a temporary maritime solution. Operational data showed a progressive increase in per-voyage efficiency, yet the corridor suffered from systemic delays and political obstruction, particularly from Russia. By mid-2023, the BSGI's functionality was severely reduced, confirming its unsuitability as a lasting framework.

The Ukrainian unilateral corridor, launched in August 2023, marked a turning point. Supported by national naval control and a bespoke war insurance mechanism (the Unity Facility), it allowed Ukraine to restore deep-sea exports, reduce financial risk for shipowners and bring back volumes to near pre-war levels.

However, a return in volume does not mean a return to the pre-war market structure. Despite recovering its capacity, Ukraine has lost export shares in various markets which have partially reoriented to Russia, Brazil, and Argentina. At the same time, EU countries like Spain and Italy absorbed large volumes. As a result, the current grain trade landscape reflects a new equilibrium rather than a restoration of the pre-war status quo.

Strategic Recommendations

1. Reimagine corridor design beyond diplomacy

Export corridors must move beyond diplomatic agreements and incorporate contractual enforcement mechanisms and neutral third-party coordination, even in wartime. Embedding digital tracking, real-time reporting, and automatic fallback protocols could reduce geopolitical manipulation.

2. Apply parametric insurance in trade corridors

The success of the Unity Facility suggests broader applicability of war insurance models where predefined events trigger coverage. This approach could benefit other conflict areas.

3. Shift focus from volume to resilience in port planning

Future port investments in Ukraine, and elsewhere, should be evaluated not only by throughput, but also by resilience indicators: multi-modal integration, decentralization, and stress-test capacity under conflict.

Areas for future research

- **Fleet deployment strategies and vessel aging:** The concentration of aged vessels in Ukrainian corridors raises questions about how warzones influence global scrapping cycles, insurance markets, and ESG compliance.
- **EU's role as a fallback market:** The redirection of Ukrainian grain to Spain, Netherlands, and Italy calls for deeper analysis of the durability and purposes of EU's fallback role. Is this shift temporary, or a new normal?
- **Russian economic and strategic gains from disrupting the BSGI:** Research could explain if and how Russia might have benefited logistically and politically from corridor disruptions, not just by rerouting trade but by reshaping its leverage over key importers.
- **Traceability in conflict zones:** An underexplored area is how vessel traceability tools could help monitor cargo origin, prevent sanction circumvention, and secure food supply transparency during wartime.

The Ukrainian case illustrates that food trade under wartime pressure cannot rely on peace-time assumptions. Resilience lies not only in infrastructure, but also in operational autonomy, insurability and political influences. As the war continues to reshape global grain logistics, the Ukrainian experience offers a rare blueprint for how critical trade flows can adapt, survive, and even innovate in conflict.

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Filters used:

- HS codes: 1001 (Wheat and meslin), 1003 (Barley), 1005 (Corn)
- Flow: Exports or Imports (depending on the specific dataset)
- Period: 2021 to 2024
- Partners: Specified individually (Ukraine, Romania, Turkey, etc., depending on the analysis)
- Reporters: Specified individually (Ukraine, Argentina, Brazil, etc., depending on the analysis)

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Use of Artificial Intelligence-assisted tools

In the context of this work, the author declares having used Artificial Intelligence-assisted tools for the following purposes:

- Improvements of form (spelling, syntax, grammar)

Mention of AI tools used: Deepl, QuillBot

- Data search and matching

Built date of vessels were researched and matched with IMO number

Mention of AIs used: ChatGPT 40

Appendix 1 – Discussions with industry professionals

Discussions B and C have been made in French and reports translations based on note taken in French have been performed using the DeepL Translator tool. (www.deepl.com/translator).

Discussion/Interview Protocol

Interview and discussion themes

- ❖ Personal experience, background and role in commodity trading
- ❖ Pre-war logistics in Ukrainian ports and regional maritime practices
- ❖ War disruptions in Ukrainian port operations
- ❖ Impacts of the war on freight rates, vessel availability, and insurance
- ❖ Reactions to the changing risk landscape
- ❖ The Black Sea Grain Initiative: efficiency, shortcomings, and challenges
- ❖ Post-BSGI period and the use of the Humanitarian Corridor
- ❖ Operational adjustments (Danube ports, AIS policies)
- ❖ Insurance strategies and the role of war risk coverage
- ❖ Long-term outlook and industry lessons

Interview transcription - Respondent A

Interview on April 30, 2025, with Yuriy Kizlevych, Head Port and Fleet at Kernel

This interview was conducted in person. For clarity, the initial discussion, presentation part and the reading of the interview factsheet were not included in the audio recording and are therefore not reflected in the transcript.

Yuriy: Okay, so let's start with port operations. So actually, I was managing five terminals:

Two of them are for liquid bulk, for sunflower oil and three of them are for dry bulk, mostly for grains and for sunflowers' meal.

In 2022, when the war started, on the 21st of February, actually all deep sea ports of Ukraine were blocked and stopped their operations. There were certain measures done by the military in order to, because there was a certain threat. And all the ports were closed. At this moment, there were in every port, in Nikolaev, in Pyvdenni, Odessa, Chernomorsk, there were vessels unloading and also under loading of not just grain, but all other different kinds of cargo. And all these operations, the vessels were blocked, even those vessels that were already loaded. And all the companies, the farmers, had to evacuate the grain to do some kind of export. And all the stakeholders tried to reroute their supply chain to remodeling their supply chain. Mostly two main directions were maintained:

1. The cargo was redirected to the Danube ports: Ismail, Reni, Kiliya, Ust-Dunaisk.
2. By the trucks or by the railcars to the inland borders: to Poland, to Romania, to Hungary, so the main borders.

The main disruption was that infrastructure, all kinds of infrastructure, roads, railway, Danube ports, these inland transshipment facilities, these infrastructures were not able to export those amounts of grains, of cargo that were available. And it was the main challenge for all stakeholders: for trucking companies, for railway companies, for freight forwarders, for exporters, for terminals. Everybody had to try to develop operations, to develop infrastructure in order to enhance export facilities.

If we speak about Danube ports, there were existing terminals that were specialized on handling of grain. But also, at those times many port operators, they started to adapt for transshipment of grain, of sunflower meal and sunflower. Mostly it was not specialized terminals, it was like flat warehouses and they bought some equipment, mobile equipment, in order to handle the grain and to load small tonnage barges and small tonnage vessels.

The restrictions for the Danube ports, it was the draft, the main restriction, and also the capacity of the channel, it also was a challenge. So, what to say, of course the market of barges and flat market of small vessels, the rates started to rise, like from 9 euro per ton, for example from Ismail or from Reni to Constanza, and at the peak there were even 115 euro per ton.

Jonathan: 115€ per ton?

Yuriy: Yeah, it's crazy, but that's the fact. The demand was not enough for this tonnage and the period when all the carriers, barge owners, started to buy new tonnage or to

bring the tonnage to the region, of course the period when there was not enough tonnage, the freight rates were skyrocketing.

The same situation was on the inland borders due to the facilities were inefficient and capacity was also not enough. Because there were different kinds of cargo that were moving by the railcars, mostly it was metal products, it was iron ore, it was also coal, and they were competing with the grains. So many railcars, many trucks on these borders, they were stacked and the exporters, the car owners, had huge costs while they were waiting for their turn to pass the border or to transship at the border. And of course the challenge was to develop this infrastructure, develop these facilities and to find out alternative ways to transship. One of the decisions that were done by the market players was to build or to buy specialized grain containers. So it's similar to a 20-foot container, but on side, it has a little bit different construction in order to have more capacity for grain. I will send you some photos of these containers. And maybe also videos how it works. And these containers were used to transship grains and sunflower meal.

And the point was that the railway tracks in Ukraine, they are Soviet Union style. They are wide: 1520 in millimeters. And the European rail tracks, they are narrow: 1435 if I'm correct. We can check.

Jonathan: So you were only able to go to the border and then had to transship.

Yuriy: Yeah, and when they used just conventional railcars, grain hoppers, there were two main technologies how it could be done:

1. You have to transship the grain from a grain hopper to the new grain hopper that is already on the narrow rail tracks.
2. You had to take the grain hopper from this coach and put it on another coach.

So, of course, it's not about efficiency, but it's the only way. And for containers, it's more easy that the technology of cargo flow scheme for using containers, it's more easier, more fast, and you can do it, for example, with a reach stacker or with a special kind of mobile crane. So it's more fast and more easy. But the challenge was to get enough of these containers.

Jonathan: One of these containers holds how much in tonnage in grain?

Yuriy: 25 tons. 25, 26, so like this.

If we speak about trucks, of course, all the markets suffered from inefficiency of road infrastructure, especially direction to the Danube ports. Because there is just one road from Odessa region to Danube, and this road is mostly just one line. And when all these trucks started to move in that direction, it was a lot of traffic jams.

And one more point is that on this road from Odessa ports to Danube ports, there is a certain area where the road is going through, it's like a transborder road, it's like a territory of Moldova. And to pass this road, you have to proceed through certain migration control. And there were challenges with migration, especially in the war period, to arrange fast servicing of these trucks in order to let them go almost without stopping. But in the first period, they were stacking in this border, and after that they were stacking near the ports.

There were huge queues near the ports because there was no additional infrastructure for trucks to wait for the discharging. They were waiting on the roads, they were waiting any piece of land that is possible. It was crazy, it was influencing not just the capacity of

export, but also the safety on the roads. Because by these roads also moved not just trucks, but civil transport cars also.

It's like in general, if we speak about the figures of transshipment in Danube ports. Figures of transshipment in the new ports. Before the war, there were almost no significant amounts of grain. Let's say it was up to 500,000 per all Danube ports. It's maximum. And in the peak, already during the war, the region was developed up to 4.2 million tons export capacity per month. So it was the fact figures that were exported through all the new ports.

Because many facilities changed their specialization. For example, in Ismail there was a ship repair facility with seven or eight berths. And they remodeled their facility to export operations, to handling the grain. They were done with this operation by different type of equipment, with some mobile belt conveyors, with floating cranes using the grabs, with some equipment like hooks also with the grabs. So the exporters, they tried somehow to adopt their facilities to export the grain and of course to earn money.

And also transshipment rates were also skyrocketing, of course because of less supply with high demand. At the peak, the tariffs for grain handling were up to USD 30\$ per ton.

Jonathan: And as usual, so pre-war, how much would that be?

Yuriy: As usual, in that region, usually it was about USD 5\$ per ton. But they were skyrocketing up to 30.

Jonathan: Yes, that's why also the price in general, everything went up. All these operations were mostly done in the period between the start of the war up to the BSGI or did they continue to handle after the introduction of the BSGI?

Yuriy: They continued to handle also during BSGI as BSGI corridor model didn't have enough capacity. There were limited capacity due to these inspections that were obligatory. And these inspections that were done by Turkish and Russian guys. They were all the time, almost every day, trying to block, they tried to make minimum inspections of the vessels.

And due to this not efficient capacity of these inspection teams, the vessels, handy, handy max, super max, panamax, all kinds of tonnage, they were queuing near Bosphorus, near Marmara Sea. And even when the queues were more than 100 vessels, the vessels were waiting even before the Dardanelles Strait. And even sometimes in the most negative period, the waiting time for the vessel were more than one month.

The vessel should wait to get the inspection for one month. And even there were some vessels that were waiting more than 40 days to be inspected. And it means that the vessel in time charter, the charterer should pay time charter rates every day. And there were huge expenses, huge costs for exporters and of course it influenced the market, the farmers, the exporters, their margins. So the market, the farmers, the exporters, the margins, there were a lot of losses. Also some negative scenarios for players who were not able to trade.

And in average, the capacity of this inspection varied through the period of this Black Sea Grain Initiative. The maximum, as I remember, it was about nine vessels per day. It was the maximum result. But in average it was four to five. And in a certain period there were just three inspections, three vessels inspected for all three ports. So it means that you get just one vessel per one port per day.

Jonathan: So it's Odessa, Chernomorsk and Pivdenny? So sometimes it's just one vessel per port.

Yuriy: Yeah, yeah. And for example with cargo handling capacity with all terminals that were able to export, let's say, up to 100 million tons. I mean all the terminals also with Nikolaev. They were limited to one vessel per day. So of course the port terminals were struggling, the exporters were struggling. The port terminals could not plan their stable operation as they all the time were stuck without vessels and with the cargo.

Of course there were certain risks because when you have cargo in the terminal and the terminals they all the time were and are at the moment under risk of attack by drones, by rockets. So you have risk to lose your cargo.

And actually the terminal that I was managing, the first terminal that in Ukrainian ports was damaged, was our terminal in Chernomorsk. It was the largest terminal for grain in Ukrainian ports. It was Transbulk terminal, Kernel terminal. And the terminal consists of two parts. One part is the old part and one part is the newly built part. Two thirds of the old part were damaged.

And at that period in silos there were up to 90,000 tons of grains. Mostly it was wheat. It was meal wheat. And this part of terminal was destroyed. And part of this grain were lost. But it was a small part that were lost. It was lost about 2,000 tons. And all other amount we were lucky to save it, to evacuate.

It took us almost five months to get the grain from the silos because the transport equipment, the conveyors, were damaged. We were unable to run this equipment. And we had to do it, let's say, in a manual way using some kind of handmade equipment to evacuate this grain and to make analysis to check whether the grain was wet as there was a fire and we had to extinguish it. And when the laboratory showed that, okay, this grain could be saved using drying machines or cleaning, we've done it as we had certain facilities to dry it. And of course it costs, it's time.

Jonathan: The terminal that was damaged, did you run repairs after it?

Yuriy: Yes, it's still running repairs, still in progress. But every terminal has its own story because the scale of damage were different for each terminal. Some terminals were able to repair, some terminals were not able to repair due to more heavy damages. And of course each terminal has its own business model, whether it's a terminal that is in the group, in the vertically integrated company, or it's an independent terminal. And every terminal decided for itself whether to proceed with rebuilding or to take some equipment for some mobile conveyors to not repair but working in asset like this.

Also during this period many small terminals were constructed. It was not like it's official they're calling themselves terminals, but mostly it was flat warehouses. They were very fast constructed. And then from these flight warehouses the grains were moved by the trucks to the berths. And at the berths there was mobile belt conveyors that were loading the vessels. Of course it's not an efficient way of transporting the grain and the costs are much more higher than at a specialised terminal. But anyway they were supported export of the grain. Even if you can do 1000 tons per day, it means you can do 30,000 tons per month. And if there are several of such terminals it's already a decent. And of course the transshipment rates were higher at that period. For somebody it was a good business.

Jonathan: The state was involved in this building of new warehouse? So it was involved not only private companies?

Yuriy: Yeah, so the model in the ports is as follows. So all let's say 95% of all berths in Ukrainian ports they are state owned. The berths according to seaports law, the berths are objects of strategic infrastructure. They could not be delivered to private operators.

Jonathan: On the ports as they went under strikes, Russian missiles, drones and everything. What was life there? Did you operate normally and had any alarms?

Yuriy: Good question. Before the war we had certain amount of parameters that you are monitoring all the time. And during the war there were added certain additional parameters. Especially every day we were measuring the time of alarms, of air alarms. When the alarm is sounded, everybody should stop their operation and proceed to the shelter. At the first period of the war there used rockets. Rockets, like let's say common rockets, and it means that you had like 15 minutes to go to shelter. But in a certain period, Russians started to use ballistic rockets, and when they launched them from Crimea, for example, for the Odessa region, they have two minutes to fly to get the target. So it means that when the air alarm sounded, you have two minutes to go to shelter.

Of course, there were different alarms depending on what kind of threat there is: the rockets, ballistic rockets, or drones. And due to these different kinds of reasons, the period of these alarms were different. Sometimes during certain months, the period of alarms could be up to, the total period of these alarms could be up to one week. One week per month. The time that the alarm sounded and no operations were allowed. And it means that you cannot intake cargo from railcars, from trucks, and you cannot load it on the vessels.

Of course, it disrupted operations extremely because you have to plan your supply chain and logistics in order to make it more smooth. But all the time you had somewhere a disruption due to air alarms, due to damage of port infrastructure, because there were a lot of periods when the port rail infrastructure were damaged completely. The railway bridges were damaged. And those periods, certain ports or Odessa or Chernomorsk, they could not receive cargo by railcars. And everybody has to switch very fast from railcars to trucks or to discharge these railcars somewhere in the vicinity of the ports to trucks and bring the cargo by trucks to the terminals. So disruptions were everywhere and every time.

Jonathan: Yeah, we heard a lot through the media, basically, of that. And as I did my different research, it's pretty difficult to kind of really understand how it is really in the ports. Because basically that's something that we never experienced. And our media don't transcript really this reality. They just say that there were strikes and some infrastructure were damaged and everything. But they not really get into the details of, for example, the fact that one week per month is lost under air time alarm.

Yuriy: And also there were other disruptions like metal. For example, it's in addition to these air alarms periods of it. And it means that your capacity were not operating efficiently. So all the time were limited in your operation.

And you were asking also about the state. The state is like operating the strategic infrastructure. They were involved in planning these inspections and coordinating inspection and planning the vessel calls to the ports. They were gathering all information from the port operators, from the flight forwarders. When the vessels were nominated to the ports to certain terminals, they were managing the vessel calls in who will be first, who will be last, according to the port rules and according to the capacity of this Black Sea grain corridor. And also the state, the state administration of seaports, they were trying somehow to also develop infrastructure where it was possible. And they, for

example, leased the land to private operators or they cooperated with private operators to construct these flat warehouses or some additional facilities for grain handling. And mostly it was their function.

Jonathan: And since 2023, Russia withdrew from the BSGI.

Yuriy: So there was a period when the corridor was decreasing its capacity of inspection of the vessels going through the corridor. And there was one point when Russia escaped from this deal and the corridor operation was stopped.

And as we were discussing that during the Black Sea Grain Initiative, the new ports still were operating and were developing its facilities to transship the cargo. And there were even certain periods when the ports were blocked once again. When, for example, our terminal was rescheduled in cargo flow scheme. We were intaking rail cars, grain from the rail cars, and we were loading it to trucks. Trucks were delivered to Danube ports. So the terminal, the deep sea port terminal with 10 plus million tons capacity was operating like inland terminal in order to make transshipment from rail car to trucks.

Jonathan: At the moment they withdrew, there were vessels that were waiting or loading.

Yuriy: At the moment I will tell you, starting from October or November, starting from November 2023, the new corridor was launched. It was like Ukrainian corridor without any deals with Turkey and Russia. And since that period the corridor started to work and each month it was starting facilitating the number of ships moving and the turnover of the vessel calls and turnover of the cargo was increasing.

Yes, there are still limitations. There are certain time windows when the vessels can move through the corridor, whether inbound or outbound. This is not 24-7. There are certain periods in daytime and nighttime, but just in certain periods. But at the moment the capacity of this corridor is much more bigger than the BSGI.

And I can say that now the challenge is that there is not so much grain as all grain capacities that were from harvest 2022-2023 that were accommodated as the export through Danube and through BSGI was not so big. Since the Ukrainian corridor started to operate, all these amounts of cargo were exported. And this year already there were no reserve from last year and it was just purely the harvest of this marketing year.

And let's say our terminal, in spite of that it is damaged, we were exporting up to 800,000 tons per month. But it's in total. It's grains, it's sunflower meal and it's sunflower oil. If I will split it, so it will be in average:

1. 100,000 tons of sunflower oil,
2. 100,000 tons of sunflower meal and 600,000 tons of grains per month. Just for this time.

If we will all split, for example, before the war in 2021, in November, actually, I don't remember the top result, we exported 1,100,000 tons per month in November. And in this season, also in November, we exported 800,000. So let's say up to 30% less, as the terminal is damaged, but the capacities are equal, let's say, to pre-war level.

Jonathan: So basically you are now almost able to export as pre-war, and there's no more reserve from the last harvest.

So now you're really running not as pre-war because obviously you're still under threat and everything, but on the quantity you're running as before.

Yuriy: Yes, more or less like this.

What has changed?

- Nikolaev ports, they are blocked, they are not operating.
- Then there is still up to 25% of Ukrainian land are occupied, because the production of grain is less due to there is less land.
- And of course, these limiting factors of corridor, of windows when the corridor is operating, and air alarms, are still here.

But at the moment there are less grain and the terminals capacity, because also new facilities were constructed in Pivdenny, in Chernomorsk, in Odessa, and at the moment we monitor that the plan ship operates. They already dropped up to from \$25 per ton in deep ports to \$8 already. We're already speaking about \$7. But as there is the end of the season, for example before the war when the harvest was good, you almost didn't feel the seasonality. I mean you had almost all year more or less stable operation. Yes, there were certain fluctuations, but it was more or less stable. And today we already can see the peak starting from let's say October, November, December, a little bit of January, like January because there is holidays, New Year, etc. Maybe part of February and that's it. After that you have slightly decrease of the volumes.

For example, if we compare by figures, for example March this year and March last year, 2024, this year the export of grain was, we do not speak about soya and rapeseed here, it was 3.1 million in this year, this March 2025. And March 2024 was 4.8 million. So it means that 1.7 million less than last year. Due to there is not so much grain.

Jonathan: So due to the occupied land and less production, less reserve.

Yuriy: And also, what was the problem for this harvest, that last August it was like abnormal heat in Ukraine and decreased harvest of wheat and a little bit of corn and also sunflower seeds. Also there were certain issues with the quality for wheat, for sunflower seeds. But it's all manageable.

Jonathan: During the whole period there were kinds of opportunities for some private companies due to the price. increase and everything, you saw like new companies coming in or some withdrawing from the market?

Yuriy: Yeah, of course. The market changed all the time, dynamically changing in different periods.

First period when the ports were blocked, when everybody went to the Danube ports and to inland borders, there were different new players were created and started to work with exporting the grain. But more or less they were like small players, but there were a lot of them. It's for grains, in sunflower oil as well. It's for exporters. Then the new terminals started to start their operations. Some terminals were sold to new owners and they started expanding.

So of course we have seen it in all sectors:

- In exporting terminals,

- In barges,
- In tonnages,
- In rail cars,
- In containers,
- In trucks.

So everybody started to try to grasp this opportunity due to high demand and low supply. But of course, who is first, that one earns more. Because in certain periods there were already overcapacity for these barges. And then when demand were decreasing, when the deep sea ports were opened, of course all these barge tonnages were inefficient. And those who didn't sell it or scrap it, they get big losses. They had to do something with these losses that they have done.

Because economically the difference in logistics between, let's say we can take inland terminal somewhere in the center of Ukraine, it's like example. And the comparison of logistics to the new ports and then to Constanza with the barges or with the small tonnage vessels. And to compare logistics to port of Odessa and then to sending vessel to destination. So the logistics between these two ports was up to 50-60 dollars per ton difference. So of course the new ports were not efficient when the deep sea ports were open.

And first the big parcels, they were more efficient for exporters than just small barges. And of course less risks. Because if you have for example 10,000 tons to export through the new region, or okay no 10,000, 100,000 tons, you need 100 barges per one ton capacity. So it means that you still have threat with these drones, with rockets and the barges can be damaged. And it will take you much more time to spend in port and to export this capacity.

But in deep sea ports you can take two supramax and load it in one, two days and export and you have less risks. Less time and less money. It's more efficient. Even at our terminals I've implemented certain index system. What does it mean? That I gave to the traders some inputs for the sales that for our terminal due to for example such breakdown of the crops that you plan to sell and the destinations, we can operate efficiently if we will have for example 40 or 50 percent of panamax parcels, then 30-40% of Supermax parcels and less like Handys. For example, I had index for Panamax vessel. For Supermax I had index like 1.15.

What does it mean? For example, it takes me 24 hours to load Panamax. Let's say 63,000 tons in average due to limitations with the drafts. In order to load Supermax, it takes me more. I have these 24 hours to multiply 1.15. So it takes me 27 hours, almost 28, to load less cargo, to less Supermax parcels. So it also influences the efficiency of the terminal and of the supply chain.

Jonathan: Usually, what were the type of vessel you had the most? So was it mostly Panamax or was it mostly Handy?

Yuriy: It depends. I will tell about our terminal and about the market as well. At the terminal, up to 50% Panamaxes and even sometimes we were loaded vessels like Post Panamax, like Baby Cape. It was possible. Then let's say 30% Supra and 20% Handymax. Split more or less like this. If we will look at the market, I guess it's more or

less the same. Maybe 40% Panamax, 30% Supra and 30% Handymax. Because there were also small terminals that are working with Handymax. More or less like this.

Jonathan: Yes, it was not like mostly one type. It was really depending.

Yuriy: Yes, depending on the traders' book. Because it depends on the demand of the crops.

For example, for also what traders done, they done like combo vessels. For example:

- Two holes with barley,
- Five holes with sunflower meal or corn.
- Or sometimes they mixed at Supras two holes of corn, three holes of wheat.

So it depends on the contract.

Jonathan: It's interesting to understand more in detail how it worked. Because I visited the port in Tarragona. So I went there, visited the vessel. I was with port agents. So yes, I would say normal operation. It was interesting to understand how the terminal ran and everything. And then see what is added to this usual operation in the war. It's very interesting to understand all the difficulties that you have to run it normally or at least efficiently.

Yuriy: You know, it's a new challenge every day.

Jonathan: And you work there currently?

Yuriy: Yeah, up to this January. I was 50% in Switzerland, 50% in Ukraine at the terminals. And day by day operation. So I have managed five terminals. Not just one, but five of them. Also with sunflower oil. It was also a certain challenge. Also there is all the time there is when you have a lot of cargo at the terminal. There's the risk that you can lose it. Because we had a damaged terminal, sunflower oil terminal in Reni. It was damaged by the drones. In 2023 and there was sunflower oil in the tanks. And these tanks were damaged. Sunflower oil was flowing out from the tanks. Damaged and some oil was flowing out from the tanks. We were grading this oil in order to save as much as possible. Of course, the main thing here is the safety of the personnel and everybody has to go to shelter when the alarm sounded. It's the rule, it's obligatory. No changes could be done. Of course, the metal equipment could be repaired or changed, but the people live.

Jonathan: The shelters are directly in the port? The shelters are close to all the infrastructures?

Yuriy: Yes, there are several types of shelters. There are underground shelters, mostly they belong to state ports. It takes time to get there. We organized special buses that all the time are standby in order to bring people to the shelter. But at the moment, depending on the type of air alarm, for example, if it's a ballistic rocket and you do not have enough time to go to the shelter, we also invested, we like a terminal, like a private company, invested in small shelters, like mobile shelters. It's concrete models that are located at the most crowded places of the terminal in order for people to get fast to the shelter. And it gives a certain high level of safety.

Jonathan: But that was a private investment from the company.

Yuriy: It was like a need because the government did not help with this. And even the government did not help with repairing the damaged facilities. Because the budget is the war budget.

Jonathan: On the future, I don't know, do you see the future? Because now that Trump also arrived at power, he's saying he wants to broke a deal with Ukraine to stop the war. How do we see the operation going?

Yuriy: I cannot speak about politics because it's a tricky thing, it's politics. I can elaborate from terminals, from the market perspective.

What can we expect next year? Next year, it means next marketing year, next harvest. It will be 25/26 years. So the harvest will be more or less on the same level like this year. So it means that the competition on the market of exporters and terminals will remain pretty tough. And it will influence the whole supply chain, the economics of this supply chain. Of course, it can enhance due to lowering tariffs of transshipment. Because capacity of transshipment, they are at the moment over capacity. And many terminals, but less cargo. Already they are discussing the rates, transshipment rates for next season. More or less the same levels like today: 10, 11, and then the beginning and then decreasing in the second part of the year. Of course, it's good for the whole supply chain as the cost for transshipment will be less. And we can expect that maybe trucks, logistics also will not be so expensive. And it means that the grain could be more competitive on the global market. But anyway, we monitor that there are some new projects ongoing under construction for new terminals, and pretty big terminals in Pivdenny. There is a project also designed in Chernomorsk. Also, there are certain facilities that can be developed in the port of Odessa.

But the point is that if or not if when the Nikolaev ports will be open, there will be additional capacity for handling, but the grain will not increase volumes so fast as the terminals.

Jonathan: So more capacity but still the same amount of grain.

Yuriy: But also it will enhance competition in the terminals. The efficiency will be strategic. I mean your operational efficiency will be your strategy. You will have to monitor your costs very detailed. Like each cent of your cost per ton should be under control. And those who will provide good service, efficient service and added value will benefit from this. Because still they will have margin. It will not be high margins like before, but still there is margin in this business.

Jonathan: So it might even change the players.

Yuriy: It could be because not everybody can survive and could handle this competition.

Today we see that some small players that were investing in some projects at 2023-2024, there was a certain financial model that was working. Even when you have cost of handling at 8 or 9 dollars per ton but higher transshipment rate, you had margin. But now when the transshipment rate is 8 to 7 and you have just cost of transshipment 8 to 9, you are already in the negative here. And there are certain facts that terminals were merged by big players or went bankrupt.

Jonathan: On insurance. So there was a lot of insurers I think we tried from the black sea market due to the war risk. Was it still not easy but was it still possible to contract insurance for a vessel without huge excessive premium or was it really as everything almost it skyrocketed?

Yuriy: No, there were no any exclusive proposals to somebody. So there was a market. Everybody were playing with the same rules. So whether you go and take these rules or whether you just take your risks by yourself. But depending on the shipowner policy and most of shipowners they required to have this insurance. Some operators that have their own vessels they decided whether to have insurance additional or not.

And even we with our vessels sometimes especially with bulkers, sometimes we didn't took insurance because it's our own vessel and we took the risk. But mostly people who charter vessels, who do not have their own of course they had to.

Jonathan: But yeah some people still take the risk to go through the channel bearing the risk of impact on the vessel.

Yuriy: But for example it's companies who own the grain who own the terminal and own the vessel. So they have all whole supply chain under control and they just on the risk decide whether to have insurance or not. And then sometimes realize okay this week there is less drones, less rockets, no vessels were hit. Okay it's safe. Let's go without insurance.

And then there were periods when three or four days, day by day, there were attacks for ports, for Odessa, Chernomorsk, and the vessels were damaged. The insurance rose up. And people started not to think about whether to take insurance or not.

Jonathan: So it's all the time depending on the situation. It's really a day-to-day observation and management of the situation.

Yuriy: Yes exactly

Jonathan: Alright, thank you very much.

Yuriy: You're welcome

Discussion report - Respondent B and C

Interviewees: Head of Market Research for a shipbroking firm and Shipbroker – Panamax desk

Date: 02.06.2025

Format: Informal discussion (notes only, no recording, for confidentiality reasons)

Summary compiled by: Jonathan Carrard

Maritime dynamics linked to exports

Circumventing the origin of cargoes

Speakers referred to practices aimed at modifying the origin of cargoes in order to circumvent sanctions or import restrictions.

One striking example is Russian shipments recertified as Turkish after processing or blending, either by passing through a flour mill or by blending with other batches. These techniques make it possible to blur the traceability of origin and reintegrate certain volumes into international markets.

Fleet mobilised in the Black Sea

It has been observed that many older vessels have been assigned to operations in the Black Sea. Some were initially intended for scrapping but were temporarily “resurrected” to operate in this high-risk area, because of the attractive freight rates and special insurance conditions.

According to experts, some shipowners saw this situation as a speculative opportunity: if the ship was hit or sunk, the insurance compensation (war risk cover) could prove more lucrative than its demolition value.

This strategy is made possible by the existence of specialised war zone insurance, provided that the ships are covered.

Insurance premium (war premium)

Shipments from Ukrainian ports have been subject to very high insurance premiums, particularly in 2022, when the risks associated with drone attacks or sea mines were highest.

This situation has limited the appetite of traditional shipowners, making way for more risk-tolerant operators, often based in Greece, China or jurisdictions with less regulatory exposure.

Alternative inland logistics

At the same time, a shift in logistics has taken place towards rail and road, particularly via neighboring countries (Romania, Poland, Slovakia, Hungary).

This enabled a certain flow of Ukrainian grain to be maintained towards Central Europe and the ports of Constanta and Gdansk, although capacity remained limited by the gauge of the rails, saturation of the hubs and higher costs.

Gradual withdrawal of certain exporters

At the start of the conflict, many exporters were still bound by forward contracts signed before the escalation. They therefore continued to ship despite the risks, in order to honour their contractual commitments. Once these obligations had been met, several major trading houses withdrew partially or totally from the Ukrainian market, due to the uncertain operating environment, political risks and prohibitive costs.

Situation on the world maize market

Speakers pointed out that Ukraine now plays a much more marginal role on the world maize market, in contrast to its dominant position in wheat or sunflower oil. There are several reasons for this decline:

China, the main buyer of Ukrainian maize before the war, has drastically reduced its purchases. This fall is attributed to several factors:

- Import volumes in 2021/22, which filled strategic stocks
- A fall in animal feed requirements, linked to the reduction in pig and poultry production
- A revised logistics strategy, focused on flexibility.

- New Chinese supply strategy:

Experts have highlighted a structural change in Chinese supply strategy. China prefers to build storage capacity directly in producer countries, such as Brazil, in order to secure access to volumes without relying on an immediate logistical flow.

This ability to store locally means that China can choose the final destination of shipments at any time, depending on its internal needs or commercial opportunities.

As well as being logically independent of geopolitically sensitive areas (such as the Black Sea), this approach gives Beijing a major competitive advantage in terms of timing and negotiating power.

- Growing competition from South American producers:

Brazil's harvest is up sharply, while Argentina has emerged from a period of drought, with good prospects for the coming season.

These two countries are also benefiting from currency competitiveness: the depreciation of the Brazilian real and the Argentine peso makes their grain particularly attractive for export.

- Persistent logistical constraints on the Ukrainian side:

Even with the partial opening of alternative corridors (Humanitarian Corridor, Danube, Constanta), the volumes exported by Ukraine remain logistically more complex to organise than those from South America, whose port infrastructure is better integrated into global logistics chains.

In short, the combination of the loss of the Chinese customer, the rise of competition from South America and the structural risks linked to the war has led to a form of marginalisation for Ukraine on the maize market, although it remains a major residual player.

Discussion report - Respondent D

Interviewee: Senior Trader – Grain Desk

Date: 18.06.2025

Position: Senior Trader at a major grain trading desk

Format: Informal interview (notes only, no recording, for confidentiality reasons)

Summary compiled by: Jonathan Carrard

Trading Desk Structure and Operations

The interviewee described the **typical workflow of a grain trading desk**, highlighting a three-part value chain:

- **Origination:** Sourcing from production regions, including Ukraine.
- **Central Desk Coordination:** Managing pricing, logistics, insurance, and documentation.
- **Destination Markets:** Such as Japan, Vietnam, Korea, and China.

Before the war in Ukraine, trades were frequently conducted buying FOB (Free On Board) from Ukrainian ports and selling CFR or CIF (Cost and Freight / Cost, Insurance, and Freight) to destination clients.

Pricing premiums and risk allocation

Since February 2022, shipping Ukrainian grain has involved notable price adjustments and risk premiums, especially compared to alternative Black Sea ports such as Constanța. Key figures included:

- FOB Ukraine cargoes priced +4–5 USD/mt higher than Constanța equivalents.
- Marine war insurance premiums added roughly +1–2 USD/mt.
- Cargo insurance costs also increased, by +1–2 USD/mt.

Total additional premiums: Approx. +6–9 USD/mt for Ukrainian shipments.

In contrast to major international trading houses that favor well-structured risk management, back-to-back sales (FOB/CFR-CIF arbitrage), local companies could accept more risk as they also controlled upstream supply chain (e.g., origination, quality, inland logistics) and benefited from potentially higher margins and greater control.

Vessel age and port restrictions

He also acknowledged that the average age of vessels used in Ukrainian grain exports increased. The reluctance of shipping companies to enter the region with recent and costly vessels left a market space for older tonnage, operated by smaller or regional players.

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
How were these cargoes exported?
How were operations managed in port and at sea?

While major trading houses typically apply strict vetting policies, especially in regard to safety, compliance, and insurance eligibility, these requirements limit their flexibility. But as the trade shifted from FOB to CFR/CIF, trading house were not responsible for nominating the vessel anymore. As a result, most of the aged vessels operating out of Ukraine were chartered by local or smaller entities, which accept more risk in exchange for continued market access.

The trader emphasized that older vessels (+20 years) face challenges:

- Overage premiums are applied by insurers.
- Certain ports such as Rotterdam refuse overage vessels, impacting route planning and chartering decisions.

Role of the BSGI and NOR Practices post-BSGI

The Black Sea Grain Initiative (BSGI) was described as having been used first as an evacuation corridor in order to get stocks out of conflict areas.

Notices of Readiness (NOR) during FOB purchases from Ukraine were often declared at Sulina, outside Ukrainian waters, during the Unilateral Grain Corridor.

Market dynamics: China and activity outlook

When asked about the drop in Chinese demand, The interviewee mentioned that there were no specific trade disruption or geopolitical driver. He attributed it to:

- Strong domestic harvests in China.
- Pre-existing stocks accumulated in earlier periods.

Regarding future flows from Ukraine, the trader noted that the minimum activity seems to have been already reached. His view is that:

"It will either remain at this reduced level or rebound modestly, depending on regional stability and buyer confidence."

Appendix 2 – Table of Ukrainian exports

Ukrainian Exports (Wheat and Meslin, Corn, Barley)					
Destination	2021	2022	2023	2024	Grand Total
Albania	14 632	19 378	42 330	29 408	105 748
Algeria	570 840	644 620	41 131	1 496 590	2 753 182
Angola	44 000		18 640	467	63 106
Austria	323	75 182	107 187	62 331	245 022
Bangladesh	849 370	323 596	909 082	1 098 041	3 180 090
Belarus	9 930	4 603			14 533
Belgium	633 908	217 886	178 384	557 662	1 587 840
Bulgaria	473	43 654	12 799	46 493	103 419
Cameroon	36 800	18 850			55 650
China	10 799 988	4 606 415	5 813 534	4 769 754	25 989 691
Colombia	14 396				14 396
Cote d'Ivoire	18 200		37 424		55 624
Croatia	84	34 728	98 689	5 460	138 962
Cyprus	94 140	192 451	449 108	523 042	1 258 741
Czech Republic	10 127	36 716	37 586	30 720	115 150
Denmark	3 500	426	14 133	15 716	33 775
Djibouti	193 749	65 648	30 240	3 650	293 288
Egypt	5 547 410	2 132 753	4 022 648	5 254 019	16 956 831
Eritrea	33 000				33 000
Estonia	483	40 900	63 415	3 806	108 604
Ethiopia	607 029	162 652	60 000		829 681
France	98	3 832	25 869	9 730	39 529
Georgia	270	8 045	1 956	30	10 300
Germany	176 307	524 667	745 604	705 612	2 152 190
Ghana	40 018	8 000			48 018
Greece	49 353	327 731	526 400	618 017	1 521 501
Hong Kong	2 265			60 095	62 360
Hungary	17 526	1 576 277	702 964	7 689	2 304 456
India			15 110	549 184	564 294
Indonesia	3 067 473	379 917	663 586	2 515 617	6 626 593
Iran	2 034 592	606 757			2 641 349
Iraq	456 138	15 430	107 495	257 375	836 438
Ireland	296 057	161 100	61 766	324 922	843 845
Israel	1 153 682	689 966	900 668	1 490 468	4 234 784

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.

How were these cargoes exported?

How were operations managed in port and at sea?

Italy	1 025 274	1 834 443	3 088 771	3 610 364	9 558 852
Japan	109 176	300	56 128	66 240	231 844
Jordan	313 651	11 269	25 536	221 558	572 014
Kenya	353 290	77 785	224 369		655 445
Latvia	6 419	19 283	64 591	11 622	101 915
Lebanon	936 028	708 317	734 850	1 135 021	3 514 216
Libya	1 407 428	787 123	383 680	1 118 132	3 696 364
Lithuania	28 778	258 996	149 779	21 857	459 410
Madagascar	32 730				32 730
Malawi				15 522	15 522
Malaysia	42 143	2 330	74 179	218 509	337 162
Malta		26 668	237 384	162 267	426 319
Marshall Islands		19 706		6 705	26 411
Mauritania	183 773			235	184 007
Mexico	190 408	339			190 748
Moldova	1 323	112 517	21 608	1 582	137 030
Morocco	992 571	98 492	6 829	339 609	1 437 500
Mozambique	63 008			7 506	70 514
Myanmar	31 206				31 206
Netherlands	2 318 928	1 423 522	1 916 697	3 115 396	8 774 543
Nigeria	348 119			30 066	378 185
Norway	1 625	1 298	672	22 211	25 806
Oman	491 813	54 250			546 063
Pakistan	1 344 223	279 449	265 366	559 337	2 448 374
Philippines	412 882	1 526	68 551	30 993	513 951
Poland	9 303	2 724 812	913 972	32 917	3 681 004
Portugal	648 279	330 295	935 733	873 704	2 788 010
Qatar	544		241	60 028	60 812
Romania	526	5 525 289	5 396 732	66 582	10 989 129
Saudi Arabia	1 084 940	176 032	201 459	195 426	1 657 857
Senegal	18 000				18 000
Singapore			40 493	6 255	46 748
Slovakia	477	486 812	283 414		770 703
Slovenia		9 696	16 324	608	26 629
Somalia	43 992	83 800			127 792
South Korea	835 082	772 222	288 163	868 304	2 763 771
Spain	2 668 631	4 326 044	8 333 193	11 323 481	26 651 349
Sri Lanka	104 521	572	104 430	13 771	223 293
Sudan	53 237	119 240			172 477
Switzerland	11 328	80 839	128 508	50 719	271 394
Syria	11 980	826	1 311	6 109	20 225
Taiwan	72 311	522			72 833

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
How were these cargoes exported?
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Tanzania	113 595	49 251			162 846
Thailand	354 543	8 769	131 889	802 878	1 298 080
Tunisia	1 267 364	583 162	762 196	1 670 107	4 282 830
Turkey	3 768 251	3 948 321	3 244 075	4 364 582	15 325 229
Uganda	46 104	71 141	94 519		211 764
United Arab Emirates	91 922	8 494	108 246	160 627	369 289
United Kingdom	625 004	157 097	91 000	205 202	1 078 303
United States	3	9 309	19 396	28	28 736
Vietnam	278 564	123 018	349 860	1 404 213	2 155 655
Yemen	796 808	303 934	107 304	416 898	1 624 943
Others (20 countries with total imports inferior to 10,000 tons each)	16 926	4 926	7 105	20 556	49 513
Grand Total	50 333 195	38 544 218	44 566 296	53 673 625	187 117 333

Impact of the Russian-Ukrainian war on grain exports, port and maritime operations.
How were these cargoes exported?
How were operations managed in port and at sea?