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Root Cause Analysis (RCA) Of Global Wheat Price Volatility: A Study Of Influential Factors Amidst The 2022 Russia-Ukraine Conflict

Aditya Kumara [1]; Amarulla Octavian [2]; Yoedhi Swastanto [3]; Rudi Laksmono [4]
[1,2,3,4] Indonesia Defence University
Email: [1] aditya_idnavy@yahoo.com ;[2] waka.brin@gmail.com ;[3] yoedhiswastanto83@gmail.com
[4] rlwidayatno@gmail.com

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ABSTRACT

The 2022 Russia-Ukraine conflict triggered significant disruptions to global food stability. As wheat producers accounting for 34.1% of the world's supply, the conflict caused prices to surge to $1400 per ton in March 2022, up from a previous average of $800–$900 per ton. The most severe impact was felt in the heavily import-dependent Middle East and North Africa (MENA) region, affecting countries such as Somalia (100%), Egypt (84%), and Sudan (75%).This research utilizes Root Cause Analysis (RCA) based on a literature review to identify the root causes of the crisis. The findings point to three primary factors: export restrictions (the Black Sea blockade), damage to agricultural infrastructure, and a reduction in human resources. Recommended solutions include diversifying food sources, establishing strategic reserves, and strengthening domestic food security. These findings underscore the need for a structural approach, rather than merely short-term mitigation, in confronting global food crises.

INTRODUCTION

On February 24, 2022, Russia launched a special military operation in Ukraine, creating deep geopolitical tensions and raising concerns worldwide. This military operation triggered a harsh international response and a series of events that affected global stability (Anshori, 2022). One of the most notable disruptions to global stability was the impact on global food security (Ben Hassen & El Bilali, 2022). This is logical, as food is a primary necessity and a fundamental aspect of life for both individuals and nations (Dewanti, 2018).

The food sector affected by the conflict includes various commodities, one of which is wheat. The disruption to this commodity caused a significant 41% increase in wheat prices (Mottaleb & Govindan, 2023). This price hike was due to the obstruction of Ukraine's agricultural sector in producing wheat and the trade restrictions imposed on Russia as a result of the conflict. The agricultural sector is a key element in the food supply, especially for achieving food

security. Climate change, damage to agricultural infrastructure, land conversion, and declining agricultural production are threats to the agricultural sector that can lead to a food crisis (Hidayana et al., 2021).

Russia and Ukraine, as wheat-producing countries that contribute 34.1% of the global wheat supply, have created a dependency for various nations, particularly many countries in the Middle East and North Africa (MENA) (Thusi & Lambbo, 2023). These countries include Somalia, Egypt, Sudan, and Yemen (Abay et al., 2023). Simultaneously, this conflict occurred at a time when global food prices were already high due to supply chain disruptions caused by the COVID-19 pandemic, high global demand, and poor harvests in several countries (Martinho et al., 2022).

Based on the issues above, an in-depth analysis is needed regarding the main factors affecting the disruption of food security, specifically for wheat, due to the conflict between Russia and Ukraine in 2022. This is important because understanding the primary factors causing the rise in wheat prices can serve as a strong foundation for mitigation efforts. By identifying the root causes of a problem, mitigation efforts can be focused on critical aspects, minimizing long-term impacts, and preventing similar issues from arising in the future. This is reinforced by the Root Cause Analysis (RCA) theory, which states that through analyzing root causes, preventive measures can be targeted at the underlying structural and process improvements.

RCA is a process for discovering the root causes of problems to identify appropriate solutions. RCA assumes that systematically preventing and resolving underlying issues is more effective than treating symptoms on an ad hoc basis. Root cause analysis can be performed with a number of principles, techniques, and methodologies to identify the root causes of an event or trend. By looking beyond superficial cause and effect, RCA can show where processes or systems failed or caused the problem in the first place. This analysis involves five stages: define the problem, collect data, identify causal factors, identify root causes, and implement solutions (Stretton, 2021).

Various previous studies have discussed the impact of the Russia-Ukraine conflict on global food from a trade and macroeconomic perspective (Ben Hassen & El Bilali, 2022; Nasir et al., 2022). This research is different because it uses an RCA approach to the 2022 global wheat crisis, which is rarely applied in food security studies. With RCA, this study maps the root causes across multiple levels (trade, logistics, infrastructure, and labor) and provides multi-level policy recommendations (global, national, and local) that can be used as a basis for policy mitigation. This serves as an original contribution that enriches the literature on global food security.

LITERATUR REVIEW

The conflict that began on February 24, 2022, when Russia launched a military operation in Ukraine, has created deep geopolitical tensions and triggered various international responses affecting global stability. One of the most significant disruptions has been to global food security. This is understandable, as food is a primary necessity and a fundamental aspect of life for both individuals and nations. This conflict occurred when global food prices were already high due to supply chain disruptions from the COVID-19 pandemic, high global demand, and poor harvests in several countries. The affected food sector includes various commodities, one of which is wheat. Russia and Ukraine are major wheat producers, collectively accounting for 34.1% of the global wheat supply, creating dependency for many nations, particularly in the Middle East and North Africa (MENA) region. The disruption to this commodity caused a significant 41% increase in wheat prices. This price hike was due to the obstruction of Ukraine's agricultural sector in producing wheat and the trade restrictions imposed on Russia as a result of the conflict. The most severe impact was felt by heavily import-dependent countries such as Somalia (100%), Egypt (84%), and Sudan (75%).

To understand the main factors influencing this crisis, an in-depth analysis is necessary. Root Cause Analysis (RCA) is a process used to discover the fundamental causes of a problem to identify appropriate solutions. RCA is based on the assumption that systematically preventing and resolving underlying issues is more effective than merely treating the symptoms on an ad hoc basis. By looking beyond superficial cause and effect, RCA can reveal where processes or systems failed or caused the problem in the first place. According to Stretton (2021), this analysis involves five main stages: defining the problem, collecting data, identifying causal factors, identifying root causes, and implementing solutions. This theory asserts that through root cause analysis, preventive measures can be targeted at underlying structural and process improvements.

Various previous studies have discussed the impact of the Russia-Ukraine conflict on global food from a trade and macroeconomic perspective. However, this research offers a different approach by applying the RCA method to the 2022 global wheat crisis, an approach rarely used in food security studies. Through RCA, this research aims to map the root causes of the crisis across multiple levels—from trade, logistics, and infrastructure to labor. Consequently, this study can provide multi-level policy recommendations (global, national, and local) that can serve as a basis for policy mitigation, representing an original contribution that enriches the literature on global food security.

METHODS

This research uses a qualitative research method by conducting a literature study on the five stages required to perform RCA. As stated by Moleong in 2018, the interpretation of phenomena can be explained using various methods, but one that provides an in-depth interpretation is the qualitative research method. By applying the RCA approach to a qualitative method, the researchers hope to dissect the phenomenon more deeply through the collaboration between the literature study and analytical techniques.

RESULTS

Define Problem

The problem of rising food prices is inseparable from disruptions in the global supply chain, the closure of transportation routes, and export restrictions that impact global food security (Santeramo & Kang, 2022). From March to May 2022, the global average prices of wheat, soybeans, and corn increased dramatically compared to during and before the COVID-19 pandemic. This poses a threat to global food security, especially for low-income countries that are heavily dependent on food imports from Ukraine (Nasir et al., 2022). Although there is significant variation across countries regarding the numbers affected, the results confirm the adverse impact of the food crisis caused by the conflict, with a total of 27.2 million people falling into poverty and 22.3 million more into hunger (Arndt et al., 2023).

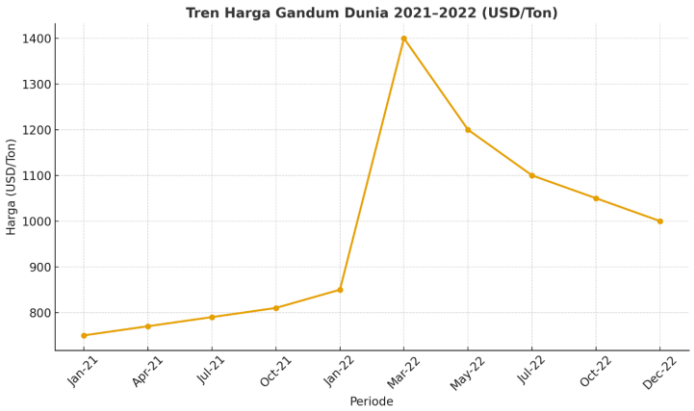
This increase in food prices has also disrupted the achievement of the Sustainable Development Goals (SDGs) in the affected countries (Pereira et al., 2022). Furthermore, the rise in food prices has triggered food price spikes, economic pressure, and social stress in most parts of Africa, with a tendency to incite political upheaval, especially in volatile nations. This has the potential to become a global crisis if not addressed promptly (Sokan-Adeaga et al., 2023). In line with Adeaga, Pappalardo et al. argue similarly that food insecurity, in turn, can trigger, amplify, or sustain violent conflict. Food insecurity can be a determining factor in increasing social dissatisfaction, combined with threats to livelihoods, socioeconomic inequality, and political marginalization. This creates a mutually reinforcing cycle of violence and hunger. Food insecurity can also compel more people, especially the poorest and most vulnerable, to become involved in

conflict and cycles of violence. Conflict and hunger are interconnected, and the impacts of the conflict will reverberate across all continents in a globalized world (Pappalardo et al., 2023).

Collect Data

According to the Food and Agriculture Organization (FAO), the number of undernourished people worldwide increased from around 630 million in 2014 to between 720 and 811 million in 2020. The main factors for this increase were conflict, climate-related shocks, and economic slowdowns due to the COVID-19 pandemic (Pappalardo et al., 2023). The FAO also estimated that the wheat export deficit from Ukraine due to the conflict would increase international wheat prices by between 8.75% (moderate scenario) and 21.5% (severe scenario) in 2022/23 (Dara et al., 2023). Indeed, after the conflict began, the world price of wheat surged to 1400 USD/Ton in March 2022, having previously ranged between 800-900 USD/Ton (Novotná et al., 2023).

Figure 1. Global Wheat Price Trend, 2021–2022 (Source: FAO (2023), Novotná et al. (2023)



This increase certainly has a significant impact on low-income countries that are highly dependent on wheat imports from Ukraine, such as Somalia with 100% dependence, Sudan with 75% dependence, and Yemen with 47% dependence. This is exacerbated by the decline in food crop production volume in Africa in 2022, which will lead to an increase in food crop imports due to population growth and extreme climate events (Santeramo & Kang, 2022). Therefore, hunger, poverty, malnutrition, and unstable food systems are some of the social challenges faced by countries on the African continent. These difficulties are caused by an inability to cope with external shocks such as poor economic growth and widespread conflict. Furthermore, the growing dependence on Ukraine and Russia for essential supplies like wheat has worsened the food insecurity crisis in Africa (Thusi & Mlambo, 2023).

Table 1. MENA Countries' Dependence on Russian & Ukrainian Wheat Imports

Country	Dependence on Russia (%)	Dependence on Ukraine (%)	Total (%)
Somalia	0	100	100
Sudan	55	20	75
Yemen	30	17	47
Egypt	62	22	84

(Source: Abay et al. (2023); Thusi & Mlambo (2023)

Identify Causal Factors

The factors causing the disruption of the wheat supply are linked to several issues, including the restriction of export routes, damage to agricultural infrastructure, and a reduction in the workforce.

Regarding the restriction of export routes, more than 300 ships were banned from passing through the Black Sea in March 2022, shortly after the conflict began. This disrupted the logistical transport routes for wheat from Ukraine to importing countries (Polish Economy Institute, 2022). Although the Black Sea Grain Initiative was agreed upon in August 2022, Russia later reinstated the blockade and canceled the agreement. As a result, Ukraine could only export wheat to neighboring countries like Romania via the Danube River (Horton & Ahmedzade, 2023). Consequently, Ukraine's grain exports plummeted by more than 30 percent, impacting the wheat supply for MENA countries.

In terms of infrastructure damage, the supply disruption is tied to production capacity. The conflict has resulted in the destruction of various facilities in Ukraine. According to a study by the Kyiv School of Economics, the special military operation conducted by Russia has caused $4.29 billion in damage to Ukraine's agricultural sector, which is almost 15% of the total capital invested in the sector. This figure is expected to rise as Russia's attacks on Ukraine continue, with estimated damages potentially reaching 50% (Kyiv School of Economics, 2022). Furthermore, a 2023 study by the Kyiv School of Economics stated that the wheat sector's output was already more than 39% lower than before the conflict (Kyiv School of Economics, 2023). This is due to damage to agricultural infrastructure, including water irrigation systems, contamination of air and farmland, and the destruction of wheat storage facilities (Wojtan, 2023).

Regarding the reduction of the agricultural workforce, the uncertainty about the conflict's end has caused many farmers in Ukraine to not engage in farming activities to their full potential. The uncertain situation makes farmers reluctant to invest in planting and maintaining food crops. Additionally, the evacuation of residents from conflict-affected areas has reduced the number of available agricultural workers. Concurrently, many farmers have been forced to abandon their fields due to high security threats, resulting in neglected farmland. According to the FAO and the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) in 2023, the impact of the 2022 Russia-Ukraine conflict has led to a drastic decline in farmer participation. Much of the farmland is not optimally managed, and a large number of farmers have lost access to agricultural resources such as seeds, fertilizers, and equipment (FAO, 2023).

Figure 2. RCA (Fishbone) Diagram of the Global Wheat Crisis

Identify Root Causes

Based on similar events in the past, especially during the crises of 2007-2008 and 2010-2011, the simplest and best approach is to let the market function by eliminating distortions and supporting the most vulnerable countries and households through international networks. However, the current crisis poses a direct humanitarian challenge, particularly as the international community is more focused on securing itself by imposing export restrictions. In reality, it is crucial for governments and international institutions to act in a coordinated and swift manner to provide assistance to the most affected countries and individuals (Perbawa, 2022).

Implement Solution

Practical solutions to maintain food security and strengthen the food system include increasing food aid, ensuring a stable supply of fertilizer, imposing energy price caps, providing support for farmers, shifting to renewable energy sources for agriculture, changing individual behavior regarding food consumption, removing trade restrictions, and ensuring political stability (Rabbi et al., 2023). However, the international community's response has been the opposite of this solution, with many countries restricting their food exports rather than voluntarily providing access to affected nations.

Therefore, affected countries must begin investing in large-scale agricultural and food productivity to reduce dependence on food imports and address food and nutrition insecurity caused by external shocks (Zarei et al., 2021). These countries must also diversify their resources, find relevant substitutes, and implement measures to stabilize their food supply in the short and long term (Zhang et al., 2023).

DISCUSSION

Several countries that successfully weathered the impact of the 2022 food crisis, caused by the conflict in Russia and Ukraine, were those with diversified food sources, strong food reserve policies, and good access to international markets to find alternative supplies. For example, countries like the United States, Canada, Australia, and Brazil had the capacity to increase production and exports to offset the supply shortfall from Russia and Ukraine. Additionally, Western European nations with solid trade infrastructure and broader access to the global market were able to cope better than countries directly dependent on food imports from Russia and Ukraine.

However, each country's specific situation depends on unique factors, including its food policies, domestic production capabilities, and international trade relations. This approach aligns with the economic concept of autarky, which refers to a condition where a country can meet its own economic needs without being heavily dependent on imports or interaction with other nations (Kartawinata, 2014). The points presented suggest that countries with diversified food sources, robust food reserve policies, and good access to international markets are more likely to survive a food crisis.

CONCLUSION

The food crisis triggered by the 2022 Russia-Ukraine conflict illustrates the complexity and wide-ranging impact on global food security. This research identifies three root causes of the global wheat crisis resulting from the conflict: export restrictions, infrastructure damage, and a reduction in the agricultural workforce. With the disruption of the wheat supply from major producing countries, this crisis highlights the urgency of diversifying food sources, implementing robust reserve policies, and securing access to alternative supplies. To address this, future recommendations include actions at the international level, such as encouraging the FAO, G20, and WTO to open permanent, barrier-free food pathways (grain corridors) and establishing a global food solidarity mechanism similar to COVAX for food. At the national level, countries should diversify wheat imports and establish strategic grain reserves sufficient for at least six months of consumption.

Locally, investment in agricultural productivity is crucial through subsidies for seeds, fertilizers, and water-saving technology alongside the promotion of food substitution programs (e.g., sorghum, corn, cassava) to reduce wheat dependency. Without such diversification and strong national food reserves, MENA countries will remain vulnerable to global geopolitical shocks. However, it must be acknowledged that these solutions face implementation limitations,

particularly within complex political, economic, and social contexts, thus requiring a strong commitment and close cooperation from all relevant stakeholders.

LIMITATION

This study has several limitations that should be acknowledged. The primary methodological limitation is that the research relies entirely on a qualitative literature review, meaning the analysis does not include primary data or in-depth quantitative analysis that could provide further empirical validation. Additionally, while the title refers to a global crisis, its geographical focus is heavily concentrated on countries in the Middle East and North Africa (MENA) region, which may limit the generalizability of the findings to other areas. Furthermore, the study acknowledges that the recommended solutions face significant implementation challenges due to the complexity of real-world political, economic, and social contexts. Finally, as the analysis is based on data and sources largely from 2022 and 2023, the dynamic and evolving nature of the Russia-Ukraine conflict may affect the long-term relevance of the study's findings and conclusions.

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