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GUIDELINES FOR RESILIENT FOOD SUPPLIES DURING CRISIS AND EMERGENCY SITUATIONS

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GUIDELINES FOR RESILIENT FOOD SUPPLIES DURING CRISIS AND EMERGENCY SITUATIONS

1. SETTING THE STAGE—COMPOUNDING SHOCKS TO FOOD SUPPLY

"One of the most striking images of the coronavirus pandemic is the contrast between farmers dumping milk, smashing eggs, and plowing vegetables back into the soil, and consumers facing empty store shelves and long lines at food distribution centers."[1]

In order to ensure the food security, nutrition, and livelihoods of millions of people, **food systems** must become more resilient to increasing shocks and stresses of diverse origins—biophysical, socioeconomic, and political—compounding upon each other.

Food systems are complex, involving primary production, food logistics supply chains, transport networks, and households—and include many interlinked actors and activities. The food logistics supply chain consists of a series of linked activities that occur while moving food from farm producers to consumers' plates. These activities thrive on logistics and transportation and involve a complex web of actors operating across the supply chain. The food logistics supply chain differs from some other supply chains in its requirement for careful temperature control to maintain the freshness of perishable food products along a cold chain, which adds to its complexity.

Shocks or stresses at any point of the supply chain can spread rapidly throughout systems and threaten the functioning of supply chains, the livelihoods of actors along the supply chain, and the food security and nutrition of consumers. Even before the COVID-19 pandemic, the world was not on track to meet the shared commitment to end global hunger and malnutrition in all its forms by 2030, and the pandemic has sent us even

[1] Julian Lampietti, Ghada El Abed, and Kateryna Schroeder, "Beyond the Pandemic: Harnessing the Digital Revolution to Set Food Systems on a Better Course," World Bank, 6 August 2020, https://www.worldbank.org/en/news/immersive-story/2020/08/06/beyond-the-pandemic-harnessing-the-digital-revolution-to-set-food-systems-on-a-better-course.

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further off track. This year's Global Report on Food Crises reported that global levels of hunger surpassed all previous records, with close to 193 million people acutely food insecure and in need of urgent assistance across 53 countries and territories.[2] Rising food prices in 2021 contributed to food insecurity, not only in low- and middle-income countries but in high-income countries as well.[3]

The Russia–Ukraine war is further aggravating food insecurity and increasing food prices globally. Russia and Ukraine are key agricultural players and together they export 34% of the world's wheat.[4] They are also major exporters of maize, barley, and sunflower oil. Agricultural products like wheat and oilseeds are ingredients for staple foods like bread and cooking oil, which are primary sources of calories for millions of people around the world—wheat is a staple food for over 35% of the world's population.[5] Several regions are highly dependent on imports from these two countries for their basic food supply. Russia and Ukraine combined supply over 50% of cereal imports in North Africa and the Middle East, and about 50 countries depend on the two countries for at least 30% of their wheat import needs.[6] It is estimated that up to 25 million tons of wheat will need to be substituted to meet worldwide food needs in the current and next seasons.[7]

The compounding effects of COVID-19, climate change, ongoing wars, political tensions, and trade restrictions are exacerbating the global food crisis, and urgent actions are needed to holistically strengthen the resilience and sustainability of food systems globally. Many countries are already facing multiple systemic shocks. In Tunisia, for example, the financial crisis compounded by the wheat crisis caused by the Russia–Ukraine war is crippling the country's food supply chain that is heavily reliant on imports, with Ukraine supplying over 40% of Tunisia's wheat. Even though the wheat supply is available from other countries, the inability to pay for cargo means significant delays in delivering food to the people of Tunisia. Moreover, the country only has the capacity to store three months of wheat supply.[8] In Afghanistan, the 22 June earthquake adds to the plight of the Afghan people who are already facing an unprecedented crisis following decades of conflict, severe droughts and floods, COVID-19, and an economic downturn. About 19 million people—that is half of the country's population—are facing acute hunger due to soaring food prices, crop losses to

[2] Global Network Against Food Crises, "2022 Global Report on Food Crises," 2022, https://www.fsinplatform.org/sites/default/files/resources/files/GRFC%202022%20Final%20Report.pdf.

[3] Katherine Kent et al., "The Impact of the COVID-19 Pandemic on Rural Food Security in High Income Countries: A Systematic Literature Review," *International Journal of Environmental Research and Public Health*, vol. 19, no. 6 (2022), https://www.mdpi.com/1660-4601/19/6/3235/htm.

[4] European Parliament, "Russia's war on Ukraine: Impact on food security and EU response," April 2022, https://www.europarl.europa.eu/RegData/etudes/ATAG/2022/729367/EPRS_ATA(2022)729367_EN.pdf.

[5] World Bank, "The Impact of the War in Ukraine on Food Security: World Bank Expert Answers," 5 April 2022, https://www.worldbank.org/en/news/video/2022/04/05/the-impact-of-the-war-in-ukraine-on-food-security-world-bank-expert-answers.

[6] FAO, "Global Food Markets and Prices," presentation made at the Extraordinary Meeting of the G7 Agriculture Ministers, 11 March 2022, https://www.fao.org/3/cb9014en/cb9014en.pdf.

[7] European Parliament, "Russia's war on Ukraine: Impact on food security and EU response," April 2022, https://www.europarl.europa.eu/RegData/etudes/ATAG/2022/729367/EPRS_ATA(2022)729367_EN.pdf.

[8] Arianna Poletti, "Ukraine's Wheat Shortage: The Final Blow to Tunisia's Crisis?" Italian Institute for International Political Studies, 23 April 2022, https://www.ispionline.it/en/pubblicazione/ukraines-wheat-shortage-final-blow-tunisias-crisis-34754; and Aida Delpuech, "Tunisia: 'Food crisis inevitable' as Ramadan begins," Middle East Eye, 4 April 2022, https://www.middleeasteye.net/news/tunisia-ramadan-food-crisis-inevitable.

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droughts and floods, high unemployment, and income losses during COVID-19, and breakdowns in food supply chains due to conflict.[9] Countries in East Africa, including Kenya, Ethiopia, Somalia, and South Sudan are also hit by the wheat crisis on top of severe drought and conflict.[10]

This paper is the third in a series of five papers on integrated multisector smart logistics. The first paper introduces the diverse players in the smart logistics ecosystem with case studies from some of the players on how they have contributed to and impacted the smart logistics ecosystem. The second paper proposes an integrated multisector smart logistics framework to address challenges and gaps in the smart logistics supply chain. This third paper focuses on the critical components of the food logistics supply chain and offers some good practices and guidelines for creating a resilient and sustainable food system that can withstand future crises and emergencies and ensure that nutritious and affordable food is available to all during normal times and crises.

During a crisis, response and emergency relief efforts are mobilized to save lives and assist those in need. About 73% of the spending on these relief efforts is logistics related.[11] The World Food Programme (WFP) operations, for instance, involve the daily use of 5600 trucks, 30 ships, and 100 planes in 2021 that must be available both for immediate deployment in an emergency and for supporting longer-term economic and social development in highly vulnerable communities.[12] Studies show that careful logistics preparedness can lead to response-time yield up to 7 dollars (USD) per dollar invested and reduce delivery lead times by between 16 and 38 days.[13]

Key challenges, however, include the increasing complexity of the food logistics supply chain with the increasing number of diverse players that need to be coordinated during emergencies, reaching the poorest and most vulnerable who usually live in remote hard-to-reach areas, linking smallholder farmers with urban and export markets, and the cumbersome processes of cross-border food trade and food safety checks delaying the delivery of food products.

Moreover, the types of challenges vary depending on income group, economic maturity, and the social and political context of countries. In the U.K., for example, labor availability is a key challenge that has been

[9] WFP, "WFP rapidly deploys food and logistics equipment to earthquake-hit eastern Afghanistan," 23 June 2022, https://www.wfp.org/news/wfp-rapidly-deploys-food-and-logistics-equipment-earthquake-hit-eastern-afghanistan; and Jamie Lutz and Jacob Kurtzer, "What the Taliban Takeover Means for Food Security in Afghanistan," Center for Strategic and International Studies, 27 September 2021, https://www.csis.org/analysis/what-taliban-takeover-means-food-security-afghanistan.
[10] Kaamil Ahmed, "Global food prices rise to highest ever levels after Russian invasion," The Guardian, 8 April 2022, https://www.theguardian.com/global-development/2022/apr/08/global-food-prices-rise-to-highest-ever-levels-after-russian-invasion-ukraine-wheat.
[11] World Economic Forum, "Supply Chains: Humanitarian and Health Supply Chains," https://intelligence.weforum.org/topics/a1Gb0000000pTDoEAM/key-issues/a1Gb00000015QNXEA2.
[12] WFP, "Logistics and Delivery Network," https://www.wfp.org/logistics-and-delivery-networks.
[13] Based on studies undertaken by HELP Logistics, Kuehne Logistics, ACF France, IFRC, Logistics Cluster, Save the Children International and UNICEF between 2017 and 2019.

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exacerbated by Brexit and the pandemic driving foreign workers away. The shortage of pickers, packers, processors, and truck drivers means that farmers and suppliers are often forced to leave their food produce rotting in the fields.[14] On the other hand, in many low-income countries, poor transport and logistics infrastructure, networks, and systems are the greater challenges. Digital technologies have helped address some of these diverse challenges and are discussed in Section 2.

2. INNOVATIONS ACROSS THE FOOD SUPPLY ECOSYSTEM

Starting at the farm, food systems are often dominated by intermediaries that create high transaction costs for smallholder farmers. In the wake of the pandemic, many governments and private operators fast-tracked the deployment of e-commerce and digital payment platforms that directly connected farm producers and buyers constrained by lockdowns. By reducing the need for intermediaries, smallholder farmers have been able to earn higher profits and incomes,[15] which in turn builds their resilience. There have also been positive reports of increased access to food for some rural populations through their access to online shopping, which was not available prior to the pandemic.[16]

However, building the e-commerce and digital payment platforms alone does not guarantee uptake and success—it must be accompanied by building trust and skills, and investing in a robust and reliable delivery and monitoring network enables the ordered food and groceries to reach buyers in a timely and safe manner. Farmers must also be connected to logistics service providers and hubs. Generally, transporting food from rural and dispersed farming areas to urban demand centers is often too costly, especially for refrigerated or frozen goods. Most small-scale farm producers lack the expertise, capital, or access to credit to acquire and use these logistics. Providing logistics-related support to these small-scale producers is important, especially since many consumers have enjoyed the convenience of e-commerce and home delivery during the pandemic.

[14] Richard Daniel and Pete Cooper, "UK labour shortage: 'It used to be easy to get fruit pickers'" BBC, 25 May 2022, https://www.bbc.com/news/uk-england-suffolk-61568286; and Jack Wright, "Vegetables are rotting in fields due to 'chronic' crop picker and driver shortage as recruitment bosses urge government to let in TEN TIMES more foreign workers to solve supply crisis," Daily Mail, 5 November 2021, https://www.dailymail.co.uk/news/article-10168619/Vegetables-left-rot-fields-chronic-crop-picker-driver-shortage.html.

[15] World Bank, *What's Cooking: Digital Transformation of the Agrifood System* (Washington, D.C., 2021), https://openknowledge.worldbank.org/handle/10986/35216.

[16] Katherine Kent et al., "The Impact of the COVID-19 Pandemic on Rural Food Security in High Income Countries: A Systematic Literature Review," *International Journal of Environmental Research and Public Health*, vol. 19, no. 6 (2022), https://www.mdpi.com/1660-4601/19/6/3235/htm.

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2.1. CONNECTING FARMERS TO ONLINE PLATFORMS

A GSMA study reveals that the most successful e-commerce businesses invest in more than a platform. They provide additional functions, such as farmer and buyer engagement, payments and logistics, quality control, and warehousing.[17] For example, the Indonesian e-commerce platform, TaniHub, manages logistics, complex warehousing and cold storage functions, marketing, as well as customer care, facilitates digital payments, and performs quality control at farms. This allows the company to ensure that produce is appropriately stored, packaged, and distributed, which introduces efficiencies and reduces postharvest waste.

In China, Alibaba's Taobao and Pinduoduo are two e-commerce platforms targeting farmers with support from China's Ministry of Commerce. Alibaba and Pinduoduo both adopted a holistic approach to engaging with farmers and other players in the logistics ecosystem.

Alibaba, an e-commerce giant, launched the Rural Taobao Programme in 2014 to help farmers increase their income by selling agricultural products directly to urban buyers online. Alibaba established e-commerce service networks in counties and villages and improved logistical connections for villages. It also provided training in e-commerce and entrepreneurship and offered rural financial services through Ant Financial, a subsidiary of Alibaba. The Rural Taobao Programme expanded rapidly, from 212 villages in 12 counties in 2014 to more than 30 000 villages in 1000 counties by 2018.[18]

Pinduoduo is another e-commerce giant that created a platform to connect rural producers with buyers. In addition, Pinduoduo partnered with universities in agrifood tech research and development and in developing industry standards for agrifood products, provided training to farmers in e-commerce, entrepreneurship, and online marketing, and invested in the improvement of cold-chain transportation and infrastructure to reduce delivery times.[19] Pinduoduo also helped farmers optimize their planting decisions by providing advice generated from its artificial intelligence capabilities that can effectively predict the demand for various types of fruit and make recommendations to farmers ahead of their planting and harvesting schedule.[20]

[17] GSMA, "Digital Agriculture Maps: 2020 State of the Sector in Low and Middle-Income Countries," September 2020, https://www.gsma.com/r/wp-content/uploads/2020/09/GSMA-Agritech-Digital-Agriculture-Maps.pdf.
[18] Brooklyn Quallen, "E-Commerce can End Rural Poverty in China," The Borgen Project, 29 April 2021, https://borgenproject.org/end-rural-poverty-in-china/.
[19] Pinduoduo, "Corporate Social Responsibility," https://m.pinduoduo.com/en/responsibility; Rita Liao, "Why Pinduoduo is putting all its profit into agriculture," Tech Crunch, 3 December 2021, https://techcrunch.com/2021/12/03/pinduoduo-puts-profit-into-agriculture/.
[20] Hao Liang and Cheah Sin Mei, "Pinduoduo: Empowering Farmers with an E-Commerce Platform," Singapore Management University, 18 November 2020, https://cmp.smu.edu.sg/ami/article/20201118/pinduoduo-empowering-farmers-e-commerce-platform.

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Besides strengthening the resilience of farmers and producers, these initiatives appear to be attracting young talents to the rural areas and are revitalizing the local agricultural industry.[21] In 2021, 11.2 million Chinese entrepreneurs and innovators returned to their hometowns, about 1.1 million more than in 2020—representing the largest and fastest growth in recent times. The trend also boosted local employment, further strengthening the overall resilience of populations.[22]

2.2. IMPROVING FOOD DELIVERY AND SUPPLY

Globally, around one-third of food produced for human consumption—that is about 1.3 billion tons—is either lost or wasted annually.[23] Although the largest source of food waste is in the production phase on farms, poor postharvest handling and storage are also major contributors, accounting for around 350 million tons of food lost or wasted annually.[24] An efficient and effective food logistics system plays an important role in addressing this critical challenge.

The last mile is the most costly and challenging segment of logistics operations. Depending on the context and the economic maturity of countries, last-mile challenges vary. Both high- and low-income countries often need to deal with problems related to congestion and delays at ports and terminals and on roads. However, low-income countries are more likely to face challenges related to the lack of access to roads, electricity, and addresses hampering the cold storage, delivery, and monitoring of products, while high-income countries tend to be more affected by labor shortages in the food and logistics sectors.

High-income countries such as the U.K. are also looking at shortening food supply chains and strengthening local food systems to overcome labor shortage challenges, which are also contributing to food loss and waste.[25]

The accelerated adoption of online and phone ordering during the pandemic led to a rapid rise in demand for last-mile food and grocery deliveries, which many startups quickly took on and developed solutions for.

[21] Pinduoduo, "Pinduoduo welcomes more than 126,000 young agricultural entrepreneurs," 5 January 2022, https://stories.pinduoduo-global.com/articles/pinduoduo-trains-more-than-126-000-young-new-farmers-in-boost-for-agriculture.
[22] Fan Shenggen and Guo Hongdong, "E-commerce boosts rural development," China Daily, 23 February 2022, https://global.chinadaily.com.cn/a/202202/23/WS62156e5da310cdd39bc88468.html.
[23] Carlos Munoz and Paul Anthem, "11 facts about food loss and waste – and how it links to sustainable food systems," WFP, 21 September 2021, https://www.wfp.org/stories/11-facts-about-food-loss-and-waste-and-how-it-links-sustainable-food-systems.
[24] The World Counts, "Food Waste Statistics," https://www.theworldcounts.com/challenges/people-and-poverty/hunger-and-obesity/food-waste-statistics.
[25] Katherine Kent et al., "The Impact of the COVID-19 Pandemic on Rural Food Security in High Income Countries: A Systematic Literature Review," *International Journal of Environmental Research and Public Health*, vol. 19, no. 6 (2022), https://www.mdpi.com/1660-4601/19/6/3235/htm.

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