SECURING FOOD FUTURES: IMPERATIVE OF DIPLOMACY IN STRENGTHENING SUPPLY CHAIN RESILIENCE

by

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Introduction

With an estimated 600 million cases of foodborne diseases and 420,000 deaths, with children under the age of five constituting 33 percent of deaths, food safety represents one of the most critical health challenges. It is also estimated that annually, low- and middle-income countries lose an estimated US$110 billion in productivity and healthcare costs due to unsafe food. According to the World Health Organization (WHO) and the Food and Agriculture Organization (FAO), food safety is the prevention and protection of food from all hazards that pose health risks to consumers. However, in the current globalized world, with food crossing multiple borders during its production, processing, distribution, and preparation to reach our plates, food safety encompasses systematic management of these supply chains. The contamination of food can take place at any of the stages of the supply chain through biological (bacteria, viruses, parasites, fungi), chemical (heavy metals and pesticides), and physical hazards (plastic). Ensuring the safety, quality, sustainability, and resilience of this flow requires deep scientific understanding and effective international coordination.

The science of food supply chains focuses on designing, managing, and optimizing the entire ecosystem that enables food production, processing, distribution, and consumption. Understanding the behaviour of foodborne pathogens under different environmental conditions is crucial for designing effective control strategies throughout the supply chain. On June 7, World Food Safety Day is commemorated, highlighting the importance of food safety in improving human health, economic development, and environmental sustainability. This year's theme of "Food Safety: Science in Action" provides an opportunity to reflect on the transformative power of science in not just detecting hazards but also developing resilient supply chains. With the global landscape of food safety being affected by issues of complex issues of climate change, anti-microbial resistance, varying regulatory and infrastructural standards, pandemics, and socio-political issues, global solidarity through scientific dialogue and diplomatic cooperation is the need of the hour.

Global Action and Challenges of Food Supply Chain

To address the complex and interconnected challenges of food safety and supply chain, a range of international institutions and platforms operate at the intersection of science, governance, and diplomacy. These bodies provide scientific guidance, harmonize standards, facilitate emergency responses, and enable technical cooperation across countries. The Codex Alimentarius Commission (CAC), which was jointly established by FAO and WHO, plays a foundational role in setting international food safety and quality standards by developing science-based guidelines and codes of practice to protect consumer health and ensure fair practices in global food trade. Additionally, established in 2004, the International Food Safety Authorities Network (INFOSAN) provides a real-time platform for global communication and cooperation during food safety emergencies linked to globally traded products.

One of the key instruments that provides a comprehensive framework for food safety management system is the International Organization for Standardization's ISO 22000. It provides a map for organizations to ensure all relevant food safety hazards are identified and adequately controlled. It complements the principles of Hazard Analysis Critical Control Point (HACCP), a management system that provides corrective measures to food safety concerns occurring from biological, chemical and physical hazards across the food supply chain. While such mechanisms are in place, their effective implementation at the national level must be ensured. Lack of harmonized standards, fragmented regulatory frameworks, and limited science-based coordination

mechanisms hamper supply chain resilience, exacerbate food insecurity, and economic losses. For instance, in Sub-Saharan Africa, due to misalignment with Codex guidelines, aflatoxin contamination in maize and groundnut was above accepted international standards, leading to export restrictions and economic losses.

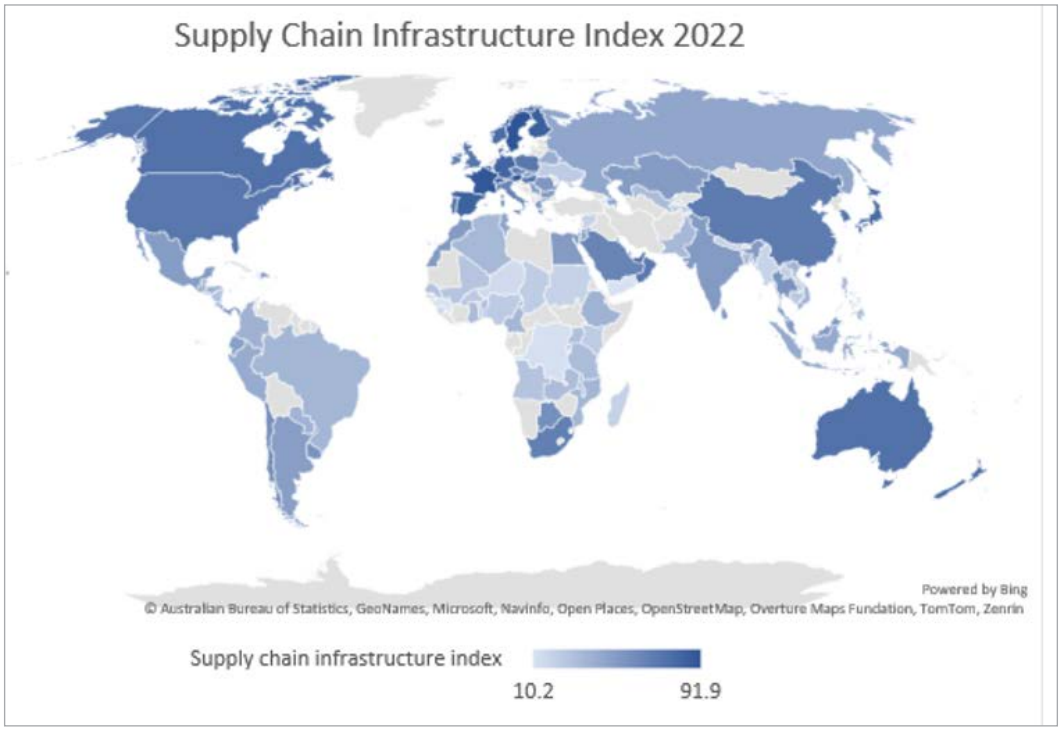
The management of food supply chains has been transformed in recent years with the incorporation of data-driven decision-making to increase inventory forecasting, risk assessment, contamination prevention, and waste reduction. Technologies such as blockchain, remote sensing, AI-based traceability, and precision agriculture optimize logistics and transparency. However, despite these advancements, a lack of supply chain infrastructure, ill-equipped laboratories, and fragmented data systems pose significant barriers to food safety among countries. It is estimated that due to lack of effective cold chain facilities, around 526 million tons of food is lost, costing the global economy estimated USD 936 billion a year. This situation is more acute in the Global South as indicated by the supply chain infrastructure index (Figure 1).

Building a resilient supply has become ever more important since the COVID-19 pandemic, which saw panic buying behaviour leading to food shortages on one hand and food suppliers unable to sell their products to restaurants due to lockdowns on the other.

For instance, in Bangladesh, the lockdowns put incredible pressure on the agri-food system, with the government launching a stimulus package of USD 59 million for businesses to keep running. Furthermore, climate-related supply chain disruptions have been ever more prevalent due to increased instances of extreme weathers affecting multiple stages of a supply chain.

In October 2024, Hurricane Milton had devastating effects on orange crops, infrastructure breakdowns, compromised cold chains, limited stock availability, leading to 42 percent surge in prices for orange juice in the U.S. and 25 percent increase in UK. Geopolitical conflicts accentuate the pressures on food supply chains as witnessed during the Russia–Ukraine conflict where globally, the wheat price increased by over 50 percent. Thus, the role of international

Figure 1: Supply Infrastructure Index 2022



cooperation and diplomacy becomes crucial in tackling the polycrisis situation that the world is currently navigating to build resilient food supply chains.

Diplomacy for Food Supply Chain Resilience

Diplomacy has emerged as a crucial enabler in enhancing food safety and supply chain resilience across the world highlighting the importance of transboundary cooperation and resource sharing. For instance, the India–UAE Food Security Corridor, developed under the South Asia–GCC–Africa Triangular Partnerships not only streamlines food trade but integrates advanced cold chain logistics, climate-resilient technologies, and agri-tech innovation, thereby demonstrating how diplomacy fosters equitable access to safe, nutritious food.

Similarly, the CGIAR's Transforming Agrifood Systems in South Asia (TAFSSA) initiative bridges science and policy by engaging with governments and civil society across India, Nepal, Bangladesh, and Pakistan. It promotes open data platforms, evidence-based policies, and gender-sensitive agricultural innovations, turning regional cooperation into a laboratory for scalable food system transformations. In 2024, the Global Food Regulators Summit was hosted in India with the vision of creating a global network, understanding compliance standards, sharing best practices, and experiences. This was in continuation of India's G20 Presidency in 2023 that advocated for action in Food, Fuel, and Fertilizers.

Regional diplomatic initiatives enhance joint investments in infrastructure, harmonize regulations, and build shared reserves to buffer against shocks. For instance, the Association of Southeast Asian Nations (ASEAN) established the ASEAN Plus Three Emergency Rice Reserve (APTERR), a diplomatic initiative that pools rice stocks from member-countries to provide rapid assistance during food crises. Conflict resolution using diplomacy for containing disruption of food supply chains was seen in the Russia-Ukraine conflict with the Black Grain Initiative signed between Russia, Turkey, and Ukraine to resume food and fertilizer exports and address the rising food prices. Multilateral platforms like the G7, G20, and BRICS, have also created food safety agreements for supply chain resilience. For instance, G20 Agricultural Ministers have issued joint declarations on strengthening food safety capacity in LMICs, while BRICS has explored regulatory harmonization, the establishment of the Agricultural Research Platform (ARP) for promoting research and development, and joint food testing protocols to ensure regional safety standards. Through these global and regional mechanisms, science diplomacy ensures that food safety is no longer siloed within borders but addressed collectively through data sharing, trust-building, and policy coherence.

Way Forward

While diplomatic collaboration and comprehensive standards is essential for strengthening food supply chains, countries must also adopt robust accountability and monitoring systems to ensure compliance with the safety legislation and regulations. To streamline the process, ESG (Environment, Social, Governance) frameworks offer a unified approach to strengthening food supply chains by embedding sustainability, equity, and accountability. A supply chain ESG can provide insights in how a company's activities can be aligned to reduce environmental impact, address social issues of workplace diversity and safe working conditions, and internal governance structuring to ensure standards, transparency and accountability.

For instance, Sweden in collaboration with the World Wide Fund for Nature (WWF) created The Swedish Roadmap for a Sustainable Food Supply Chain, which sets clear targets for energy efficiency, fossil-free transport, and reductions in climate footprint throughout the value chain which covers 80 percent of its food. The European Union (EU) with its Directive of 2022/2464 on Corporates Sustainable Reporting Directive (CSRD) makes it necessary for companies to disclose their ESG practices. Complementing this, the EU-funded TRUST-FOOD project provides training to business owners and employees to monitor, report, and verify ESG and SDG compliance through blockchain technology to

ensure right sourcing, environmental sustainability, and transparent governance.

The practice of ESG has also been adopted in developing countries like in Malawi, where the framework improved the banana supply chain's operational efficiency, alignment to sustainable goals, improved monitoring systems and resource optimization leading to shelf-life, reduced waste, higher product quality. Compared to fragmented approaches of inspection round, one time-supply chain audits, ESG provides a holistic, measurable structure that aligns business practices with regulatory objectives. With the food supply chains connecting producers, processors, distributors and consumers from across the globe, mainstreaming the ESG framework requires diplomatic efforts of harmonizing standards, enabling technology transfer, and fostering inclusive dialogue among all relevant stakeholders. ESG serves as a neutral and universally applicable framework that enables countries to collaborate on harmonizing food safety standards and regulatory practices without being bound by political or economic divisions. By aligning with approaches like Lifestyle for Environment (LiFE), ESG encourages responsible production and consumption patterns, fostering shared accountability and sustainable behaviour across borders

As global food systems face growing pressures from climate change, pandemics, and geopolitical shifts, building resilient, safe, and equitable supply chains is more urgent than ever. Diplomacy and the ESG framework together can ensure food safety and supply chain resilience become a global priority and shared responsibility in transforming food systems to deliver safe, sustainable, accessible and affordable food for all.

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