FOOD SAFETY MANAGEMENT SYSTEM: THE ROLE OF INTERNATIONAL LAW AND ITS EFFECTIVENESS

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ABSTRACT

The role of international law in international food safety management is crucial in assuring compliance within the global Food and Beverage (F&B) industry. This industry operates within a complex supply chains and diverse governing landscapes around the globe. In the context of food safety frameworks, international organisations such as the World Health Organisation (WHO), the Food and Agriculture Organisation (FAO) and the World Trade Organisation (WTO) have implemented wide-ranging of guidelines, treaties and agreements intended to ensure the harmonising food safety standards around the globe. The most notable standards are known as the Codex Alimentarius (Codex) and the Sanitary and Phytosanitary Measures (SPS Agreement). These standards have been successfully implemented in developed nations, subsequently enhanced the public confidence, improved health outcomes and strengthened trade regulations. However, in most developing nations, implementation often lack the technical expertise, facilities and financial resources. Furthermore, the non-binding nature of many international standards and the over reliance on national regulation mechanisms weaken their global effectiveness. Thus, the article suggests for stronger international cooperation, resource mobilisation and information exchange, particularly to support developing nations. This article further suggests to ensure compliance and accountability, where there is a need for the formation of binding international regulations and global food safety watchdog. The article in essence studies the relationship between international food safety standards and industry practices, exploring implementation challenges, struggle from industry stakeholders, and the capacity of international organisations to ensure obedience. Finally, it concludes by assessing whether current international frameworks are adequate to meet the growing food safety challenges worldwide.

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GLOBAL FOOD SAFETY GOVERNANCE

Food safety is an assurance that food will not cause any harm to human body when it is intended to prepare for human consumption. Food our essential for us to sustain and enjoy our daily live. Therefore, it is imperative to ensure that every food and drinks that we consumed are safe. Food that can cause harm may lead to hazardous implications, such as transmitting diseases and causing illness or death. Today, it is no surprise that foodborne illness is one of the most common contagious health problems in the world today and a significant cause of increasing health problems. Contaminated food also has downside implications at various levels of people. For example, at the individual and family levels, illnesses caused by unsafe food consumption may lead to increased healthcare expenditure, loss of income due chronic illness and, in the worst-case, it can lead to death.[1] As for the food manufacturers or producers, they also may suffer from losses, not only from product recalls but also from potential damage to their reputation and exposure to legal consequences.

The global food safety governance relies heavily on the establishment of international standards that serve to ensure harmonisation of safety measures across countries. These standards namely Codex Alimentarius (Codex) and Sanitary and Phytosanitary Measures (SPS Agreement) aim to guarantee that food produced globally is safe for human health and consumption while addressing the complexities of international trade. These frameworks created by the international organisations such as the FAO, WHO, and WTO provide not only the strategies for achieving food safety but also the instruments for encouraging international cooperation. However, while these frameworks are well-intentioned and reliable, their practical implementation and effectiveness remain subjects of ongoing question.

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[1] World Health Organization. Food Safety (No. EM/RC46/6). Geneva: World Health Organization, 1999. https://iris.who.int/bitstream/handle/10665/121784/em_RC46_6_en.pdf. Accessed January 20, 2025.

Moving forward, this article will briefly explore the historical and institutional contexts that shaped these frameworks, including the Codex, the SPS Agreement under the WTO, and the role of the FAO and WHO. It also explores into the objectives of these frameworks, which range from protecting public health to facilitating trade in equitable manner, and examines how these goals transform into real-world impact. By analysing the foundational principles and intended objectives of these standards, this section provides a baseline for understanding the application and effectiveness of global food safety.

CODEX ALIMENTARIUS (CODEX)

The Codex represents one of the most successful international efforts to establish harmonised food safety standards globally. It was created in 1963 by the FAO and WHO, determined by the increasing globalisation of food trade and the associated risks of contradictory national standards around the world.[2] Its establishment indicates a critical need for consistency in food safety standards to protect consumer health and ensure fair competition in international trade.[3]

Essentially, Codex has become a central reference point for food safety regulations followed by states around the world. It includes a wide range of standards, guidelines, and codes of practice that address food safety issues such as contaminants, food flavourings and additives, labelling, and hygiene practices.[4] Importantly, Codex standards are based on demanding scientific research and developed through a process of member states consensus,

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[2] Mina Kojima and Angelika Tritscher. "Codex Alimentarius Commission: Ensuring Food Safety and Nutrition Security for over 50 Years*." Food Safety Magazine*, April 6, 2015. https://www.food-safety.com/articles/3617-codex-alimentarius-commission-ensuring-food-safety-and-nutrition-security-for-over-50-years. Accessed December 20, 2024.

[3] Ibid.

[4] World Health Organization. *WHO Global Strategy for Food Safety 2022–2030: Towards Stronger Food Safety Systems and Global Cooperation*. Geneva: World Health Organization, 2022. Licence: CC BY-NC-SA 3.0 IGO.

industry representatives and scientific professionals.[5] A significant achievement of the Codex is also its ability to serve as a foundation for resolving trade disputes between state members under the WTO's SPS Agreement. Thus, linking food safety matters with international trade law.[6]

Despite the strengths, Codex nevertheless faces significant challenges in achieving collective applicability, so often in low-income nations. Mainly these countries often lack the technical capability, infrastructure and financial resources required to implement Codex standards successfully.[7] The costs of compliance such as testing, certification and maintaining traceability systems are prohibitively high to the small exporters and food producers which resulting their exclusion in the market and reduced competitiveness. This amplifies inequalities in global trade market, creating heavy barriers for developing nations to grow while remain favouring multinational corporations (MNCs) that own the resources and capable of meeting these demanding international standards such as Codex.[8]

As from a public health standpoint, weak regulatory and inadequate enforcement mechanisms in developing countries undermine the Codex's effectiveness in preventing foodborne diseases.[9] Major outbreaks those caused by unsafe local products and lead to massive numbers of affected consumers, reveal there is a gap in the real-world application of these

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[5] Ibid; see also: Joon-Goo Lee et al. "Codex Alimentarius Commission on Ensuring Food Safety and Promoting Fair Trade: Harmonization of Standards between Korea and Codex." *Food Science and Biotechnology 30,* no. 9 (2021): 1151–1170.

[6] See (n 3) & (n 4).

[7] Samuel Benrejeb Godefroy, "Codex Alimentarius Commission at 50: Major Achievements and Challenges Ahead," *International Food Risk Analysis Journal 4*, no. 10 (2014): 33–40, Proceedings of the Special Session on Cosex at the China International Food Safety and Quality Conference.

[8] Esther Garrido-Gamarro, Cecilie Smith Svanevik, Anne-Katrine Lundebye, Monica Sanden, Enrica D'Agostino, Marian Kjellevold, Lauren Pincus, and Johannes Pucher. "Challenges in the Implementation of Food Safety and Quality Assurance Systems in Small-Scale Fisheries." *Food Quality and Safety 7* (2023): 1–9.

[9] Delia Grace. *Food Safety in Developing Countries: An Overview.* A Learning Resource for DFID Livelihoods Advisers. Evidence on Demand: International Livestock Research Institute, 2015, 4–30.

standards. Such challenges not only affect public health systems but also hamper the broader goal of global food safety compliance where inconsistent enforcement may cause disparities between state members.[10]

The Codex's implementation also remain as a challenge in globalised supply chain as the fragmented nature of production, distribution, and consumption across the borders often creates struggle to the developing states to practice the Codex requirements and standards.[11] For instance, small farmers, who produce a portion of agricultural suppliers in developing states, often struggle to align their practices with Codex guidelines due to their limited resources. This eventually disconnect the harmonisation efforts planned to make food safety a global priority.[12]

The challenges are particularly noticeable in developing states, where issues such as corruption, political instability and lack of technical capacity caused the difficulties in implementing effective food safety structures. Moreover, governments in these regions frequently prioritise urgent concerns like food insecurity, political and economic turmoil and outbreaks of infectious diseases,[13] and may disregard the safety aspect of food security as defined in the 1996 World Food Summit Plan of Action.[14]

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[10] Ibid.

[11] International Labour Office, GOVERNANCE Department. *Food and Agriculture Global Value Chains: Drivers and Constraints for Occupational Safety and Health Improvement.* Volume 1: Perspectives from Relevant Research Areas. Geneva: ILO, 2017, 25–26.

[12] See: (n 11) p 35-39

[13] Benard Oloo, Lanoi Daisy, and Ruth Oniang'o. *Food Safety Legislation in Some Developing Countries*. IntechOpen, 2018, 19–33.

[14] In the 1996 World Food Summit Plan of Action, food security is defined as: "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life." It includes four main criteria's: (1) sufficient food supplies must be available at all times, (2) access to food through resources and infrastructure development, (3) food to meet nutritional needs, and (4) continuous access over time without interruptions from economic, climatic or political crisis. ***See****:* Wen Peng, and Elliot M. Berry. "The Concept of Food Security." In Encyclopedia of Food Security and Sustainability, Vol. 2, edited by P. Ferranti, E.M. Berry, and J.R. Anderson, 1–7. Elsevier, 2019.

While the Codex serves as a key document for international trade agreements and cooperation's between states, such as the WTO's SPS Agreement, its voluntary nature means enforcement still depends on national capacities and priorities. This creates significant differences in adherence and raises concerns about the real-world effectiveness and applications of the system in driving industry-wide compliance.[15] Incidents like the melamine contamination in China[16] and the Peanut Corporation of America (PCA) Salmonella outbreak[17] demonstrate that even in nations with advanced regulatory systems and standards, gaps in enforcement and commercial accountability persevere.[18]

In efforts to bridge these gaps, international organisation such as FAO and WHO have included the introduction of global food safety management systems such as ISO 22000:2005, which intended to improve HACCP into a comprehensive food safety management system.[19] While these standards

[15] Oloo et al (n 13)

[16] This refers to a food safety incident in 2008, where a toxic industrial chemical was illegally added to milk and dairy products. The incident sparked when it was revealed that melamine-contaminated milk caused kidney stones and other health issues. Estimated over 300,000 people were affected and at least six infants died as a result of this scandal. Melamine is a toxic chemical not safe for human consumption which its consumption can cause serious injuries to human health. The incident led to extensive recalls of the contaminated products both within China and internationally. While the incident sparked global outrage, the China government acted by arresting the General Manager and its suppliers. Through this incident, the effectiveness of regulatory bodies and the role of international law played imperative roles in ensuring food safety. ***See:*** Changbai Xiu and K.K. Klein, "Melamine in Milk Products in China: Examining the Factors That Led to the Deliberate Use of the Contaminant," *Food Policy 35*, no. 5 (2010): 463–470

[17] This refers to a food safety incident in 2009, where its peanut butter products was contaminated with Salmonella. It was reported that the contamination leading to over 700 illnesses and nine deaths. Post food safety investigation, the outbreak was traced due PCA's negligent practices, unhygienic facilities and shipping of contaminated products. It led to one of the largest food recalls in U.S. history and resulted in the establishment of the Food Safety Modernization Act (FSMA) in 2011 intended to strengthen food safety regulations and prevent similar incidents in the future. ***See:*** Paul Leighton, "Mass Salmonella Poisoning by the Peanut Corporation of America: State-Corporate Crime Involving Food Safety," *Critical Criminology 24* (2016): 75–91.

[19] Andrés Cartín-Rojas, "Closing Gaps: Integrating Food Safety Management Systems into the Veterinary Curriculum—A Tool to Improve Food Quality and Trade," *Veterinary Research Forum: An International Quarterly Journal 4*, no. 4 (2013): 205–206.

give advantage to global food safety standards awareness, to many developing countries it remains as challenges due to high compliance costs, technical difficulties and limited awareness of the economic losses caused by food safety failure. For these reasons, only some companies, typically those with well-established food safety capability, achieve certification.[20] Therefore, to address these issues, it is important to align food safety regulation in developing states with the WTO's SPS, Technical Barriers to Trade (TBT) agreements and Codex standards.[21] Currently, many existing laws in these regions are rudimentary, outdated, and not based on science which deterring regional and international trade.[22] It is also imperative to note that food safety is not only a public health concern but also a foundation for long-term economic development, reduced conflict, and a long term healthier population.[23]

Nevertheless, the Codex remains a keystone of international food safety governance. It can only progress through capacity-building initiatives, financial support and stronger collaborative frameworks thorough international organisations and state members that address the unique challenges of low-income states and smaller producers.[24]

WTO'S SPS AGREEMENT

Sanitary and Phytosanitary Measures (SPS Agreement)[25] was established by the WTO during its Uruguay Round in 1995. The framework was

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[20] ibid; see also: Oloo et al (n 13).

[21] Ezzeddine Boutrif, "The New Role of Codex Alimentarius in the Context of WTO/SPS Agreement," *Food Control 14*, no. 2 (2003): 81–88. ***See also:*** World Trade Organisation, *Agricultural Trade Fact Sheet: Fourth WTO Ministerial Conference,* Doha, 9–14 November 2001 (2001), https://www.fao.org/4/aa001e/aa001e05.htm (accessed December 20, 2024).

[22] Oloo et al (n 13)

[23] FAO and WHO, *The Future of Food Safety: Transforming Knowledge into Action for People, Economies and the Environment – Technical Summary* (Rome: FAO and WHO, 2020), https://doi.org/10.4060/ca8386en.

[24] Oloo et al (n 13)

[25] SPS agreement applies to initiatives taken by WTO state members to protect the health and life of humans, animals and plants. These measures are structured to protect from the

designed to ensure connecting food safety governance and international trade.[26] Its main objective is to ensure that food safety regulations are not misused and misinterpreted as protectionist mechanism and excuse of public health concerns.[27] SPS Agreement mandates that such measures must be grounded in scientifically credible risk assessments and uphold the two crucial objectives of protecting the public health and facilitating trade. This indicates that SPS Agreement does emphasis on evidence-based decision-making to ensure a broader commitment in promoting transparency and fairness among WTO member states.[28]

SPS Agreement's framework is imperatively important in validating of national food safety standards due to its reliance on internationally recognised standards, such as those developed by the Codex Alimentarius. This arrangement not only reassures harmonisation among member states but also provides a valid reference for resolving trade disputes arising from conflicting regulatory practices among the state members.[29]

One example of resolved matter under the SPS Agreement is the *EC-Hormones Case*[30], which serves as a notable case where the European Union's ban on hormone-treated beef was challenged. The case highlighted

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spreading of diseases and pests, and to protect against contaminants, chemicals and additives in food. It also highlighted the importance of scientific backing which includes the obligations of non-discrimination, encourage transparency and scientific rationale. In this sense, the SPS Committee regularly reviews and updates on its implementation and operation to ensure the reliability of the Agreement. ***See:*** Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), 1867 U.N.T.S. 493 (World Trade Organization, 1994), entered into force January 1, 1995.

[26] World Trade Organization, Understanding the WTO Agreement on Sanitary and Phytosanitary Measures (Geneva: WTO), accessed December 18, 2024, https://www.wto.org/english/tratop_e/sps_e/spsund_e.htm.

[27] Chapter 5: SPS Measures. (Chapman Tripp: *PACER Plus Chapter Summary*, 2021) pp. 2-21.

[28] Boris Rigod, "The Purpose of the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS)" (2013) 24(2) European Journal of International Law, pp. 503–532.

[29] ibid.

[30] World Trade Organization, *European Communities: Measures Concerning Meat and Meat Products (Hormones)*, Report of the Appellate Body (16 January 1998), WT/DS26/AB/R, WT/DS48/AB/R.

the agreement's crucial principle that is the requirement of scientific justification for food safety procedures. By adjudicating such disputes, the SPS Agreement plays a critical role in ensuring there is a balance between trade liberalisation and public health concerns, thus, showcasing its potential to lessen trade tensions through science-based mediation.[31]

However, similar to the Codex, the SPS agreement's requirements pose significant challenges too, particularly to the developing states. Implementing and following to the SPS requirements often need advanced technical and institutional abilities, which include innovative risk assessment tools, updated testing facilities and skilled employees.[32] For many developing states, these requirements unfortunately represent an extensive financial and infrastructural burden. The failure to meet these standards not only limits their participation in international market but also exposes them to the risk of non-compliance disputes. Ultimately, this trend unfortunately benefiting the rich and developed states as well as the multinational corporations (MNCs). Thus, increasing inequalities within the global food safety system.[33]

Globalised supply chains further complicate the implementation and enforcement of SPS principles. For example, MNCs operating in less-regulated regions have been accused of exploiting regulatory gaps to minimise their costs, weakening the agreement's goal of equitable practices.[34] This circumstances raise a critical questions about the agreement's effectiveness in harmonising food safety management while ensuring equity in international trade.

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[31] Renee Johnson, *The U.S.-EU Beef Hormone Dispute*, Congressional Research Service (CRS) Report, January 14, 2015, https://sgp.fas.org/crs/row/R40449 (accessed December 18, 2024).

[32] See (n 11) p 67

[33] ibid, pp. 45-49

[34] S. J. Henson et al., *Impact of Sanitary and Phytosanitary Measures on Developing Countries* (University of Reading: Centre for Food Economics Research), 1–77. ***See also***: Zdenek Drabek, "Is the WTO Terminally Ill? Threats to the International Trading System," *Asia and the Global Economy 4,* no. 1 (2024): 1–18.

With the broader context of global food safety governance, the SPS Agreement strengths and limitations have become more apparent. While the agreement provides an ideal framework for incorporating trade governance with food safety, its implementation is troubled with challenges.[35] In order to address these issues, it requires a multi-layered approach including capacity-building initiatives addressing to the needs of developing states and reforms to include non-scientific considerations during its decision-making processes. Such considerations are essential for making sure that the SPS Agreement remains both equitable and effective in implementing the complex global food system among the state members.[36]

GLOBAL INITIATIVES FOR FOOD SAFETY

The Codex Alimentarius plays a central role in harmonising food safety standards worldwide through the collaborative joint between FAO and WHO Food Standards Programme[37]. These frameworks have formed the foundation of global food safety governance by providing a structured approach of food safety across the borders.[38]

One of the key initiatives under the WHO's umbrella is known as the Global Strategy for Food Safety. It was introduced to address weaknesses in food safety governance which significantly has shaped the landscape of global food safety regulation.[39] It prioritising the alignment food safety regulations

[35] *ibid*.

[36] Spencer Henson and John Humphrey, *The Impacts of Private Food Safety Standards on the Food Chain and on Public Standard-Setting Processes* (FAO/WHO, May 2009), 1–44.

[37] Joint FAO/WHO Food Standards Programme, Codex Alimentarius Commission, *Report of the Fifty-Seventh Session of the Executive Committee of the Codex Alimentarius Commission* (WHO Headquarters, Geneva, December 6–9, 2005; Twenty-ninth Session, Geneva, July 3–7, 2006).

[38] AO and WHO, *The Future of Food Safety: Transforming Knowledge into Action for People, Economies, and the Environment – Technical Summary by FAO and WHO* (Rome, 2020), https://doi.org/10.4060/ca8386en.

[39] *ibid.*

with scientific developments and responding to outbreak incidents such as new pathogens, contaminants and foodborne illnesses.[40]

Meanwhile, the FAO also has played a vital role in connecting the regulatory and technical capability gaps in developing countries.[41] The FAO's significant contribution is the establishment of the International Food Safety Authorities Network (INFOSAN) which provides international cooperation by facilitating the rapid exchange of information during food safety crises.[42] For example, INFOSAN plays an important role in responding to 2011 E. coli outbreak in Europe, which affected more than 4,000 individuals across multiple countries. It highlights INFOSAN's strength in mitigating food safety risks.[43] Despite its effectiveness in contributing a rapid response between the European communities, it remains a challenge in ensuring full participation and benefit from this network, particularly for low-income states that may lack the infrastructure or technical capabilities to effectively involve with international networks.[44]

Another initiative taken by WHO and FAO is addressing the antimicrobial resistance (AMR) in food production, a rapid growing issue that poses a significant risks to human health and body. It posed a danger due to the unregulated use of antibiotics in agriculture which leading to a surge in

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[40] *ibid.*

[41] Michael Alurame Eruaga, "Enhancing Global Food Safety Standards through International Collaboration and Policy Harmonisation," *International Journal of Scholarly Research in Multidisciplinary Studies 4*, no. 1 (2024): 20–32.

[42] Carmen Joseph Savelli, "Looking Inside the International Food Safety Authorities Network Community Website," *Journal of Food Protection 83*, no. 11 (2020): 1889–1899.

[43] European Food Safety Authority (EFSA), "EFSA Publishes Report from Its Task Force on the E. coli O104:H4 Outbreaks in Germany and France in 2011 and Makes Further Recommendations to Protect Consumers," (EFSA, July 5, 2011), https://www.efsa.europa.eu/en/news/efsa-publishes-report-its-task-force-e-coli-o104h4-outbreaks-germany-and-france (accessed November 10, 2024). ***See also***: Helge Karch et al., "The Enemy Within Us: Lessons from the 2011 European Escherichia coli O104:H4 Outbreak," *EMBO Molecular Medicine 4*, no. 9 (2012): 841–848.

[44] Carmen Joseph Savelli, Adam Bradshaw, Peter Ben Embarek, and Ceu Mateus, "The FAO/WHO International Food Safety Authorities Network in Review, 2004–2018: Learning from the Past and Looking to the Future," *Foodborne Pathogens and Disease 16*, no. 7 (2019): 481–488.

preventable diseases.[45] Through the WHO and FAO joint efforts, it encourage for responsible antibiotic use in agriculture and the development of science-based national policies to restrict the rise of AMR used on food and agriculture industries.[46] However, despite these initiatives, countries such as India, China and regions of Sub-Saharan Africa, agricultural antibiotic usage remain high and unregulated. Through a recent study, it was predicted that AMR could lead to an additional 10 million deaths yearly by 2050 due to foodborne pathogens being a major contributor.[47] These initiatives have certainly raised awareness globally, but its effectiveness, particularly in poor countries remain a critical challenge.[48]

Assessing Effectiveness In Implementation

The implementation of international food safety standards varies in its effectiveness, where it could successes or challenges across different nations. In develop countries with well-established food safety regulatory such as New Zealand and the European Union (EU), their alignment with international food safety standards has improved public health, consumer assurance and trade.[49] New Zealand as an example, implemented Codex Alimentarius standards consistently to ensure the safety of its food products

[45] World Health Organization (WHO), "Factsheet: Antimicrobial Resistance" (WHO, November 21, 2023), https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance (accessed December 20, 2024).

[46] Christy Manyi-Loh et al., "Antibiotic Use in Agriculture and Its Consequential Resistance in Environmental Sources: Potential Public Health Implications," *Molecules 23*, no. 4 (2018): 1–48, https://doi.org/10.3390/molecules23040795.

[47] GBD 2021 Antimicrobial Resistance Collaborators, "Global Burden of Bacterial Antimicrobial Resistance 1990–2021: A Systematic Analysis with Forecasts to 2050," *The Lancet 404*, no. 10459 (2024): 1199–1226. Published by Elsevier Ltd.

[48] *ibid.*

[49] Eruaga (n 41) pp. 20-32

for both of its domestic and export consumption.[50] Similarly, the EU has facilitated both food safety and international trade by integrating the WTO's SPS Agreement measures into its food safety laws.[51] These developed countries due to their well-equipped laboratory facilities, skilled people and established institution, have been able to effectively harmonize their food safety regulations with international standards.[52]

Another major accomplishment is their positive economic impact through trade.[53] By following to international food safety standards, these countries have managed to reduce the possibility of foodborne illnesses, enhance consumer confidence and able to grow their food export industries.[54] Through the application of Codex standards, it ensures that food products able to meet the expectations of international markets. Thus, making it easier for countries like New Zealand and EU member states to export their products without encountering obstacles related to food safety.[55] This has proven that international standards have not only improved the public health but also strengthened these nations' economic development by implementing effective international trade and preventing trade disputes related to food safety matters.[56]

However, similar to as previously discussed, the situation is immensely different in developing states, where food safety implementation is often

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[50] Sieh Ng, Shuyan Shao, and Nan Ling, "Food Safety Risk-Assessments Utilised by China, Australia/New Zealand, Canada, and the United States," *Journal of Food Science 87*, no. 11 (2022): 4780–4795.

[51] Bettina Rudloff and Johannes Simons, "InBrief: Comparing EU Free Trade Agreements," *European Centre for Development Policy Management* (2004): 1–12.

[52] Jessica Vapnek and Melvin Spreij, Perspectives and Guidelines on Food Legislation, with a New Model Food Law, *Food and Agriculture Legislative Study* (United Nations, 2005), 59–62.

[53] Rudloff and Simons (n 51)

[54] ibid. ***See also****:* Rabia Shahir Ahmad, Hamza Munawar, and others, "Introductory Chapter: Food Safety," *IntechOpen*, 1–12.

[55] Rudloff and Simons (n 51)

[56] Markus Lipp, Vittorio Fattori, and Cosimo Avesani, "Improving Food Safety to Foster Trade," *Policy Brief no. 51* (Food and Agriculture Organization [FAO], Rome, 2023): 1–2.

hindered due to lack of infrastructure capabilities, technical expertise and insufficient financial resources.[57] For example, in country such as Kenya, although technical support has been supported by international organisations such as the FAO, challenges remain in addressing foodborne diseases and contaminants prevention, particularly in the agricultural sector.[58] More often than not, laboratory facilities in many developing states are not well-equipped, and in some cases, the capacity to test for modern contaminants like pesticide residues or heavy metals are remain underdeveloped. Furthermore, the shortage of trained personnel in their regulatory bodies, making it difficult to monitor the compliance of food safety by the food producers.[59]

Inadequate food safety infrastructure can lead to the food hazards issue of aflatoxin contamination in agricultural goods, particularly in East Africa.[60] Aflatoxin is a dangerous fungi which can cause serious health risks such as liver cancer. This hazards often found from crops such as maize and groundnuts due to contamination.[61] In Kenya, despite with the Codex standards and international support, the enforcement of aflatoxin testing remains challenging, causing public health at risks and trade hindrances.[62] Likewise, international organisations effort to help mitigate foodborne

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[57] O. A. Bassitou Koumassa, Romaric Ouétchéhou, Mathias Hounsou, and others, "Factors Influencing Street-Vended Foods Quality and Safety in Developing Countries: A Review," *Discover Food 5*, no. 18 (2025).

[58] Abebe Tibebu, Habtamu Tamrat, and Adane Habiru, "Review: Impact of Food Safety on Global Trade," *Veterinary Medicine and Science* (John Wiley & Sons Ltd, 2024): 1–9. ***See also***: Jean C. Buzby, ed., *International Trade and Food Safety: Economic Theory and Case Studies* (Electronic Report from the Economic Research Service, United States Department of Agriculture, Agricultural Economic Report No. 828, 2003), 115–122.

[59] See (n 58)

[60] Jolly Oder Akullo, Robert Amayo, David Kalule Okello, Abdi Mohammed, Robert Muyinda, David Magumba, Robert Gidoi, and Alice Mutiti Mweetwa, "Aflatoxin Contamination in Groundnut and Maize Food Products in Eastern and Northern Uganda," *Cogent Food & Agriculture 9,* no. 1 (2023): 1–13.

[61] IARC Working Group on the Evaluation of Carcinogenic Risks to Humans, Chemical Agents and Related Occupations, IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, no. 100F (International Agency for Research on Cancer, 2012), https://www.ncbi.nlm.nih.gov/books/NBK304413/ (accessed January 30, 2025).

[62] See (n 58)

diseases through its initiatives, such as the INFOSAN, have had limited accomplishment due to political instability in the regions and resource limitations.[63] For example, the conflict in regions such as Syria and Haiti have impacted the implementation of food safety standards and regulations. These disruptions have increased risks of food security and contamination, exemplifying how weak governance due to conflict exacerbates global food safety effectiveness.[64]

The global nature of the food supply has further exacerbated the implementation of food safety typically in developing states. This also means that food safety issues in one region can quickly affecting another region, making international collaboration and standardisation become imperative.[65] Through the previous example of the PCA's Salmonella outbreak, which spread across multiple states, indicated the interconnectedness of globalisation effect through food system and thus the need for dependable adherence to international food safety standards such as the Codex. The severity of the PCA outbreak caused over 700 reported cases of illness and a number of deaths, causing to the recall of thousands of products worldwide. This incident posed a lesson that not only stringent regulatory is required but as well as emphasizing the vulnerabilities of a globalised supply chain importance on the safety practices of food producers.[66]

Another example where food safety implementation and efforts faced challenges was during the COVID-19. The closure of borders during the pandemic restrictions and the reduction in workforce capacities have a

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[63] Jessica Vapnek and Melvin Spreij, Perspectives and Guidelines on Food Legislation, with a New Model Food Law, *Food and Agriculture Legislative Study* (United Nations, 2005), 481–488.

[64] FAO and World Food Programme, *Monitoring Food Security in Countries with Conflict Situations: A Joint FAO/WFP Update for the United Nations Security Council*, issue no. 4 (2018): 29–32.

[65] Subidey Togan, "Food Safety: A Developing Country Perspective," *Central European Economic Journal 11*, no. 58 (2024): 54–66.

[66] Leighton (n 17) pp. 75-91.

cascading effect on food safety efforts.[67] In countries where food safety systems were already weak and unsystematic, the COVID19 pandemic has worsened the challenges even more. Lockdown measures have delayed food inspections and testing, which potentially could increase the risk of foodborne illnesses.[68] Additionally, the increasing demand for processed and packaged foods during the pandemic, raising concerns about the food products safety entering the national market. Thus, highlighted the need for resilient food safety management systems that can counter crises and able to maintain compliance with international standards.[69]

Another challenge that influencing global food safety implementation is the impact of climate change. Changes in weather patterns can affect the safety of food production and storage due to rising temperature and hot weather. It also can increase the growth of harmful bacteria and viruses such as Salmonella and Escherichia coli in food products.[70] Moreover, the increasing occurrence of natural disasters around the world such as floods, droughts and cyclones can disturb food supply chains, compromising food safety from 'farm to fork'[71].

Despite the challenges, international organisations such as the FAO and WHO have been continuously working on toward strengthening the food safety systems globally.[72] The need for greater international cooperation, resource mobilization and capacity building particularly in developing

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[67] Tarek Ben Hassen and Hamed El Bilali, "Three Years into the Pandemic: Insights of the COVID-19 Impacts on Food Security and Nutrition in Low and Middle-Income Countries," *Heliyon 10*, no. 7 (2024): 1–8.

[68] FAO and WFP, *Impacts of COVID-19 on Food Security and Nutrition: Developing Effective Policy Responses to Address the Hunger and Malnutrition Pandemic*, 3rd ed. (updated September 2021), 2–13.

[69] Ying Guo, Fang Liu, et al., "Supply Chain Resilience: A Review from the Inventory Perspective," *Fundamental Research 14*, no. 3 (2024): 1–12.

[70] Ramona Duchenne Moutien and Hudaa Neetoo, "Climate Change and Emerging Food Safety Issues: A Review," *Journal of Food Protection 84*, no. 11 (2021): 1884–1897.

[71] Kyle Frankel Davis, Shauna Downs, and Jessica A. Gephart, "Towards Food Supply Chain Resilience to Environmental Shocks," *Nature Food 2* (2021): 54.

[72] Eruaga (n 41) pp. 20-32

states have become imperative inititaives to the FAO and WHO.[73] Through the initiatives from INFOSAN's network[74] and the WHO's Global Strategy for Food Safety are crucial in bridging the gaps in food safety implementation and enforcement.[75] However, the success of these initiatives in the long term also depending on the ability of countries to build sustainable and locally adapted food safety systems that can sustain the growing challenges and complexities of global food supply chain and trade.[76]

FOOD SAFETY MANAGEMENT SYSTEMS

With the food safety standards already in place by the international organisation s as discussed previously, a structured approach to the food safety system is required to ensure that food production is safe for consumption by minimizing contamination and preventing foodborne disease. A Food Safety Management System (FSMS) serves as a preventive measure, a system that incorporating monitoring programme, corrective actions and risk assessment to identify and control food hazards. The most commonly used by food industries are Hazard Analysis and Critical Control Points (HACCP) and the International Organisation for Standardization 22000 (ISO 22000). These certification standards provide key criteria such as hazard identification and risk assessment, identification of control measures (such as temperature control), operational and food handling practices, monitoring, documentation, record keeping, and compliance with legal and regulatory requirements.

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[73] Zemichael Gizaw, "Public Health Risks Related to Food Safety Issues in the Food Market: A Systematic Literature Review," *Environmental Health and Preventive Medicine 24*, no. 1 (2019): 68. ***See also*** Malik Altaf Hussin, "Economic Impact of Food Safety Outbreaks on Food Businesses," *Foods* (Basel, Switzerland) 2, no. 4 (2013): 585–589.

[74] Eruaga (n 41) pp. 21-22

[75] WHO (n 1) pp. 2-53

[76] FAO and WHO (n 23)

Hazard Analysis Critical Control Points (HACCP)

Hazard Analysis and Critical Control Points[77] (HACCP) is a globally recognised preventive food safety system intended to ensure that food products are free from hazards that could harm public health. Unlike the traditional quality control approaches, which typically identify the final stage of food production and identify problems post-production, HACCP designed to identify potential risks throughout the entire food production chains by preventing contamination at its source. HACCP focuses on identifying consumer food safety hazards and implementing control measures to prevent the biological, chemical and physical hazards. The principles of this system apply to all phases of food production which include agriculture practices, food preparation and handling, food processing, packing, distribution and storage systems, food service and consumer handling. Endorsed by UN Food and Agriculture Organisation (FAO) the International Commission on Microbiological Specifications for Foods (ICMSF), HACCP has been adopted as the system of choice for managing food safety procedures.[78]

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[77] HACCP Principles & Application Guidelines was established 14 August 1997. The HACCP system is designed based on seven main principles that ensure food safety throughout the food production process. The first principle is known as hazard analysis, which involves identifying potential biological, chemical and physical hazards that could potentially contaminate products at each stage during the production process. The second principle identifies the Critical Control Points (CCPs), where hazards are controlled to ensure food safety, such as pasteurisation to neutralise microbial hazards. The third principle develops the critical limits, such as temperature or pH, to establish whether a CCP is under control and monitor properly. Principle four is where monitoring procedures are set up, whether CCPs remain within the critical limits expected. The fifth principle, corrective actions will take place which aim to ensure immediate steps are taken, if deviations occur from the CCPs set. Principle six includes verification through audits, testing and equipment calibration to confirm the effectiveness of the HACCP system. Finally, the seventh principle is record keeping, involves documenting all steps of the HACCP plan to demonstrate compliance, facilitate audits and maintain traceability. These principles work together to create a comprehensive and preventive approach in managing food safety. The HACCP system is also internationally recognised for its role in reducing foodborne disease and ensuring consumer protection.

[78] Anavella Gaitán Herrera, "The Hazard Analysis and Critical Control Point System in Food Safety," *Methods in Molecular Biology* (Clifton, N.J.) 268 (2004): 235–280.

HACCP is designed as a systematic food safety framework that assigns responsibilities to food manufacturers and producers in ensuring compliance of food safety. HACCP certification can only be obtained when food manufactures and producers capable of full-filling the food safety management system requirements. It includes a full-scale audit, validation of the food industry's process flow and involvement from the board level, upper management and down to lower-level staff. For instance, as part of HACCP requirements, a dedicated group of HACCP members will be assigned to ensure compliance with HACCP standards and actively participate in ensuring that food process and practices are correctly implemented. The responsibilities of HACCP team members comprise of identifying and recording any matters related to products and processes, initiating corrective actions and controlling nonconforming products until any deviation or unsatisfactory condition affecting food safety has been resolved, and implementing measures to prevent the occurrence and recurrence of non-compliances related to products and processes. Thus, making it the HACCP members being the focal personals responsible for developing and implementing the HACCP system effectiveness, which emphasises prerequisite programs such as Good Hygiene Practices (GHP) and Good Manufacturing Practices (GMP) in accordance with the Codex General Principles of Food Hygiene.

HACCP system is built on seven core principles,[79] which collectively create a framework for robust food safety management. These principles focusses on the analysis of hazards that involves identifying the biological, chemical and physical contaminations.[80] Examples of such hazards include biological bacteria like Salmonella and E. coli, chemical hazards from pesticides, and physical hazards such as glass or metal fragments. One crucial step in this system is through the identification of critical control points (CCPs), which function to determine and isolate stages in production where all the three

[79] See (n 77)

[80] Herrera (n 78) pp. 235-280

hazards can be effectively controlled or eliminated. [81] As a result, the risk of food poisoning outbreaks and food contamination can be ultimately reduced.

Figure 1: CCP Decision Tree

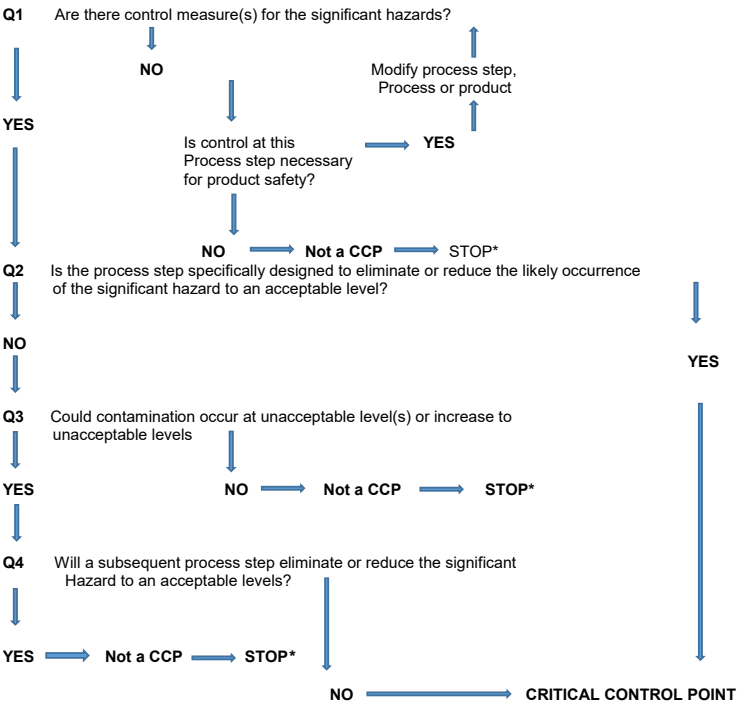

Figure 1 Above is a process decision tree for CCP identification that the HACCP team in the organisation can use to evaluate whether the steps in the process require CCPs.

Source: Royal Brunei Culinary (RBC), *Hazard Analysis Critical Control Point (HACCP) Manual*, 2025, 25.

[81] Critical control point (CCP) is any step, procedure or point in the manufacturing process, where control is applicable to prevent or eliminate food safety hazard, or at least reduce it to acceptable level. *See also:* Chinaza Godswill Awuchi (2023) HACCP, quality, and food safety management in food and agricultural systems, Cogent Food & Agriculture, 9:1, 2176280, DOI: 10.1080/23311932.2023.2176280

Critical Control Point No	Significant Hazard(s)	Critical Limits	Monitoring			Corrective Action	Verification
			What	How	When		
CCP 1 Storage - Chilled	Microbial hazard such as Staphylococcus, E.coli, coliform, yeast & mould	Chilling temperature to be: Critical Limit: 5^{0}C Operational limit : 4^0 C - 0 ^{0}C Refrigerator temperature Vegetables & Fruits: 5 ^{0}C - 10^{0}C	Chiller Temperature	Read from the temperature indicator	2 times a day 3 times a day 3 times a day	• If temperature cannot be reached, departmental personnel shall randomly check the food core temperature. • Where food temperature rise above 5^{0}C evaluate the appropriate corrective action to be taken and document it • If problem not solved, respective departmental head will contact the maintenance / external contractor to repair the chiller.	• Daily verification on the monitoring record • Scheduled external calibration of thermometer • Periodic external microbiological testing • Conduct Internal Audit yearly

Figure 2: Sample of Critical Limits in a CCP after its identification.

Source: Royal Brunei Culinary (RBC), Hazard Analysis Critical Control Point (HACCP) Manual, 2025, 36.

To ensure further effectiveness in the system, measureable parameters are established within the CCP such as temperature, pH and time records. Monitoring systems are implemented to track compliance with the CCP limits, ensuring food safety throughout the production process. In cases of nonconformity to food safety, corrective actions are applied immediately to prevent rejected or contaminated products from reaching consumers. Whereas, in order to ensure the food system has been validated effectively, verification procedures are implemented such as routine audits, microbial testing and process reviews. Finally, record keeping and documentation are part of crucial implementation of HACCP to ensure transparency and compliance tracking throughout the food production supply and process chain[82].

Being the key foundation to global food safety system, HACCP preventive approach has significantly contributed positive outcomes such as reduced foodborne diseases, increased consumer confidence and enhanced the reliability of global food supply chains.[83] Many international bodies, such as the Codex Alimentarius Commission, have endorsed HACCP as a benchmark for food safety management. It is typically recommended to industries with high contamination risks, such as meat processing, seafood and dairy, which are particularly will benefit from HACCP implementation.[84]

Despite its positive outcomes, HACCP faces significant challenges, particularly in developing states. Similarly, they are often lack of financial resources, technical capability and infrastructure, leading to inconsistencies in food safety standards and limiting the goal of global food safety supply

[82] Chinaza Godswill Awuchi, "HACCP, Quality, and Food Safety Management in Food and Agricultural Systems," *Cogent Food & Agriculture 9* (2023): 1–29.

[83] A. Baikadamova, Y. Yevlampiyeva, D. Orynbekov, B. Idyryshev, A. Igenbayev, S. Amirkhanov, and M. Shayakhmetova, "The Effectiveness of Implementing the HACCP System to Ensure the Quality of Food Products in Regions with Ecological Problems," *Frontiers in Sustainable Food Systems* (2024): 1–10.

[84] Awuchi (n 82) pp. 1-29

chain.[85] The frequent barriers often face by the small-scale producers that hinder them from the implementation of HACCP, are due to the expensive costs of training, equipment upgrades and frequent audits. These associated costs restrict their ability to compete in international markets where HACCP compliance is necessary.[86] Furthermore, the absence of a universal binding enforcement mechanism creates variances in how HACCP principles are implemented, particularly in countries where its regulatory structures are weaker and fragile. In order to address these challenges, it requires targeted capacity-building initiatives, technology transfer plans and financial support for developing countries.[87] It thus also requires further enhancement of international collaboration and equitable resource allocation to strengthen HACCP's role in global food governance[88].

International Organisation For Standardization (ISO) 22000

ISO 22000 is a food management system builds upon the principles of HACCP system.[89] However, unlike HACCP, which focuses on controlling hazards at specific stages of production, ISO 22000 addresses food safety from an organisational standpoint. It intends to ensure that both operational and systemic elements of food safety are effectively covered.[90] Established in 2005, ISO 22000 focuses on food safety management that also incorporating the seven principles of HACCP. These standards are reviewed every five years to determine whether revisions are necessary to ensure their continued relevance and usefulness for businesses in the industry.

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[85] Adriana Dima et al., "Exploring Key Barriers of HACCP Certification Adoption in the Meat Industry: A Decision-Making Trial and Evaluation Laboratory Approach," *Foods* 13, no. 9 (2024): 1–16.

[86] Pedro Javier Panisello and Peter Quantick, "Technical Barriers to Hazard Analysis Critical Control Points (HACCP)," *Food Control 12* (2001): 165–173.

[87] Ibid.

[88] Eruaga (n 2) pp. 20-32

[89] Awuchi (n 123) pp. 1-29

[90] Awuchi (n 123) pp. 1-29

A core component of ISO 22000 is the establishment of a documented food safety policy aims to ensure there is commitment from the food industry organisations to their food safety goals and objectives.[91] This policy reflects a clear and organisational approach to food safety, which help to guide food operations and ensuring that food safety is a priority across all levels. Therefore, ISO 22000 focuses on communication across the organisation, ensuring that all employees and stakeholders understand their roles and responsibilities in maintaining food safety for the policy to be effective.[92]

The implementation of ISO 22000 emphasise on the involvement of top management. Leadership and accountability are the focal mechanism to meet this standard, as top management is responsible for ensuring that the necessary resources such as financial, technological and human are established to the food safety management system. In order to ensure a proactive risk management, the top management often encourages to provide a platform where a culture of continuous improvement continuously imposed. This is to ensure that food safety is the objective of the organisation. This leadership is essential for implanting food safety at all organisational levels, making sure that employees are invested to take ownership of safety procedures.[93]

Another key role to ensure ISO 22000's effectiveness is resource management. This intends to ensure that the organisation must has the right infrastructure, modern equipment and skilled people in place to manage food safety effectively. Resource management may involve investing their expenditures in advanced technologies for the purpose of monitoring and controlling food safety risks or providing ongoing training for staff to ensure they have the right skills required. It is imperative that a well-

[91] International Organization for Standardization, ISO 22000:2018, *Food Safety Management Systems – Requirements for Any Organization in the Food Chain*, 2nd ed. (2018).

[92] Nuno F. Soares, Cristina M. A. Martins, and António A. Vicente, *Food Safety in the Seafood Industry: A Practical Guide for ISO 22000 and FSSC 22000 Implementation* (John Wiley & Sons, 2016), 60–62.

[93] Ibid*,* p. 60

resourced food safety system will ensure hazards are managed and monitored at every stage of the food production.[94]

Transparency and effective interaction with stakeholders including suppliers, regulators and customers, are also the key criteria implemented by ISO 22000. Clear and open communication is vital for ensuring compliance with food safety regulations, as well as building trust with stakeholders. Organisations are encourage to establish systems that able to facilitate the exchange of information regarding food safety practices through regulatory updates, audit results and any corrective actions taken. This transparency ensures that food safety risks are identified and mitigated, and fosters an environment of collaboration and trust.[95]

ISO 22000 also significantly contributes to global food governance by promoting standardisation and aligning with international frameworks such as the WTO's SPS Agreement and the Codex Alimentarius standards. This alignment helps create uniformity in food safety practices, facilitating international trade and ensuring that food safety standards are consistently met across borders. The adaptability of ISO 22000 allows organisations of all sizes to comply with these international standards, ensuring that small businesses can meet local requirements while multinational corporations can maintain compliance across diverse global markets.[96]

Despite its advantages, ISO 22000 does have notable limitations. Achieving and maintaining certification incurs significant costs, including the need for detailed documentation, regular audits, and extensive employee training.[97] These costs can be a burden for small and medium-sized enterprises

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[94] Ibid*,* pp. 75-76

[95] International Organization for Standardization, ISO 22000:2005, *Food Safety Management Systems — Requirements for Any Organization in the Food Chain* (International Organization for Standardization, 2005), 15–16.

[96] Oliver Von Hagen et al., "Chapter 23. Private Food Safety and Quality Standards in International Trade," *in MediTERRA 2014: Logistics and Agro-Food Trade, A Challenge for the Mediterranean* (Presses de Sciences Po, 2014), 387–399.

[97] See (n 95)

(SMEs), particularly in regions with limited resources.[98] Additionally, the stringent requirements of ISO 22000 may be overwhelming for businesses in developing countries that lack the technical expertise or infrastructure to fully implement the standard. The absence of a globally binding enforcement mechanism among the state members further complicates the consistent application of the standard, thus, reducing its overall effectiveness in ensuring global food safety.[99]

To address these challenges, one of the initiatives taken by domestic state is through the assistance of financial incentives, such as subsidies or grants. This intended to help the Small Medium Enterprises (SMEs) able to cover the costs of the overall certification. Undoubtedly, international cooperation also play a pivotal role in facilitating the implementation of ISO 22000 in developing states. Through the assistance of the developed nations, international cooperation could provide technical assistance, help build local capability and support technology transfer to ensure that food businesses and producers in these regions can meet international food safety standards.[100] Another initiative is through capacity building. This helps to foster the skills and knowledge for businesses to operate effectively within the global food safety structures. Thus, by facilitating collaborations between developed and developing states, ISO 22000's can significantly contribute positive impact on food safety and trade, making it more accessible to businesses worldwide.[101]

ROLE OF MULTINATIONAL CORPORATIONS (MNCS)

Multinational corporations (MNCs) play a vital role in influencing the global food safety framework due to their dominance in food production,

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[98] Ibid, p. 102

[99] Jessica Vapnek and Melvin Spreij, *Perspectives and Guidelines on Food Legislation, with a New Model Food Law, Food and Agriculture Legislative Study* (United Nations, 2005), 59–62.

[100] Eruaga (n 41) pp. 20-32

[101] Regina Adams, "Food Safety Regulations and Consumer Confidence," *International Journal of Livestock Policy 2*, no. 1 (2023): 15–25.

processing and distribution.[102] They also play a significant role where the degree of compliance with food safety standards may contribute to both positive and negative effects. This section will analyse the influence of MNCs on food safety compliance, where their corporate practices and the need for international frameworks are the main focus of the discussion to ensure accountability and enforce compliance.[103]

Corporate Influence On Food Safety Compliance

MNCs often act as key drivers in shaping the global food safety practices. This is mainly due to their extensive reach as well as their capability being able to implement sophisticated food safety mechanisms. On the positive side, many MNCs manage to align their operations with international standards and practices, often going beyond mere compliance to supersede their industry benchmarks. For instance, Nestlé has been practicing the "Farm-to-Fork" initiatives. This reflects MNCs commitment to ensuring food safety at every stage of production, by monitoring from its source of raw materials to the final product of their distribution. Incorporating sustainability practice is also one the criteria often adopted by the MNCs. Through rigorous quality control and transparency, MNCs like Nestlé have set a high standard for food safety in the global market and food supply chain. This approach further incorporating the hazard analysis and critical control points (HACCP) systems, ensuring traceability and engaging in third-party audits and consultants, all of which intended to improve consumer health protection and safety.[104]

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[102] Eric Nyarko and Tina Bartelmehl, "Drivers of Consumer Food Choices of Multinational Corporations' Products over Local Foods in Ghana: A Maximum Difference Scaling Study," *Globalisation and Health 20*, no. 22 (2024): 1–16.

[103] Margerita Scoppola, "Globalisation in Agriculture and Food: The Role of Multinational Enterprises," *European Review of Agricultural Economics 48* (2021): 1–30.

[104] Francesca Schwarz, *Ensure Food Safety and Compliance through Lean Ways of Working during Rapid Product Development with a Focus on Continuous Improvement of Managing Raw Materials and Monitoring Quality during Commercial Production (QMS)* (Master's thesis, Hochschule für Angewandte Wissenschaften Hamburg, 2024).

Furthermore, MNCs can drive positive transformation through their self-regulation capacity, where they voluntarily adopt and apply food safety standards that exceed those required by national regulations where they operated.[105] For instance, Unilever has been committed to reducing foodborne disease risks by incorporating food safety practices and standards into its supply chain. This proactive approach significantly will influence their local suppliers to elevate their standards by fostering a culture of food safety.[106] Therefore, MNCs can act as global leaders, not just gaining profitability but also elevating food safety initiatives that will help and benefit consumers worldwide.[107]

However, it is also important to note that these positive impacts are not universal. Profit maximizing often creates a conflict of interest that weakens MNCs obligations to food safety. While many MNCs promoting food safety to boost their brand image and reputation, their profit oriented motivations can sometimes weaken the food safety system.[108] One example related to this issues is the melamine scandal in China, where the intentional adulteration of infant formula contaminated with melamine led to significant public health concerns and outrage. The outbreak illustrated how cost-cutting and corporate greediness can result in catastrophic consequences.[109] In such instances, MNCs may not incompliance with food safety regulations, particularly in developing regions where enforcements and regulations are weak. It is prevalent that MNCs may have resistance to

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[105] Lisa L. Sharma et al., "The Food Industry and Self-Regulation: Standards to Promote Success and to Avoid Public Health Failures," *American Journal of Public Health 100*, no. 2 (2010): 240–246.

[106] Van Duijn and G. Den Dekker, "Unilever Food Safety Assurance System for Refined Vegetable Oils and Fats," *OCL 17*, no. 2 (2010): 100–103.

[107] Jan Mei Soon and Richard N. Baines, "Public and Private Food Safety Standards: Facilitating or Frustrating Fresh Produce Growers?" *Laws 2* (2013): 6.

[108] Lisa L. Sharma and others (n 105) pp. 242-245

[109] Pinghui Xiao, "China's Milk Scandals and Its Food Risk Assessment Institutional Framework," European Journal of Risk Regulation 2, no. 3 (2011): 397–406; Qi Li, Pan Song, and Jianguo Wen, "Melamine and Food Safety: A 10-Year-Old Review," *Current Opinion in Food Science 30* (2019): 79–86.

policies and regulations and often involve in lobbying aimed to achieve diluting regulations or bypassing compliance altogether.[110]

Corporate Accountability And Enforcement Mechanisms

There have been numerous initiatives intended to improve corporate responsibility among the MNCs. Yet, ensuring accountability for food safety violations remain a significant challenge, particularly for MNCs operating in various jurisdictions.[111] Despite the fact that food safety frameworks such as the Codex Alimentarius and the World Trade Organisation's (WTO) SPS Agreement provide guidelines and minimum standards, they are often lack of binding enforcement mechanisms. The gaps have allowed MNCs to bypass international standards, particularly in states where their regulation is limited or ineffective. Moreover, the lack of food safety enforcement further complicates efforts to hold MNCs responsible for violations they have incurred. Often under pressure from powerful corporate interests, national government may be unwilling or unable to enforce stringent food safety regulations. This happens when these corporations are crucial to their national economy and resources such as employments, technologies and developments.[112]

The absence of binding international obligations also means that MNCs are often not directly liable for food safety offences. Hence, the mechanisms for ensuring compliance with international standards are weak. This gap and lack of legal accountability allows the MNCs to exploit the weak regulatory, leading to food safety incidents that could have been stopped with stronger enforcement preventions.[113] As globalisation has increasingly

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[110] Michele Simon, "Can Food Companies Be Trusted to Self-Regulate? An Analysis of Corporate Lobbying and Deception to Undermine Children's Health," *Loyola of Los Angeles Law Review 39*, no. 1 (2006): 169–236.

[111]Molly Anderson et al., *From Plate to Planet: How Local Governments Are Driving Action on Climate Change Through Food (*IPES-Food Panel, 2023), 4–28.

[112] M.J. Taboada Calatayud, J. Campo Candelas, and P. Pérez Fernández, "The Accountability of Multinational Corporations for Human Rights Violations," no. 64/64 (University of Castilla-La Mancha, Spain, 2008): 171–186.

[113] M.J. Taboada Calatayud, J. Campo Candelas, and P. Pérez Fernández (n. 112), 171–186; Indra Vandamme, *Binding or Non-Binding Responsibility of Multinational*

interconnected supply chains and distributions across the borders, the need for global regulatory structures with enforceable penalties becomes more obvious. Enhancing international laws and creating binding obligations for MNCs would ensure greater accountability and consequently may contribute to reducing global foodborne diseases.[114]

One of the international initiatives undertaken to address these issues is the establishment of the Global Food Safety Initiative (GFSI), intended to encourage collaboration between food industry stakeholders, regulatory bodies and international Organisation s. The GFSI aims to encourage industry-wide compliance with food safety standards by providing a platform for sharing best practices and exchanging information, conducting third-party audits and encouraging the adoption of voluntary standards.[115] While this organisation contributed to improving food safety in some instances, its dependency on voluntary compliance makes it inadequate in addressing systemic violations, particularly when MNCs face little legal consequences for non-compliance.[116]

For that reason, stronger enforcement mechanisms are required. This includes the introduction of mandatory third-party inspections, penalties for non-compliance and public exposure of food safety violations. By doing public disclosure, the transparency of food safety practices can be improved and corporate encouragements for safety compliance can be better aligned with public health objectives.[117] Furthermore, international cooperation

Corporations for Gross Human Rights Violations (Master's dissertation, Ghent University, 2021–2022), 1–87.

[114] Philip G. Crandall et al., "Impact of the Global Food Safety Initiative on Food Safety Worldwide: Statistical Analysis of a Survey of International Food Processors," *Journal of Food Protection 80*, no. 10 (2017): 1613–1622.

[115] OECD, Industry Self-Regulation: Role and Use in Supporting Consumer Interests (Unclassified DSTI/CP(2014)4/FINAL, 23 March 2015), 16; Fabrizio Cafaggi, *A Comparative Analysis of Transnational Private Regulation: Legitimacy, Quality, Effectiveness and Enforcement* (Comparative Report, Scuola Nazionale dell'Amministrazione/European University Institute, June 2024), in collaboration with Colin Scott and Linda Senden.

[116] Crandall and others (n 114) pp. 1613-1622

[117] Lisa L. Sharma and others (n 105) pp. 240-246

should be reinforced to monitor and enforce global food safety standards, assuring that corporations are held to the same high standards regardless of where they operate.[118]

In essence, this section highlights that corporate accountability is crucial to safeguarding global food safety, particularly in the context of globalisation and increasingly complex supply chain. While MNCs can bring positive developments to the domestic economy through their innovation and self-regulation,[119] they must be held accountable through vigorous enforcement mechanisms and international cooperation.

CONCLUSION

This article critically examines the connection of global food safety standards, MNCs and international law, with a particular focus on their implications for public health and regulatory frameworks. While the international food safety standards established by international organisation s have contributed to significant successes in developed states, challenges remain as developing nations are unable to cope and implement the international standards. To obtain broad implementation and sustainability of these standards, it is vital to enhance capacity-building efforts, address infrastructure gaps and strengthen international collaboration to tackle emerging risks such as those posed by the COVID-19 pandemic, climate change and food safety outbreaks.

The melamine crisis serves as an example where potential dangers due to corporate malpractices driven by profit motives and greediness, could led to legal consequences and tarnish the organisation image. Similarly, the PCA Salmonella outbreak has illustrated the failures of both corporate self-regulation and regulatory enforcement. This questioning the effectiveness of voluntary compliance measures and highlighting the requirement for more stringent enforcement at both the national and international levels.

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[118] Cafaggi (n 115) pp. 11-100

[119] Calatayud and others (n 112) pp. 171-186

Another key subject of this article is the role of the MNCs in shaping food safety practices around the globe. Many MNCs, such as Nestlé and Unilever, have set a high standards in their food safety practices through initiatives like the "Farm-to-Fork". This aligns corporate practices with international food safety standards and promotes future sustainability. Conversely, the article also critiques the profit-driven motives of MNCs which often result to conflicts of interest and non-adherence to food safety regulations.

This article further explores the corporate accountability mechanisms offered under the existing international frameworks. International standards such as the Codex Alimentarius and the WTO's SPS Agreement provide essential guidelines for food safety for food industries and producers, however, these standards are often non-binding and depend heavily on national enforcement mechanisms. This factor unfortunately can be undermined further by political or economic pressures. Therefore, it is essential that binding international regulations are required with recommendations to establish a global food safety watchdog capable of monitoring and enforcing food safety practices, especially for multinational corporations. Under these circumstances, third-party audits and public disclosures of corporate breaches in food safety are proposed as mechanisms to enhance corporate accountability.

In conclusion, this article highlights the critical importance of international law and its organisations in safeguarding global food safety. Although self-regulation and voluntary compliance have contributed to improvements in food safety practices, it is no doubt that they are not sufficient to ensure consistent and complete protection for consumers. Enhancing international cooperation, endorsing mandatory compliance measures and enforcing corporate accountability are essential steps toward improving global food safety standards and protecting public health.