FOOD SAFETY ALWAYS TAKES TOP PRIORITY

By Manfred Klinkhardt

Globalisation and liberalisation of international trade in fish and seafood products open up economic opportunities, but at the same time greater hurdles loom over any notions of uninterrupted access to markets. The requirements for traded foodstuffs are very high, as numerous safety and quality standards have to be met.



In industrialised countries, fish processing is often highly mechanised. Manual labour is largely avoided, which ensures high sanitary and hygiene standards.

Red shrimp from Argentina, sardines from Morocco, pangasius from Vietnam, salmon from Norway or Chile – the counters and shelves of fish trade in wealthier countries offer a wide selection and variety of seafood delicacies. Fish and seafood are the most traded food group in the world. Nearly 38% of the global production of 184.5 million tons in 2022 (FAO SOFIA 2024) was traded on the world market. Per capita consumption of seafood has more than doubled over the past six decades, from 9.0 kg (live weight equivalent) in 1961 to 20.7 kg in 2022. However, it is also true that, in terms of value, more than half of the international seafood business originates in developing countries. It is precisely there that fish and seafood products, both for export and for domestic consumption, play an important role in ensuring the livelihoods of millions of people. Fishing and aquaculture production, processing and trade, as well as other related activities, are an important source of income, foreign exchange, consumption, and growth.

This development has been given a major boost due to globalisation and liberalisation of markets in many countries. Moreover, the World Trade Organization (WTO) classifies fish as an industrial product, for which, unlike many agricultural products, relatively low import duties apply. The opening of markets to products from other regions of the world, which often produce food under completely different traditions, regulations and standards, offers not only opportunities but also poses a particular challenge. This is because there is a real risk that products from the producing countries may collide with regulations and requirements in recipient countries and therefore be rejected.

The range of requirements and possible safety and quality concerns that can prevent unhindered market access is wide. It is no longer just about protecting the safety and health of consumers, but also protecting and preserving the environment in the producing countries, ensuring decent working conditions, and using aquatic resources sustainably.

Preventing the compartmentalisation of markets

The issue of fish safety and quality goes beyond microbial spoilage and the use of chemicals or veterinary medicines. This increases the pressure on stakeholders in the producing countries, who often have no means to meet complex requirements, which in turn affects the livelihoods of many local people. The situation is complex and tricky. On the one hand, the global demand for fish and seafood is rising. Market liberalisation and the associated international political environment create tempting opportunities for parties in the fishing sector. On the other hand, there are growing concerns that the traded products could potentially jeopardise consumers, the environment, or resources, and therefore should not be imported. Unfortunately, safety and quality concerns are sometimes used as a "protectionist weapon" in international trade to shield domestic fishing industries and local markets from often cheaper imports. The decision on whether the rejection of a delivery is indeed justified or rather constitutes an artificially erected trade barrier is sometimes not easy. In order to avoid unfair trading practices and disquised technical trade barriers, it is essential that judgements are based on sound scientific evidence.



Many fish products today are portioned and pre-packaged for sale, making them suitable for self-service in supermarkets.

However, data in this field is highly inadequate and there are considerable gaps in the statistics on fish-borne diseases and quality defects The available data mostly comes from industrialised countries and shows that seafood, mainly shellfish, are involved in up to a quarter of reported disease outbreaks. Due to their filter-feeding nature, there is a risk that they accumulate pathogenic viruses and bacteria. In contrast, most outbreaks of foodborne diseases in fish can be attributed to biotoxins (particularly ciguatera) and histamine. The main reason for import rejections in the United States is microbial spoilage, followed by the detections of Salmonella, which account for about a quarter of all rejected cases. However, Salmonella do not necessarily indicate hygiene deficiencies in processing, as they are widespread in many tropical ponds. In the EU, the European Commission operates the Rapid Alert System for Food and Feed (RASFF), which informs all member states about food that does not meet safety and quality requirements. The main causes of alerts were residues of chemicals and medicines (approximately 45%), followed by microbial contamination (approximately 40%), while histamine and parasites caused the lowest alert rates, namely 1.3% and 4%, respectively.

Controls according to standardised regulations

The assessment of potential risks and real dangers in the seafood sector shows, on the one hand, that marine biotoxins are responsible for many transmitted diseases. These include both ichthyotoxins (fish toxins), especially paralytic, diarrhoeic, or neurotoxic shellfish toxins. Bacteria or viruses can often be killed by thorough heating. The risks are particularly high with shellfish, which are often consumed raw (e.g., oysters). On the other hand, hazards can also arise from harmful chemicals such as mercury, PCBs, or DDT, which accumulate in the fish body and thereby increase the risk of health problems (bioaccumulation).

To counteract such risks, binding international standards are needed for the harmonisation of safety and quality standards in the global trade in fish and seafood. This harmonisation must encompass all areas of the food trade, from sourcing raw materials to processing and packaging, to export to other countries, as far as it pertains to food safety. Particularly important is the traceability of all products and their ingredients to the place of origin, as laws and regulations regarding food safety often differ from country to country and supply chains are becoming increasingly complex. Ensuring the safety and quality of fish products requires enhanced international cooperation and the development of sciencebased standards. These must align with the latest findings in the field and effectively distribute the responsibility for safety across the entire food chain.

Trade barriers complicate global business

The currently recognised international regulatory framework for fish safety and quality has been mainly developed by the Codex Alimentarius committees. This Codex is a collection of international norms, standards, guidelines, and codes of practice in the food sector, first issued in 1963 by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO). With the benchmarking function of the Codex, the Codex Alimentarius Commission has created an international platform to adequately assess the health risks of food and provide scientifically sound recommendations. In the 1990s, this platform was further expanded and refined by the SPS and TBT agreements of the World Trade Organization (WTO). The SPS Agreement (sanitary and phytosanitary measures) confirms the right of WTO member countries to implement measures in international trade that are necessary to protect the life and health of humans, animals, and plants.

However, these legitimate measures must not be misused as a pretext for the creation of technical trade barriers. The TBT Agreement (technical barriers to trade) aims to prevent such unjustified trade barriers. Technical regulations, standards, and conformity assessments must be non-discriminatory and must not create unnecessary barriers to trade. Internationally recognised standards such as ISO 22000, developed by the International Organization for Standardization (ISO), also aim in the same direction by providing an important framework for management systems in food safety.

HACCP has significantly improved production standards

Awareness of the need for integrated, multidisciplinary concepts for ensuring the safety and quality of fish in trade chains has grown, regardless of the fact that there may occasionally be disputes in international trade because one of the parties perceives certain requirements or restrictions as unjustified or even discriminatory. This is evidenced, among other things, by the development of integrated risk management strategies that analyse and help prevent potential hazards and risks within food chains. FAO plays a key role in this, offering direct support to its member countries through the CODEX committees and other expert groups, with a focus on training and building the capacity to act in developing countries. Together with the Canadian Food Inspection Agency, FAO has, for example, initiated the Aquatic Food Programme to establish a comprehensive knowledge base that contributes to the safety and quality of aquatic foods in international food chains.



Fish and seafood products meant for export are produced under very high safety and hygiene standards almost everywhere in the world.

As early as the 1980s, many countries reformed their fish inspection systems. A decisive step towards the safety and quality of fish products was the introduction of operational HACCP concepts, which led to a significant improvement in sanitary and hygienic conditions in fish processing worldwide. The HACCP principles adopted by the Codex Alimentarius Commission (CAC) in 1997 and 1999 encompass both basic details of the design and setup of facilities as well as controls of operational processes (including temperature, raw materials, water supply, documentation, and recall procedures) and personal hygiene and staff training. The implementation of these measures has indeed resulted in a significant decrease in foodborne illnesses. This is a remarkable success, but it is not enough, as the opening and liberalisation of world trade means that requirements are constantly increasing.

Supply chain management holds all parties accountable

Unlike earlier models, which mainly held the processing sector and state control services responsible for food safety, the new holistic approach assigns these tasks to all participants along the entire food chain from production to trade. Thus, fishers and aquaculture producers are just as responsible for safe, healthy, and nutritious fish and seafood products as are processors, transport companies, wholesalers, and retailers, as well as governments committed to protecting public health. The implementation of such a complex food chain approach requires a political and regulatory environment at both the national and international levels. Applicable rules and standards must be clearly defined, and their adherence must be continuously monitored. To guarantee fair conditions for all stakeholders, the assessment and management of potential risks should be institutionally separated. Within food chains, the focus must clearly be on risk avoidance or prevention.



Products for the domestic market are often subject to less strict controls or are even traded without refrigeration.

By definition, there is a fundamental difference between a hazard and a risk. A hazard is always a real fact, such as a biological, chemical, or physical substance or a food condition that may have a harmful effect on health. In contrast, a risk is only an estimate of the likelihood and severity of potential health-damaging effects that a foodstuff could have on consumers. Such risks in the seafood sector are primarily caused by *Listeria* monocytogenes and *Vibrio* bacteria. Any measures of risk management must be aimed at identifying, reducing, and ideally eliminating such risks through effective monitoring and control programmes. Particularly in focus are filter-feeding shellfish, which can accumulate biological substances and biotoxins.

A useful tool in these assessments is the Risk Ranger software package, developed at the Australian Food Safety Centre of Excellence to better assess the microbial risks of foods. The software scales the potential hazards in a point system across eleven categories and assigns products a ranking from 0 to 100. Low risk corresponds to values below 35, medium risk lies between 36 and 59 and high risk is over 60. The reliability of this software is, of course, only as good as the input data. If used correctly, it provides valuable insights into potential product risks and indicates where the focus of inspections should be placed.

Assistance and support for developing countries

Uniform safety standards that all parties in the food supply chains must adhere to regardless of their geographical location, are essential in global seafood trade. Compliance with, and implementation of these standards can already pose a challenge for small producers and some developing countries that lack adequate capacities and resources in this area. The requirements are increasing and often go beyond HACCP. Some buyers now require their suppliers to operate according to food safety standards such as SQF, BRC, and IFS. The integration of technologies such as blockchain for better traceability or the development of more robust risk assessment models may also be necessary for access to global markets. Those who do not meet these requirements often struggle to gain access to international markets and face economic losses.



Aspects of food safety currently play a minimal role in regional trade of freshlycaught daily catches in many developing countries.

Thus, globalisation and international legally binding standards in the seafood sector have created opportunities but also high hurdles for market participants, which can become an obstacle to development, particularly for developing countries. The introduction of control systems that meet the requirements of importers in industrialized countries causes additional costs for suppliers. These are often perceived as unfair if they are not customary in the supplying countries or if other buyers forgo them. Some producers apply a dual system, where fish products for large export markets are subject to strict controls, while the same or similar products for local markets or regional trade are less strictly monitored.

This practice is neither desirable nor acceptable, as consumers in poorer producing countries also have the same right to safe and high-quality fish and seafood products. Therefore, the goal of international efforts in this field must be to establish effective national fish control systems that meet both domestic needs and the requirements of export markets.



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