Market-based standards and certification in aquaculture

Expert Panel Review 4.2

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Abstract

Fish and seafood, including from aquaculture, are the most traded food commodity in the world. Around 32 to 40 percent of fish globally harvested entered international trade over the last 40 years, representing an export value of USD102 billion in 2008.

But to enable international market access and to ensure food safety and quality that function across national borders, credible and transparent food safety and quality systems are vital. In addition to the range of public regulatory frameworks for food safety and quality and for the protection of the environment from potential negative impacts of aquaculture, a range of related standards have been introduced by the private sector (e.g. processors, retailers) or by non-governmental organizations (NGOs). These standards and the related certification are becoming significant features of international fish trade and marketing. They relate to a range of objectives, including sustainability of fish stocks, environmental protection, food safety and quality, as well as to aspects such as animal health and welfare and socio-economic considerations. They are increasingly linked to the private firms' corporate social responsibility strategies.

This paper describes the context in which market based standards and certification in aquaculture are developing and their implication for aquaculture development and fish trade, with emphasis on the issues of relevance to developing countries.

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Introduction

Fisheries and aquaculture are vital for global food security. For example, fisheries and aquaculture supply over 1.5 billion people with almost 20 percent of their average animal protein intake and 3 billion people with at least 15 percent of their average animal protein intake (FAO, 2010).

While fish supply from wild capture fisheries has stagnated over the years, the demand for fish and fish products continues to rise (Table 1). Consumption has more than doubled since 1973. The perceived health benefits of fish and the technological developments enabling its increased production and availability in the form of convenience products suited to modern and affluent lifestyles are key reasons for this rise in demand and consumption.

This increasing demand has been steadily met by a robust growth in aquaculture production, estimated at an average 8.3 percent yearly growth during the period 1970–2008, while the world population grew at an average of 1.6 percent per year. As a result, the average annual per capita supply of food fish from aquaculture for human consumption has increased ten fold, from 0.7 kg (8 percent) in 1970 to 7.8 kg (47 percent) in 2008, an average rate of 6.6 percent per year. This trend

TABLE 1
World fisheries and aquaculture production and utilization 2004–2009 (excluding aquatic plants)

|	2004	2005	2006	2007	2008	2009*
PRODUCTION	(million tonnes)					
Inland						
Capture	8.6	9.4	9.8	10.0	10.2	10.1
Aquaculture	25.2	26.8	28.7	30.7	32.9	35.0
Total inland	**33.8**	**36.2**	**38.5**	**40.7**	**43.1**	**45.1**
Marine						
Capture	83.8	82.7	80.0	79.9	79.5	79.9
Aquaculture	16.7	17.5	18.6	19.2	19.7	20.1
Total marine	**100.5**	**100.2**	**98.6**	**99.2**	**99.2**	**100.0**
Total capture	**92.4**	**92.1**	**89.7**	**89.9**	**89.7**	**90.0**
Total aquaculture	**41.9**	**44.3**	**47.4**	**49.9**	**52.5**	**55.1**
Total world fisheries	**134.3**	**136.4**	**137.1**	**139.8**	**142.2**	**145.1**
Utilization						
Human consumption	104.4	107.3	110.7	112.7	115.1	117.8
Non-food uses	29.8	29.1	26.3	27.1	27.2	27.3
Population (billions)	6.4	6.5	6.6	6.7	6.8	6.8
Per capita food fish supply (kg)	16.2	16.5	16.8	16.9	17.1	17.2

* Data for 2009 are provisional estimates.
Source: FAO (2010).

is projected to continue, with the contribution of aquaculture to fish food supply estimated to reach 60 percent by 2020, if not before.

Likewise, fish and seafood are commodities that have been preserved and traded since the Bronze Age. In fact, fish and seafood are the most traded food commodity. According to FAO (2010), around 32 to 40 percent of fish globally harvested entered international trade over the last 40 years, increasing in value from a mere USD8 billion in 1976 to an estimated export value of USD102 billion in 2008. Developing countries contribute almost 50 percent in value of world fish exports, and their net receipts of foreign exchange (i.e. deducting the value of imports from the value of exports) increased from USD1.8 billion in 1976 to USD27.2 billion in 2008. This is greater than the net exports of other agricultural commodities such as rice, coffee, sugar, tea, banana and meat altogether. Three main import markets, the European Union (EU), Japan and the United States of America, acquire 70 percent of fish trade. These markets dominate international fish trade in terms of prices as well as market access requirements.

This increased globalization of fish trade has highlighted the risk of cross-border transmission of hazardous food agents, and the rapid development of aquaculture has been accompanied by the emergence of food safety and quality concerns. For example, the EU alert system for food and feed indicated that fish and fishery products have been often responsible for a large proportion, and sometimes the largest proportion (up to 25 percent), of food safety and quality alerts during the period 2000–2005. Of these, aquaculture products were involved in 28 percent to 63 percent of alert cases (Figure 1), mainly

FIGURE 1
European Union border alerts involving fish and seafood

EU Rapid Alert System-by year (2000-2005)
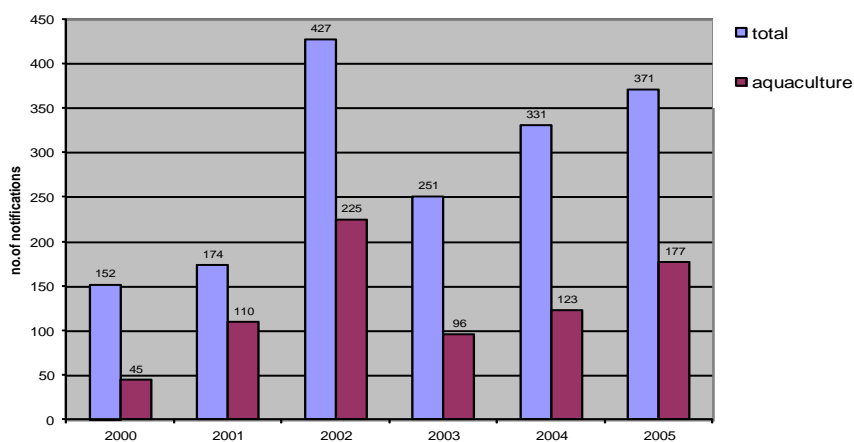
Source: FAO.

because of the presence of high residues of veterinary drugs, unauthorized chemicals and bacterial pathogens. For example in 2005, 177 alert cases were due to aquaculture products which contained bacterial pathogens (37 percent), nitrofurans (27 percent), malachite green (20 percent), excess residues of sulfites (13 percent) and unacceptable residues of veterinary drugs (3 percent). Similar safety problems have been reported by the control authorities of other major fish-importing countries.

Consequently, systems to enable international market access and to ensure food safety and quality that function across national borders are vital. Consumers expect that the food they purchase will be safe and of acceptable quality, regardless of how and where it is produced, processed or ultimately sold. Consumers, mainly in developed countries, are increasingly interested in the social and environmental implications of the food they consume. This trend is also starting to take hold in emerging and developing economies.

As a result, in addition to the range of public regulatory frameworks for food safety and quality and for the protection of the environment from potential negative impacts of aquaculture, a range of related standards have been introduced by the private sector (e.g. processors, retailers) or by non-governmental organizations (NGOs). These standards, referred to as private standards, and the related certification are becoming significant features of international fish trade and marketing. They relate to a range of objectives, including sustainability of fish stocks, environmental protection, food safety and quality, as well as to aspects such as animal health and welfare and socio-economic considerations. They are increasingly linked to the private firms' corporate social responsibility strategies.

This paper describes the context in which private standards and certification in aquaculture are developing and their implication for aquaculture development and fish trade, with emphasis on the issues of relevance to developing countries.

Overview of standards and certification in aquaculture

Definitions

According to ISO (2004), a standard is: "*a document established by consensus and approved by a recognized body, that provides for common and repeated use, rules, guidelines, or characteristics for activities or their results, aimed at the achievements of the optimum degree of order in a given context.*" It also notes that: "*Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.*"

The Agreement on Technical Barriers to Trade (TBT) of the World Trade Organization (WTO, 2011b) distinguishes standards from technical regulations. A standard is *"a document approved by a recognized organization or entity, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory under international trade rules. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method."*

In contrast, a technical regulation is defined as: *"a document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method."*

Certification is the procedure by which a certification body or certifier gives written or equivalent assurance that a product, process or service conforms to specified requirements. Certification may be, as appropriate, based on a range of inspection activities which may include continuous inspection in the production chain (FAO, 2011). There are three main types of certification:
  – *First-party certification:* by which a single company or stakeholder group develops its own standard, analyzes its own performance, and reports on its compliance, which is therefore self-declared.
  – *Second-party certification:* where an industry or trade association or NGO develops standards. Compliance is verified through internal audit procedures or by engaging external certifiers to audit and report on compliance.
  – *Third-party certification:* where an accredited external, independent, certification body, which is not involved in standard setting or has any other conflict of interest, analyzes the performance of involved parties, and reports on compliance.

Accreditation is the procedure by which a competent authority consistent with applicable law gives formal recognition that a qualified body or person is competent to carry out specific tasks (ISO/IEC Guide 2:2004).

An accreditation system is a system that has its own rules of procedure and management for carrying out accreditation. Accreditation of certification bodies is normally awarded following successful assessment and is followed by appropriate surveillance (ISO Guide 2, 2004).

An accreditation body is the body that conducts and administers an accreditation system and grants accreditation (ISO Guide 2, 2004).

Standards and certification schemes relevant to aquaculture products

Before describing the various standards used in aquaculture, it is useful to review what has been driving the development of standards and certification in aquaculture.

Standards, technical regulations and the certification systems sitting behind them are considered a means of assuring buyers of the safety and quality of products and the conformance of production and processing methods. Standards and certification are becoming even more important because of the increase in information asymmetry, that is, where buyers and consumers cannot easily judge certain quality aspects of products or production processes called credence goods. For example, food safety and the environmental friendliness of products are credence goods, since consumers cannot practically assess either aspect and use that assessment to inform their purchasing decisions (Washington and Ababouch, 2011). Private standards, and certification against those standards, are therefore a way of compensating for information asymmetry. Certification (and related labelling of certified products), offers verification or a "burden of proof" of compliance with the given standards.

Civil society and consumer advocacy groups are increasingly influencing the agendas of private companies, including in areas relevant to fish trade and marketing. NGOs concerned with the environmental and socio-economic aspects of aquaculture have shifted their focus to increasingly target industry players. As well as trying to influence the purchasing decisions of consumers and lobbying governments to improve their performance, over the last decade they have developed environmental standards and labelling schemes to encourage fish farmers to adopt more responsible practices.

NGOs have targeted companies' procurement policies through a variety of means, including media campaigns, organized boycotts or protests against certain retailers, or league tables announcing the most ethical supermarkets (such as Greenpeace's rankings of the sustainability of supermarkets' seafood supplies). Retailers are no longer just responding to this pressure. Indeed, it has been argued that on the basis of "enlightened self interest", retailers and brand owners are actually driving the demand for ethical products (OECD/FAO, 2009).

Competition in the food sector is increasingly shifting from a focus on price to competition based on quality (in all its aspects) and price. In this context, retailers differentiate themselves on the basis of reputation or the overall quality image of their "brand", including through their corporate social responsibility (CSR) policies. By adopting private standards and requiring their suppliers to be certified to a recognized international food safety management scheme (FSMS) or ecolabel, retailers can protect and even enhance their reputation and hence the value of their overall business. CSR strategies related to fish products fall

into two main areas: those relating to safety and quality (including organic, no pesticides or toxic residues, and "fresh" or "natural" type claims), and those of a broader nature related to the impacts on the wider environment (e.g. low carbon footprint, sustainable aquaculture), or to issues such as animal health, welfare or social responsibility.

From the perspective of the firm, attachment to an environmental standard provides some insurance against boycotts and bad press from environmental groups and in the media. It also helps them tap into and grow consumer demand for ethical products. Table 2 presents examples of standards and certification schemes applying to aquaculture.

TABLE 2
Standards and certification schemes operating in aquaculture

Standard (S), Code (C), guidelines (G), label (L) or certification scheme (CS)	Type	Main market orientation	Food safety	Animal health	Environ-ment	Social/ ethical	Food quality
Codex alimentarius	S, C, G	Global	√	–	–	–	√
OIE*	S, C, G	Global	√	√	–	–	–
Global GAP	S, CS	Europe	√	√	√	–	√
GAA/ACC	CS, L	USA	√	–	√	√	–
Naturland	CS, L	Europe	√	–	√	√	√
Friend of the Sea	C,S	Global	–	–	√	–	–
FEAP code of conduct	C	Europe	√	√	√	√	√
ISO 22000	S	Global	√	–	√	–	√
ISO 9001/14001	S	Global	–	–	√	–	√
ASC	C, S, L	Global	–	–	√	–	–
ISEAL	S, C, L	Global	–	–	√	√	–
Scottish Salmon Producers Organization	C, L	Global	√	√	√	–	√
SIGES Salmon Chile	CS, L	Europe/USA	√	√	√	–	√
Shrimp quality guarantee ABCC, Brazil	CS, C, L	UK, Europe	√	√	√	√	√
Thai quality shrimp, GAP, Thailand	S, L	Europe/USA	√	–	–	–	√
Bio Gro, New Zealand	S, L	Global	√	√	√ Organic	–	–
Debio, Norway	CS, L	UK, Europe	√	√	√ Organic	–	–
Krav, Sweden	C, L	Europe	√	√	√ Organic	–	–
BioSuisse	C, L	Switzerland	√	√	√ Organic	–	–
NASAA, Australia	C, L	Europe	√	√	√ Organic	–	–

TABLE 2 (Continued)

Standard (S), Code (C), guidelines (G), label (L) or certification scheme (CS)	Type	Main market orientation	Market access issues addressed				
			Food safety	Animal health	Environ-ment	Social/ ethical	Food quality
Irish Quality salmon and trout	C, L	Europe	√	√	√ Organic	–	√
Label rouge, France	C, L	France, EU	√	–	–	–	√
La truite charte qualité	C, L	France, EU	√	–	–	–	√
Norway Royal Salmon	S, L	Europe	√	√	–	–	√
Qualité aquaculture de France	S, L	France/EU	–	–	√	–	√
Shrimp Seal of Quality, Bangladesh	S, L	Global	√	–	√	√	√
China GAP	C, CS	Global	√	√	–	–	√
Fishmeal and Fish Oil Organization responsible supply standard	C, CS	Global	√	–	√ Sustain-ability	–	√

* OIE = World Organisation for Animal Health, GAP = good aquaculture practices, GAA/ACC = Global Aquaculture Alliance/Aquaculture Certification Council, FEAP = Federation of European Aquaculture Producers, ISO = International Organization for Standardization, ASC = Aquaculture Stewardship Council, ISEAL = International Social and Environmental Accreditation and Labelling Alliance, SIGES = integrated management system for salmonids, ABCC = Associacão Brasileira de Criadores de Camarão, NASAA = National Association for Sustainable Agriculture.

Source: adapted from Washington and Ababouch (2011).

Standards and technical regulations can relate to products themselves (specifications or criteria for product attributes) or to processes (e.g. outlining criteria and practices for the way products are made). Food safety standards and technical regulations typically focus on process aspects with the overall goal of improving the safety of final products. However, they can also define product specifications or criteria related to residues of additives, contaminants or microbiological criteria.
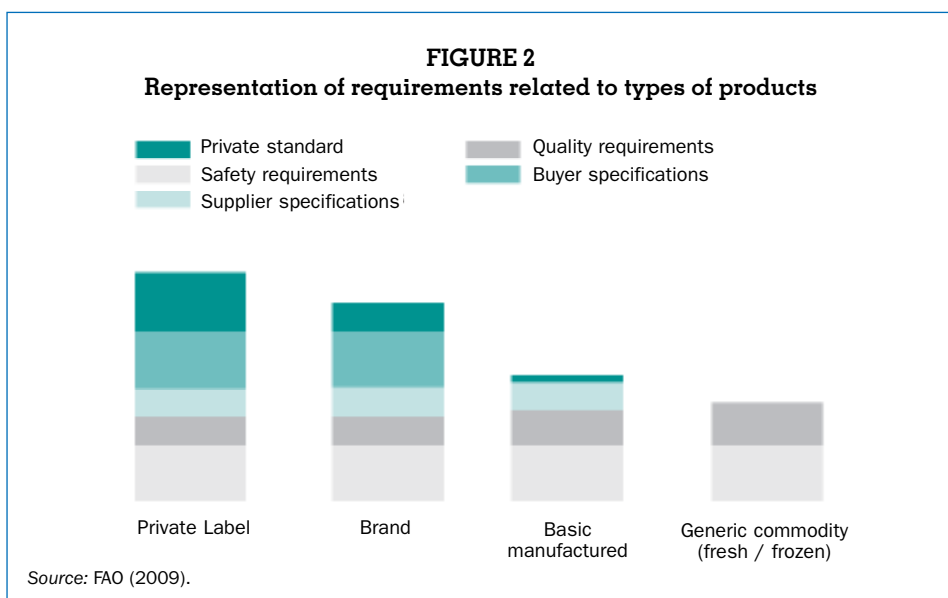
Standards, technical regulations and certification schemes are developed by:
– government institutions which enact regulations with the aim to protect consumers and/or the environment, and fair trade practices;
– buyers (retailers, processors, food service operators, etc.), whose standards are internal to the company and might simply reflect product and process specifications required of suppliers and/or requirements for certification to an independent third-party certification scheme;
– groups of producers/industry bodies, whose regulations are usually designed to promote good practices within an industry and are often referred to as codes of conduct or codes of practice;
– coalitions of retail firms, for example, the Global Food Safety Initiative (GFSI); and
– independent NGOs, such as the World Wildlife Fund (WWF).

In general, standards developed by retailers or groups of retailers primarily focus on quality and safety aspects, those developed by aquaculture producers concentrate on good practices, while those developed by NGOs are more directed at the environmental implications of aquaculture. That is not to say that retailers, for example, are not interested in environmental issues. As discussed later, the procurement policies of most large retailers and processors now include a significant sustainability-related component, but in that case they are more likely to associate themselves with an existing certification scheme than to develop their own. Standards related to food safety and quality, are typically business-to-business arrangements (B2B), whereas those related to sustainability or environmental protection, or directed to other niche markets such as organics, typically follow a business-to-consumer model (B2C). In the former case, certification is a tool for communicating assurance to buyers that the supplier is in compliance with the food safety and quality standard (although sometimes a quality mark is marketed directly to consumers). In the latter case, certification is marketed to consumers at point-of-sale, often through the medium of a label attached to the product.

The following sections present a description of some of the standards and certification schemes relevant to aquaculture. The most active and visible standards and certification schemes in aquaculture are those developed by NGOs, while others have been developed by industry organizations, separately or in collaboration with government institutions, especially in major aquaculture-producing countries.

Figure 2 shows the relative levels of compliance required depending on the type of product and level of processing. The intensity of the pressure to meet above-

FIGURE 2
Representation of requirements related to types of products

Legend:
- Private standard
- Safety requirements
- Supplier specifications
- Quality requirements
- Buyer specifications

Categories: Private Label, Brand, Basic manufactured, Generic commodity (fresh / frozen)

Source: FAO (2009).

the-legal-requirements, including by certification to an FSMS, varies greatly by market, by market segment (product type), and according to the importance of the segment for seafood items that carry a "name" linking products directly to a brand owner or supermarket chain.

NGO-driven standards and certification

NGOs have been active in developing private standards and related certification schemes for farmed fish and seafood. Those schemes have been borne out of a desire to improve the image of farmed fish and seafood as a safe and sustainable alternative to wild capture fish and are aimed at improving practices generally throughout the industry, including reducing the negative environmental impacts. Most of the work to improve management practices has been carried out on salmon and shrimp, mainly due to their high value and the volumes of trade they generate.

Aquaculture Certification Council

The certification scheme developed by the Global Aquaculture Alliance (GAA) is an important aquaculture scheme in terms of volumes and global coverage. GAA first developed a voluntary best practice programme for aquaculture producers, the Responsible Aquaculture Program, which included various guiding principles, codes of practice and best practice standards. Responding to industry calls for more formal recognition of these practices, GAA aligned with the Aquaculture Certification Council (ACC) (www.aquaculturecertification.org), a non-governmental body based in the United States of America, to develop a certification of aquaculture production processes. The GAA's Best Aquaculture Practices (BAP) Standards are applied in a certification system that combines site inspections and effluent sampling with sanitary controls and traceability. Certified producers are entitled to use the "BAP certification mark", a label attached to products from certified fish farms. Standards cover a range of considerations including food safety, traceability, animal welfare, community and social welfare and environmental sustainability. Both farms and processing facilities can be certified.

As of December 2009, ACC has used independent inspectors and auditors from 30 countries to inspect aquaculture farms, conduct seminars for various governmental and non-governmental organizations in 12 countries and to audit, for certification, facilities processing aquaculture products.

The importance of the ACC scheme was enhanced by Wal-Mart's announcement that it will only buy farm-raised shrimp from ACC-certified sources. Darden's Restaurants also require its supplies of aquaculture shrimp to be ACC certified.[1]

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[1]   Roger Bing, Vice-President Protein Procurements, Darden Restaurants, United States, in OECD/FAO (2007).

GlobalGAP
EurepGAP was developed in 1997 by the Euro-Retailer Produce Working Group (Eurep), a private-sector body driven by a group of European retailers. In late 2007, it changed its name to GlobalGAP (www.globalgap.org/cms/front_content.php?idcat=9) to reflect its more international focus. EurepGAP was initially designed as a standard for good agricultural practices. Its food safety criteria are based on hazard analysis and critical control points (HACCP).

Originally applied to fruits and vegetables, EurepGAP was later extended to fish farming practices. It was the first to develop an Integrated Aquaculture Assurance Standard (in late 2004). In addition to the general code of practice, specific criteria have also been developed for salmonids, tropical shrimp, pangasid catfish and tilapia. Its Integrated Farm Assurance Standard includes an overall base of requirements for all farms and a specific rubric of standards for crops, livestock and aquaculture.

GlobalGAP uses independent and accredited certification bodies in more than 80 countries. Notably, it also allows other schemes to be benchmarked against it. Moreover, in June 2009 it announced a "voluntary add-on module to its existing food safety, environmental and social requirements with the metrics-based environmental and social standards"[2] under development by the WWF Aquaculture Dialogues (described later). It is of particular interest in developing countries because it allows certification of grouped farms (rather than a separate certification for each operator). GlobalGAP has strong support in the retail sector, mainly in Europe (e.g. Royal Ahold in Holland, Carrefour in France, Tesco and Sansbury in the United Kingdom, Aldi in Germany).

In 2009, ACC announced an agreement to cooperate with GlobalGAP (a certification scheme with strong support in Europe, discussed hereafter) to develop and harmonize certification systems for the aquaculture sector worldwide. A "joint checklist approach" to farm audit is expected to facilitate efficiencies at the farm audit level and to benefit producers exporting to both the United States of America and Europe and related seafood buyers.

World Wildlife Fund "Aqua Dialogues" and Aquaculture Stewardship Council
Following on from its involvement in the certification of sustainable forestry (Forestry Stewardship Council) and wild-capture fisheries (Marine Stewardship Council), the World Wildlife Fund (WWF) has developed standards for aquaculture certification, with the objective of reducing or eliminating the negative environmental and social impacts of aquaculture. It has organized a range of round-tables involving aquaculture producers, buyers, NGOs and other

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[2] "World Wildlife Fund and GLOBALGAP partner on aquaculture dialogue standards" (www.globalgap.org/cms/front_content.php?idart=883).

stakeholders in an attempt to develop standards for aquaculture certification. The goal of the dialogues is to create standards for 12 aquaculture species by the end of 2011.

As with the MSC, the standard has been handed over to an arms' length independent standards-holding entity. WWF recently announced the formation of the Aquaculture Stewardship Council (ASC), which will be responsible for hiring independent third-party auditors to certify the compliance of aquaculture farms with the Aquaculture Sub-committee on Standards. Those standards concern 12 species (salmon, shrimp, pangasius, tilapia, abalone, clams, trout, oysters, scallops, mussels, seriola and cobia) considered to have the greatest impact on the environment, highest market value and/or important trading volumes in the global market. As with MSC, the ASC is also aimed at consumers, giving them "assurance that their food purchases are good for the environment", whereas its competitors in the aquaculture area are largely B2B schemes. ASC is expected to be operational within the next two years.

Friend of the Sea

Friend of the Sea (FoS) (www.friendofthesea.org) was set up in 2006 and has origins in the Earth Island Institute. It covers both wild capture and farmed fish and seafood with an environmental focus. Its "Criteria for Sustainable Aquaculture" require, *inter alia,* that:
- an environmental impact assessment (EIA) or equivalent be run before the development of a farm;
- the farm not impact critical habitats, such as mangroves, wetlands, etc;
- procedures be in place to limit escapes of fish to a negligible level;
- genetically modified organisms (GMOs) and growth hormones not be used;
- antifouling paints not be used;
- waste, water, feed and energy management be in place; and
- only FriendOfTheSea certified feed be used (where available).[3]

FoS Criteria for sustainable fisheries and aquaculture also include recommendations on carbon footprint reduction and offset (20 percent per annum) and "social accountability". However, it does not include criteria for food safety and quality.

Organic aquaculture

Other niche markets, such as organic aquaculture, are also being developed. Sometimes, certification for fish and seafood products is linked to existing certification schemes for agricultural products. For example, the United Kingdom Soil Association and the New Zealand organics certifier BioGro have added aquaculture to their schemes. There are 20–25 certifying bodies for organic aquaculture products. For example, Naturland (www.naturland.de), based in

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[3] Certified FoS feed ranges for seabream, seabass and trout became available in late 2009.

Germany but operating internationally, certifies organic farmed seafood. It is said to be widely accepted in both the United States of America and in Europe, although some European buyers also insist on certification by local organic organizations (such as Bio Suisse in Switzerland and the Soil Association in the United Kingdom). However, organic aquaculture accounts for very small volumes of production: only about one percent of overall aquaculture production.

Standards developed by producers and/or government institutions

As a response to the pressure by buyers for certification of aquaculture products, many industry organizations have embarked on the development of their own standards and certification schemes, including a label to be used for B2C labelling. Some of these standards are developed by government institutions, others by industry associations or through a collaboration of both. These standards have received different rates of recognition by stakeholders, especially buyers. Some standard promotion initiatives have been aborted while others are subject to continuous changes and development to adapt to market requirements and competition. The following are examples that should be considered illustrative only, and not representing the current situation.

Integrated Management System (SIGES) – Salmon Chile

The SIGES standard was developed for the Chilean salmon producers association, Salmon Chile (www.salmonchile.cl/frontend/index.asplt) is managed by the Salmon Technological Institute (INTESAL), the institute for salmon technology in Chile, and functions as a certifiable integrated management system, dealing with food safety and quality management, environmental issues, fish health and occupational safety.

It incorporates all relevant legislation, plus technical standards and is based on international norms and standards including ISO 9001 and ISO 14001.[4] As of August 2008, 31 companies were participating in SIGES, which accounts for 90 percent of the companies associated with Salmon Chile. Wal-Mart requires that all its Chilean suppliers have SIGES certification.

The Scottish Salmon Producers' Organization

The Scottish Salmon Producers' Organization (SSPO) (www.scottishsalmon.co.uk) is the trade association for the Scottish salmon farming industry, whose membership accounts for 95 percent of the tonnage of Scottish salmon production. It has developed a Code of Good Practice for Scottish Finfish Aquaculture that includes some 300 main compliance points covering consumer assurance issues (traceability), animal health, environmental issues and feed requirements (including the sustainability of sources of fish used as fish feed). The organization also offers access to certification schemes, including Tartan Quality Mark (involving independent inspection of production processes and

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4   ISO 14001 deals with environmental management systems (see: www.iso.org).

robust traceability requirements) and Label Rouge. Scottish salmon was the first non-French product to gain the French public quality mark described hereafter.

Label Rouge

Label Rouge is a quality label set up by the French Ministry of Agriculture in 1960 with the aim to differentiate high-quality food products from standard products of the same type. It covers various food products, especially of animal origin.

Since its launch, this label has gained widespread adoption, recognized by 80 percent of French consumers. For fish and seafood, the label covers both capture fisheries and aquaculture. It defines specific requirements for practices during production and handling and specific product criteria (e.g. color of salmon fillets) (Loreal and Falconnet, 2003).

The administration of the label is carried out by the Commission nationale des labels et certifications (CNLC). Aquaculture species that have been the subject of Label Rouge labeling are salmon from France, Scotland, Norway and Ireland, as well as seabass, shrimp, scallops and oysters from various European countries.

Thai Shrimp GAP

To maintain and expand market shares and offer its industry support services, Thailand has been trying to build its national reputation as a producer of safe, quality products. Ninety-five percent of Thai shrimp is destined for export markets. According to the World Bank (2005), Thailand has increased the proportion of value-added prepared and processed shrimp from 25 percent to 50 percent during the period 1995–2005.

The strategy pursued by the Government of Thailand has included the development of a sustainable shrimp aquaculture standard, a one-stop-shop service agency for food safety, the creation of a national committee on food safety, the alignment of national sanitary standards with international standards, and a strengthened approach to food safety management generally.

The Department of Fisheries (DoF) is actively encouraging Thailand's shrimp farmers to meet good aquaculture practice standards (Thai Shrimp GAP) or better for marine shrimp farming, incorporating various international standards including Codex, ISO 14001 and relevant FAO codes and guidelines. Processing plants must meet the requirements for HACCP certification.

It has been argued that these improvements have allowed shrimp farmers to enter into direct supply contracts with supermarkets: "Shrimp farmers now have more experience in making contracts with foreign foodservice providers themselves without using any brokers" (FAO, 2009). Moreover, to help promote exports, the Thai DoF has entered into mutual recognition agreements with

buying countries – for example, with the Republic of Korea – to speed product inspection procedures. The DoF is also one of the third-party certification bodies chosen as part of the United States Food and Drug Administration's (US FDA) pilot programme for farmed shrimp.

United States Food and Drug Administration certification pilot program
In 2008, the US FDA initiated a voluntary third-party certification pilot programme for imported farmed shrimp. The programme responds to the "President's Action Plan for Import Safety", which called for the development of voluntary third-party certification programmes for foreign producers who export to the United States of America. The FDA's Food Protection Plan (November 2008) "emphasizes qualified and legitimate third party certification as a way to help verify the safety of products from both foreign and domestic food companies." The FDA defines a third-party certifier as any entity, private, NGO, government or statal with no conflict of interest with the FDA.

A range of certification bodies, including private certifiers like the ACC, as well as public bodies such as the Thai DoF and the United States of America Seafood Inspection Service of the National Marine Fisheries Service are part of the pilot. The intention is to evaluate third-party certification schemes with the possibility of eventually allowing products from facilities certified by those bodies expedited entry into the United States of America. This programme might signal the increasing importance of standards and certification schemes as facilitators of entry to important fish and seafood markets.

While expedited and facilitated entry has been at the center of the European Commission (EC) strategy for accreditation of "competent authorities" of exporting countries, it has involved only national food control services and mutual recognition agreements. The FDA voluntary third-party certification programme offers equal opportunities to both private and government certification systems to demonstrate their worthiness. This unique initiative may help reduce duplication between private and government certification systems. Its results and future developments should be closely monitored.

Private standards developed by importers and retailers
Setting product and process specifications, and requiring suppliers to meet those specifications, is not a new phenomenon. Most large retailers, processors and food services have developed their own detailed product and process specifications. Most take mandatory national (or EU, in the case of European retailers) food safety regulations as a baseline and then build on other specifications in line with their in-house standard sanitation operating procedures (SSOPs). These additional requirements are typically related to quality rather than food safety. Industry sources suggest that they are less likely to include more stringent safety-related criteria than required by national regulations, such as "use by" dates or more stringent requirements in terms of acceptable levels of

pathogens (e.g. *Salmonella*) or contaminants (such as veterinary drug residues). However, they usually include stringent SSOPs or requirements for certification to a food safety management system (FSMS), which include detailed traceability and audit requirements and documentation (see Figure 2).

Retailer product specifications are usually treated as confidential, as they are considered commercially sensitive in what is a highly competitive market (World Bank, 2005). However, the package of specifications is likely to include detailed:

– product specifications: organoleptic and/or sensory and/or taste, metrological (size, block, dimension, etc.), chemical and physical, bacteriological specifications;
– packing and packaging, labelling requirements;
– delivery conditions (where, when, how much); and
– demands for information about the supplier company's safety and sanitary management capacities: SSOPs, safety and quality management process (including details on HACCP and product controls), traceability and recall procedures.

These specifications are typically communicated to the next level down in the supply chain – to processors, brokers or importers, who subsequently translate those specifications to their suppliers.

The practice of buyers inspecting suppliers' facilities and auditing their food safety management systems has occurred for decades in relation to processed (frozen, canned) fish products. Some retailers are now buying direct from aquaculture producers and therefore communicating specifications directly to them. Many have their own audit and inspection requirements. For example, Carrefour, the world's second largest retailer, buys shrimp directly from farmers in Thailand, which involves sending their own inspectors to verify that products and farming practices meet their own standards. In the United States of America, Whole Foods Market (www.wholefoodsmarket.com/stores/departments/aquaculture. php) has developed its own standards for a range of farmed fish and seafood. The standards require that all documentation, records, farms and processing plants be subject to annual inspection (both announced and unannounced spot inspections) by independent third-party auditors, selected by the buyer. Suppliers are required to meet the costs of those third-party audits.

However, most large retailers, commercial brand owners and foodservice industry firms prefer to align themselves to (and require suppliers to be certified to) private standards schemes developed by other bodies, rather than to develop their own certification and verification schemes. Therefore, in addition to their firm-specific product and process specifications, firms might also require their suppliers to be certified to:

– for aquaculture, one or other of the schemes that merge quality and safety with environmental protection, animal health and even social development. For example, Wal-Mart and Darden Restaurants have pledged to buy only farm-raised shrimp from sources certified by the ACC.
– for processed fish and seafood, including from aquaculture, to a national or international FSMS, such as the British Retail Consortium (BRC), International Food Standard (IFS) in Germany, Safe Quality Food (SQF) in Australia, CCvD-HACCP in Holland or DS 3027 HACCP in Denmark.

Adherence to these and other private standards (related to environmental protection, animal health and social development) usually forms part of firms' corporate social responsibility (CSR) strategies, which are marketed both to other businesses as well as to consumers, to enhance the firm's overall reputation.

Safety and quality requirements are supported by multilayered audit and inspection requirements. Independent private certification schemes are attractive to large-scale buyers – requiring third-party certification is cost effective, as it can reduce the need for companies to carry out their own inspection and audit of suppliers.

However, large retailers and food firms may not be equally demanding of all their suppliers or product lines. The pressure on suppliers to conform to stringent private standards depends on the market and the type of product in question. For example, requirements are more stringent for private-label and high-risk processed fish and seafood products than for basic commodity fish and seafood.

The Global Food Safety Initiative

In April 2000, chief executive officers (CEOs) from a range of international retail firms identified the need to enhance global food safety, including by setting requirements for food safety schemes. They were concerned that retailers were having to deal with a multitude of certificates issued against various standards in order to assess whether the suppliers of their private-label products and fresh products had carried out production in a safe manner. They noted that their suppliers were being audited many times a year, at significant cost and with what they perceived to be little added benefit. The Global Food Safety Initiative (GFSI) was developed as an attempt to improve cost-efficiency throughout the food supply chain.

The GFSI's main objective is to implement and maintain a scheme to recognize food safety management standards worldwide, including by facilitating mutual recognition between standard owners, working towards worldwide integrity and quality in the certification of standards and the accreditation of certifying bodies.

The GFSI does not undertake any certification or accreditation activities. Instead, it encourages the use of third-party audits against benchmarked standards. The overall vision is to achieve a simple set of rules for standards, harmony between countries and cost-efficiency for suppliers by reducing the number of required audits.

A guidance document lists key requirements against which food safety management standards can be benchmarked. Those requirements include three key elements: food safety management systems; good practices for agriculture, manufacturing or distribution; and the HACCP system.

A number of relevant standards have been benchmarked as compliant with the GFSI, including:
 – BRC (British Retail Consortium) Technical Standard (Version 5);
 – IFS (Version 5); www.ifs-certification.com
 – Netherlands HACCP;
 – Safe Quality Food SQF 2000 Code level two (manufacturing), SQF 1000 level two (primary production);
 – GAA BAP (GAA seafood processing standard);
 – GLOBALG.A.P IFA (Integrated farm Assurance Aquaculture www.globalgap. org/cms/front_content.php?idart=1446

The board of the GFSI (Global Food Safety Inititative) is its main governing body and is made up of representatives from the largest retail and wholesale food companies in the world. It is responsible for policy-making and overall decisions. The board is supported by a task force, which acts as a consultation body. Overall, the coalition accounts for more than 70 percent of food retail sales worldwide.

The GFSI is an important development in that it is an attempt to reduce the transaction costs associated with retailers and their suppliers having to apply a multitude of different standards. Suppliers to European retailers report needing BRC certification for the United Kingdom market and IFS certification for the French and German markets. In theory, having a standard benchmarked against the GFSI should mean that there is some form of mutual recognition or equivalence.

In 2009, The GFSI announced that its "vision of 'once certified, accepted everywhere' has become a reality" (www.ciesnet.com/2-wwedo/2.2-programmes/2.2.foodsafety.gfsi.asp). Carrefour, Tesco, Metro, Migros, Ahold, Wal-Mart and Delhaize have all agreed to reduce duplication in supply chains through the common acceptance of any of the GFSI-benchmarked schemes. Impacts on suppliers will need to be monitored. While experts have yet to reach a consensus on whether the GFSI has reduced the proliferation of private standards, it has clearly increased awareness of global food safety issues and facilitated cooperation between international retailers.

Traceability

Traceability is "*the ability to trace the history, application or location of that which is under consideration*" (ISO 9000:2005). When considering a product, traceability relates to the origin of materials and parts, the processing history and the distribution and location of the product after delivery.

In the case of food safety, the *Codex Alimentarius* (FAO, 2006) defines "*traceability/product tracing as the ability to follow the movement of a food through specified stages of production, processing and distribution*".

This definition has been further refined into a regulation by the EU to signify "*the ability to trace and follow a food, feed, food producing animal or substance intended to be, or expected to be incorporated in a food or feed, through all stages of production, processing and distribution*" (EC, 2002).

Traceability can be divided into internal and external traceability. Internal traceability is traceability of the product and the information related to it, within the company, whereas external traceability is product information either received or provided to other members of the supply chain.

Chain of custody is a more specific concept and guarantees not only the ability to trace products but also to ensure their integrity throughout the value chain. In terms of certified fish and seafood, chain of custody includes guarantees that certified product is not mixed with non-certified product.

It is arguably the traceability aspects of private standards schemes that retailers and brand owners find most compelling: they provide valuable guarantees and risk-management functions when there is a lack of confidence in public systems, especially in the food safety arena where control systems in some exporting countries are perceived to be weak. Traceability is especially important in the context of increasingly complex supply and distribution systems and where products pass through multiple hands and even multiple countries before reaching the final consumer. Robust traceability and chain of custody mechanisms also prevent fraud, or non-certified products (of inferior quality or different origins) being passed off as certified product.

Traceability can use either paper or electronic systems, although most are a mixture of the two. Paper traceability systems are widespread and have been used for a long time throughout the supply chain. Electronic traceability uses either the bar code systems or the more recent radio frequency identification (RFID) systems. Bar code systems have been in use since the 1970s and are well established in the food industry. RFID technology uses tags that send identification codes electronically to a receiver when passing through a reading area. These technologies and others such as standardized electronic product coding (EPC) enable products to be traced as they pass along the supply chain.

These tools could be used for public purposes, while related synergies between public and private requirements could be identified to enable cost-efficiencies to be realized.

There is a multiplicity of drivers for traceability in the food sector generally: mandatory food safety requirements, private safety/quality certifications, sustainability claims and business related drivers such as inventory control, promoting efficiencies and communication along the supply chain.

Major issues associated with the development of standards and certification in aquaculture

The impact of standards – safety/quality or aquaculture certifications – is not uniform across markets, species or types of products. However, overall, the impact of private standards in the trade and marketing of fish and seafood is likely to increase as buyers (processors, retailers, food services) consolidate their role as the primary distributors of fish and seafood products, and as their procurement policies move away from open markets towards contractual supply relationships. As the leading retail transnationals extend their global reach, their buying strategies are likely to progressively influence retail markets in East Asia, Africa, Eastern Europe and Latin America. Key issues related to the overall impact of private standards in aquaculture and how they affect various stakeholders require resolution.

Assessing the quality and credence of private standards and related certification

The proliferation of private standards causes confusion for many stakeholders: producers and processors trying to decide which certification scheme will bring the most market returns, buyers trying to decide which standards have most credence in the market and will offer returns to reputation and risk management, and governments trying to decide where private standards fit into their food safety, animal health management and resource management strategies. Transparency and good governance in private voluntary schemes is imperative. A mechanism for judging the quality of schemes is required.

The recently adopted *FAO Technical Guidelines on aquaculture certification* provide guidance for the development, organization and implementation of credible aquaculture certification schemes. They address the following four areas: i) animal health and welfare, ii) food safety, iii) environmental integrity and iv) socio-economic aspects associated with aquaculture production. The guidelines define the minimum substantive criteria for these four areas and cover: i) standard setting processes required to develop and review certification standards, ii) accreditation systems needed to provide formal recognition to a qualified body to carry out certification, and iii) certification bodies required to verify compliance with certification standards (FAO, 2011).

Since the adoption of the *FAO technical guidelines on aquaculture certification*, many aquaculture certification schemes have been aligning themselves with these guidelines and claiming their conformity to them. However, debate continues as to who should be responsible for verifying these claims, what assessment methodologies to use, who should carry out any benchmarking exercise, and for what purpose (e.g. as an assessment tool, a formal benchmark or to achieve mutual recognition). Those are issues that will likely emerge at the next session of the FAO Committee on Fisheries, Sub-Committee on Aquaculture to be held in 2012 in Cape Town, South Africa.

Reducing and/or redistributing compliance costs

Many producing countries have raised concerns regarding the cost of certification, especially for small-scale aquaculture producers. The distribution of those costs is also problematic in the sense that the compliance costs associated with certification to a private standard scheme are borne disproportionately by those up-stream in the supply chain (i.e. producers, processors) rather than those downstream (i.e. retailers, food services, importing processors) where the demands for certification generate. Yet the most robust evidence of price premiums suggests that they accrue to the retailers who demand certification. Should they help foot the bill for certification? Is some redistribution of costs possible, and using what levers? Further international dialogue and sharing of experiences is needed.

Challenges and opportunities for developing countries

Fish and seafood are important income earners for many developing countries. Developing countries are crucial for current and future global supplies of fish and seafood products. In general, certified operators from developing countries tend to be those that are large-scale, involved in more integrated supply chains with direct links to developed-country markets (through equity or direct supply relationships).

Evidence suggests that meeting and maintaining equivalence to mandatory public standards of developed-country markets continues to be more of a barrier to trade than requirements to meet private standards. For developing countries to take advantage of the opportunities presented by private standards, they must first be able to meet the requirements of mandatory regulatory requirements in importing countries. This would create the foundations for future responses to private standards. Any technical cooperation in developing countries would be best focused on getting the public systems right.

Some countries have argued that private standards go beyond relevant international public standards, have no particular scientific rationale and are therefore inconsistent with SPS obligations (WTO, 2008). Some countries fear that private standards could allow importers to impose their domestic policy frameworks and/or other standards (e.g. labour, human rights), offering grounds

to discriminate against developing-country products. Further analysis is required to determine the consistency of private standards with international standards and obligations of the SPS and TBT agreements (WTO, 2011a,b).

While governments have the right to challenge the actions of other governments within the context of the WTO, the grounds for challenging non-governmental actors is less clear. What recourse governments have to challenge these assessments and their implications is still largely unknown. Further inquiry and evidence of the actual effects of private standards on trade opportunities, especially for developing countries, is needed. However, as the boundaries between public and private standards and requirements start to blur, there are implications for trade that need to be closely monitored.

Do private standards complement, duplicate or undermine public regulation and policy frameworks?

Private standards pose key questions for governments: do they duplicate, complement or undermine public regulatory frameworks for food safety assurance and sustainable aquaculture?

Private safety/quality standards are typically based on mandatory regulation and therefore are not likely to conflict with public food safety regulation. Duplication is more likely to be an issue, if not in relation to the content of requirements, then in methods of compliance and verification (including multilevel documentation). There is little evidence to suggest that compliance with private standards facilitates the implementation of public standards. Rather, compliance with public standards provides a baseline for, and is therefore essential for meeting the additional requirements included in private standards schemes. Operators who achieve certification to a private FSMS are mainly those that already run effective food safety management systems.

Private standards overall are unlikely to conflict with public regulatory systems; they are typically either based on public requirements or include compliance with public requirements as part of the criteria for certification. They may duplicate public systems (e.g. food safety, animal health), but they are unlikely to undermine them. Whether or not private standards incentivise better management remains unclear; and whether profit-maximizing private-sector firms or NGOs are the best agents for incentivising better food safety management and sustainable aquaculture also requires further debate.

Are private standards an efficient mechanism for achieving public policy goals of food safety assurance and sustainable aquaculture? If they are compensating for perceived shortfalls in public governance, then they might be simply treating the symptoms when a more effective solution would be to invest in strategies to improve those public systems. Governments need to determine, both individually and collectively, how private-market mechanisms fit into public policy frameworks for aquaculture and how they will engage with them.

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