Knowledge is Power?

A market orientation approach to the global value chain analysis of aquaculture:

Two cases linking Southeast Asia and the EU.

A Thesis submitted in Fulfilment of the

Requirement for the Degree of

Doctor of Philosophy

by

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UNIVERSITY OF STIRLING

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December 2012

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Declaration

I declare that this thesis has not been and will not be submitted in whole or part to another University for the award of any other degree. The nature and extent of work carried out by, or in conjunction with, others has been specifically acknowledged by reference.

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Abstract

This thesis adds the market orientation approach to a global value chain analysis of four farmed seafood value chains from two Asian countries to the EU. The overall aim of the research is to critically evaluate whether, and to what extent, access to market information is the key to unlocking the potential of developing countries to create greater value: whether knowledge is power. The objectives of the thesis are therefore to explore the process of generating market information in seafood value chains from Asia to the EU; understand under what conditions market information is, is not or is only partially disseminated; and, evaluate the role of market information in responses by chain agents that create value.

In order to achieve these objectives, fieldwork was conducted along the length of shrimp (*Penaeus monodon*) and prawn (*Macrobrachium rosenbergii*) from Bangladesh, and shrimp (*Penaeus vannamei*) and tilapia (*Oreochromis niloticus*) from Thailand to the EU. The EU is the world's largest single market for imported fish and fishery products. France, Germany and the UK were selected for fieldwork as they are primary importers of the species from the selected countries.

The research found that although increased knowledge is necessary, it is not a sufficient condition for increased value creation. Instead, the research advances existing understanding of seafood value chains by revealing that successful integration of developing country producers into global markets is partly dependent on governance and industry development in the exporting

country. Weaknesses in these structures and relationships undermine supplier power by reducing access to market information, lessening incentives for sharing information, and restricting response capabilities. A number of methods for overcoming these constraints were found in the chains examined, focusing on direct links between market and value chain agents. Importantly, the research found that integration is also dependent on the willingness of those with a market presence in importing countries to share knowledge and power. Critically, the research has led to the conclusion that the possession of market information is one way for value chain agents, particularly those downstream, to guard knowledge and power for themselves.

A better understanding of seafood markets and an improved analysis of aquaculture value chains from Asian countries to the EU revealed through the research will facilitate public and private responses that focus on the competitive advantage of the whole chain as a means to more sustainable development. This may well promote new chain configurations that place a premium on stronger and more collaborative linkages, increasing coordination between weak and strong suppliers and contribute to private sector development assistance. Only when knowledge is shared and suppliers gain power, will the market orientation of seafood value chains be improved, if not optimised.

Glossary

Accreditation	The evaluation and formal recognition of a certification programme by an authoritative body.
Audit/Inspection	An on-site visit to verify that the performance of an operation is in accordance with specific standards of a certification programme.
Arut	A marketing intermediary, based in a chatal, Bangladesh.
Baht	Thai currency. 100 Thai Baht = USD 3.25 or EUR 2.53 (2 November 2012).
Brackish water	Coastal or inland waters with a salinity level ranging from 1 to 16.5 parts per thousand (ppt).
Broodstock	A group of mature fish that is kept separate and used for producing fry, also mature fish retained at a hatchery to produce eggs and young. The term can include younger fish eventually to be used as spawners but not yet mature. May be used for eggs or juveniles from which subsequent generations will be produced.
Buyers	A person employed to select and purchase stock or materials for a large business. In the context of this research, the term 'buyers' is attributed to *end buyers* i.e. those procurers closest to the consumer e.g. retail buyer.
Certification	A procedure by which a third-party gives written assurance that a product, process or service is in conformity with certain standards.
Certification body	An organisation performing certification. Sometimes referred to as the certifier or the certification agency. The certification body may use an existing standard or may set its own standard, perhaps based on an international and/or normative standard.
Certification label	A label or symbol indicating that compliance with specific standards has been verified. The standard-setting body usually controls use of the label.
Certification programme	A system of rules, procedures and management for carrying out certification. Sometimes referred to as a certification system. One certification body may execute several different certification programmes.
Chatal	An auction market, Bangladesh.
Commission Agent/Aratdar	A marketing intermediary, usually linking depots and processing plants (Bangladesh).
Competent Authority (CA)	The legally delegated authority for the provision of export certification.
Consumer	A person who purchases for personal consumption.

Cost sector (of foodservice)
: Meals provided out of necessity. Tends to be associated with the public sector but also exists in the private sector.

Crustacean
: Marine shrimp, freshwater prawns and crabs.

Downstream
: Refers to processes that occur closer to marketing

European Commission (EC)
: The executive body of the EU, responsible for proposing legislation, implementing decisions and upholding the Union's treaties and the general day-to-day running of the Union.

EU (EU)
: An economic and political association of (27, at the time of writing) European countries with internal free trade and common external tariffs.

Euro
: The official currency of the Eurozone (Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia and Spain). 1 Euro = USD 1.29 (2 November 2012).

Everything But Arms (EBA)
: An initiative of the EU under which all imports to the EU from the Least Developed Countries are duty free and quota free, with the exception of armaments.

Exports
: Exports consist of the outward movement of goods produced by businesses in the UK, plus goods, which after importation, move outward from bonded warehouses or free zones without having been transformed i.e. both exports and re-exports. Export statistics exclude fish caught by domestic fishing craft, whether or not processed on board, landed in foreign ports.

Faria
: A marketing intermediary who transports goods between two points in the chain (Bangladesh).

Fish preparations
: Fish preparations refer to fish that have been prepared using one of the following techniques: fresh or chilled, frozen, salted, in brine, dried or smoked, prepared or preserved.

Fishery products
: Products caught at sea or in inland waters and the products of aquaculture. These include live, fresh, chilled, frozen, dried, salted or smoked fish, fish in brine and crustaceans, molluscs, meal, powders etc.

Foodservice
: Term commonly used for the provision of meals out of home (also known as the 'catering' sector).

Freshwater
: Inland waters with a salinity level below 1 ppt.

Fry
: Baby shrimp and prawns.

Harmonised System (HS)
: The World Customs Organisation's system of code numbers for identifying products. The codes are standard up to six digits.

In-house
: Provision of activities and services by a company's own business.

Marine water	Coastal or oceanic waters with a salinity level greater than 16.5 ppt.
MFN (Most Favoured Nation) tariff	
	This is the normal non-discriminatory tariff charged on imports (excludes preferential tariffs under free trade agreements and other schemes or tariffs charged inside quotas).
New Product Development (NPD)	
	A product is a set of benefits offered for exchange. These benefits can be tangible (something that can be physically touched) or intangible (such as a service). The two parallel paths involved in the NPD process are idea generation, product design and engineering; the other involves market research and marketing analysis. Companies typically see NPD as the first stage in generating and commercialising new products within the overall product life cycle management.
Nitrofuran	A banned antibiotic.
Node	A value chain node is the point in a value chain where a product is exchanged from one actor to another or goes through major transformation or processing.
Polyculture	The cultivation of more than one species of fish or shrimp simultaneously.
Post-larvae	A stage of development in which the full complement of trunk segments and appendages appears for the first time.
Profit sector	Meals within the 'profit' sector are provided in response to consumer demand.
Shrimp vs. prawn	The FAO has attempted to establish clear-cut distinctions for these terms where 'prawns' refer to freshwater creatures while shrimp refer to their marine and brackish water relatives. Common usage has often resulted in reference to large shrimps as prawns and to small shrimp as shrimp regardless of the salt content of their habitat. The latter applications are deeply embedded in the common and scientific usage.
Standards	Document agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines or definition, to ensure that materials, products, processes and services are fit for their purpose. Standards include environmental, organic, labour, social and normative standards.
Strand	A value chain strand is a parallel filament of a value chain that is structured differently in some segments due to different product characteristics (for example, sustainability-certified fish); a different institutional configuration (for example, exchange via auction); or a different end-market or production origin (for example, Thai shrimp vis a vis Bangladeshi shrimp; or shrimp consumed in the EU rather than the US).

Taka	Bangladesh currency. 100 Taka = USD 1.23 or EUR 0.96 (2 November 2012).
Tariff line	A product, as defined by a system of code numbers for tariffs.
Upstream	Refers to processes closer to production.

List of Abbreviations

ASEAN	Association of South East Asian Nations
B2B	Business-to-business
B2C	Business-to-Consumer
BFFEA	Bangladesh Frozen Food Exporters Association
BIP	Border Inspection Post
BRC	British Retail Consortium
BSFF	Bangladesh Shrimp and Fish Foundation
BQSP	Bangladesh Quality Support Programme
CA	Competent Authority
CSR	Corporate Social Responsibility
DOF	Department of Fisheries
EC	European Commission
EUR	Euro
EU-15	EU 15 Members (before 2004) (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden and the United Kingdom)
EU-27	The 27 Member States of the EU (the EU-15 plus Bulgaria, Cyprus [Greek part], Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia)
FAO	Food and Agriculture Organisation of the United Nations
FIQC	Fish Inspection and Quality Control, Bangladesh
FVO	Food and Veterinary Office (EU)
GAA	Global Aquaculture Alliance
GAP	Good Aquaculture Practices
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GMP	Good Manufacturing Practice
GSP	Generalised System of Preferences
GVC	Global Value Chain
HAACP	Hazard Analysis and Critical Control Point: A Control Regulation
ICS	Internal Control System

ISO	International Organisation for Standardisation
ITC	International Trade Centre
LC	Letter of Credit. A letter issued by a bank to another bank (typically in a different country) to serve as a guarantee for payments made to a specified person under specified conditions
LDC	Least Developed Countries
MD	Movement Document
MFN	Most Favoured Nation [GATT/WTO Context]
MNC	Multi-national Corporation
MSME	Micro, Small and Medium-Sized Enterprise
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Cooperation and Development
PL	Post-larvae
RASFF	Rapid Alert System for Food and Feed
SOP	Standard Operating Procedure
SPS	Sanitary and Phytosanitary (measures)
TBT	Technical Barriers to Trade
UNIDO	United Nations Industrial Development Organisation
USA	United States of America
USAID	United States Agency for International Development
USD	United States Dollar
WTO	World Trade Organisation

Acknowledgements

I owe my deepest gratitude to my supervisor, Professor James A. Young, for his wise counsel, support, discernment and the much-needed bottle of gin during fieldwork. Grateful thanks also to Froukje Kruijssen, who was an excellent field and project manager. It has been a privilege and pleasure to work with them both. Thanks also to my second supervisor, Professor Leigh Sparks.

I extend particular thanks to all respondents who gave generously of their time and insights, as well as to those who assisted me during the fieldwork periods. In Bangladesh: Dr. Mohammad Mahfujul Haque, my translators Ali Hazrat and Palash Halder, and the SEAT project team. Thanks also to Sarah and David Hall, Nadia and Atunn, Sandii and Deon, and Alam Rahman, who all kindly helped me with accommodation during my stay. A special thanks to Michael and Regina Kestner, for the 'home away from home' in Khulna. In Thailand: thanks to my translator Apinyaruk Wankeo and the

other members of the SEAT project team. Kind assistance was received in particular from Achiravit Kiriruangchai, Dr. Michael Phillips, CV Mohan, Dominique Gautier, Juliette Reunkrilerk and Christ Church, Bangkok. In the EU: thanks to Dr. Ralf Döring at the vTI, Brigitte Langenhagen, Anja Bauer, and the numerous colleagues and friends who put me in contact with their networks. In Penang: grateful thanks are extended to Alexa and Eddie Allison and their family, who hosted me for so long, as well as to my colleagues at the WorldFish Center. In Copenhagen: an enormous thank you to Dr. Stefano Ponte and Karen Sau Jespersen for their ongoing collaboration, as well as to Anna Christina Riisager, Rens van Munster and DIIS colleagues.

Grateful thanks are extended to other members of the SEAT project team: Professor David Little, Dr Francis Murray, Dr Eddie Allison, my fellow PhD students, Hooi Bing at the WorldFish Center Office in Penang and Sharon Martin at the Management Education Centre Office at Stirling University.

I am particularly grateful to Anthony Cox for his review of the thesis in its final stages and insightful comments, as well as his support. Thanks also to Struan Stevenson MEP and Carl-Christian Schmidt for their assistance, and to Lore Kelling, Sonia Boyd and Fiona Kelling for their editing and formatting help.

Finally, a special thank you to my mother who has made my long absences from home possible by taking care of my finances, property and administration needs over many years. Thank you for all the hard work you have done on my behalf to help me get to where I am today, which includes instilling in me self-confidence and a sense of peace and purpose. Thanks to

my inspirational siblings, both my parents, and Margret and Stan Lamb for their unfailing support and baked goodies. Thanks also to so many friends scattered all over the world, especially those from St Andrews, Cambridge, London, Brussels, New Zealand and Paris. Thank you for the spare rooms and free meals during fieldwork as well as the fun, friendship and holiday destinations.

And to Frédéric, who has led and nurtured our relationship using Skype and mobile phone communication across time zones for years. Thank you for being part of this adventure and always welcoming me with open arms and wallet (both equally necessary at times). I am incredibly grateful for a partner who is the reason I can be all I can be, even if it means I occasionally smell of fish. Thank you for becoming my husband this past year, for your belief in me and encouragement, and those Microsoft Excel abilities. *Pour tout, merci. Je t'aime.*

December 2012, Stirling, Scotland.

Chapter 1

Introduction

We call this period in which we live The Information Age, characterising our times by the ability of individuals to have almost instantaneous access to information and to transfer it freely (Castells 2010; Kotler 2003). Such communication is one of the pillars on which globalisation is built, as information flows are necessary for increasing international integration arising from interchanges of products and ideas. The classic economic theory of international trade states that, in general, any country that engages in trade will be better off (Avinash and Norman 1980; Gudmundsson, Asche, and Nielson 2006). Michael Porter, in his seminal book on the competitive advantage of nations, argues that while natural endowment is important in increasing welfare through trade, it is the way in which such endowments are used that is critical (Porter 1990). Endowments are used efficiently when they result in product attributes that consumers demand. Knowing those demands, transferring them to production and producing the desired product are critical in the global marketplace (Castells 2010). These elements of generating information, disseminating and responding to it are the crux of the market orientation approach, which is used in this thesis as a means of analysing global value chains.

A value chain is more than a supply chain. Supply chains focus on the movement of products while value chains are concerned with how a product is changed to create value for the consumer at each link in the chain. A key

premise of the global value chain approach is that the sum of all the chain activities together provides the product with more added value than the total of its independent activities (Porter 1985). According to market orientation theory, this is only possible when value chain agents have an understanding of market requirements and are able to take advantage of these (Kohli and Jaworski 1990; Grunert et al. 2010; Reid and Brady 2012). This thesis applies the market orientation approach to international seafood trade by examining four seafood value chains from two Asian countries to the European Union (EU). The research critically evaluates these value chains to understand under what conditions value creation occurs. In doing so, the research will explore whether, and to what extent, access to market information is the key to unlocking the potential of developing countries to create greater value addition in seafood supply chains: whether knowledge is power.

The use of seafood as a case study is valuable to this research for four reasons. First, fish stocks have declined in traditional fishing grounds, leading to increased reliance on farmed seafood supply (Figure 1.1). Since the 1990s, aquaculture has been driving growth in fish production, contributing 40.3% of 148 million tonnes (t) in 2010 (worth USD 217.5 billion), an increase from 20.9% in 1995[1] (FAO 2012a). This has led to new countries of supply and longer, international chains of procurement.

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[1] Aquaculture's contribution to fish production for human consumption was even higher at 47% of 130.8 million t in 2010.

Figure 1.1 World create fisheries and aquaculture production
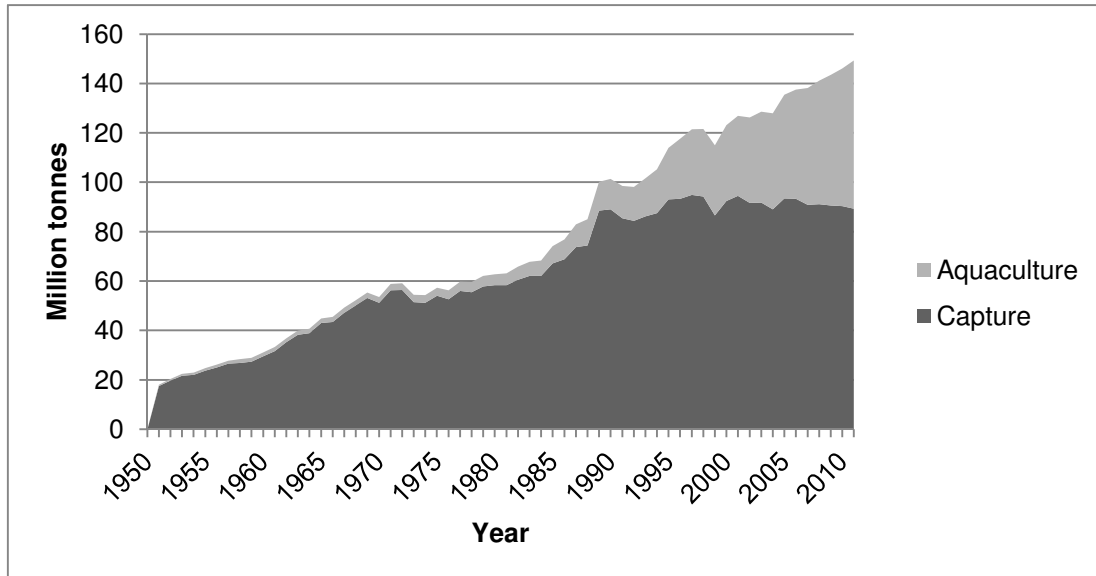
Note: Data excludes aquatic plants.

Source: (FAO 2012a)

Second, examining farmed seafood supply chains is particularly pertinent due to the inherent north-south orientation of these chains. In 2010, 48% of the import value of developed countries fish and fishery products originated from developing countries (FAO 2012a). A study of tropical chains therefore provides an understanding of developed-developing country power relationships in value chains (Talbot 2009). In addition, the Asia-Pacific region dominates aquaculture production, making this an important area of study (Table 1.1). In 2010, the top ten Asian producing countries accounted for 87.6% by quantity and 81.9% by value of the world's farmed food fish of 59.9 million t (FAO 2012a).

Table 1.1 Top ten Asian aquaculture producers, 2010

Country	Tonnes	%
China	36,734,215	68.9
India	4,648,851	8.7
Viet Nam	2,671,800	5.0
Indonesia	2,304,828	4.3
Bangladesh	1,308,515	2.5
Thailand	1,286,122	2.4
Myanmar	850,697	1.6
Philippines	744,695	1.4
Japan	718,284	1.4
Republic of Korea	475,561	0.9
Other	1,557,588	2.9
Total	53,301,157	100

Note: Data exclude aquatic plants and non-food products. Data for 2010 for some countries are provisional and subject to revision.

Source: (FAO 2012a)

Third, the reliance by developed country markets on farmed imports from developing countries means that seafood exports are a large contributor of developing country export earnings as well as important sources of income generation, employment and rural development for the poor (FAO 2012a) (Figure 1.2). In 2010, fisheries and aquaculture provided livelihoods and income for an estimated 54.8 million people engaged in the primary sector of fish production (FAO 2012a). At the same time, 97% of the 16.6 million people engaged in fish farming are concentrated in Asia (FAO 2012a).

Figure 1.2 Net exports of selected agricultural commodities by developing countries, 2009
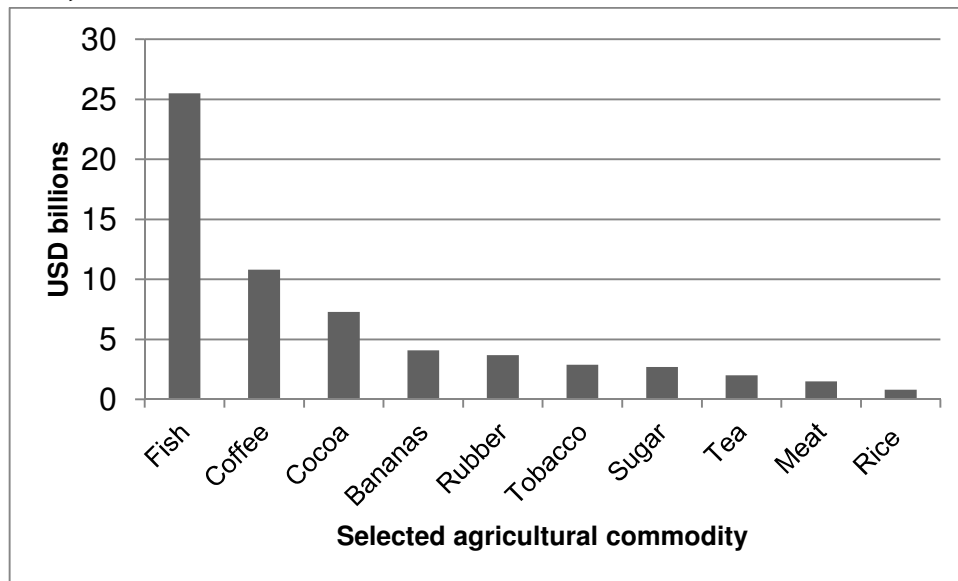
Source: (FAO 2012a)

Fourth, the international seafood market is highly competitive and markets are moving towards products with higher levels of value addition and degrees of differentiation. Extensive market requirements, such as food safety criteria and product quality aspects related to environmental and socio-economic sustainability, are in place for internationally traded fish.

These four reasons lead to questions about the causal links between the structure of value chains and their means of creating value – and the importance of market information flows to this process. A better understanding of seafood markets and an improved analysis of aquaculture supply chains from Asian countries to the EU market can lead to public and private responses that focus on the competitive advantage of the whole chain as a means to sustainable development.

The Sustaining Ethical Aquatic Trade (SEAT) Project

The need to improve understanding, analysis and action on sustainable development in seafood supply is recognised by the SEAT project; an inter-disciplinary, collaborative project within the *Food, Agriculture and Fisheries, and Biotechnology* theme of the EU Seventh Framework Programme (Grant Number FP7 KBBE-222889). The overall aim of the SEAT project is to explore, and through improved understanding, enhance the sustainability (including, *inter alia*, the environmental impact, social justice, economic efficiency, nutritional quality and safety) of four major aquatic food commodities (pangasius, prawns, shrimp and tilapia[2]), farmed in four Asian countries (Bangladesh, China, Thailand and Viet Nam) and exported to the EU, by developing an improved framework for the sustainability assessment of trade in farmed aquatic products from Asia to the EU.

For the purposes of the research that follows in this dissertation, two of the four countries were selected for analysis, as agreed by the European Commission (EC) and the SEAT project team. While a larger sample of countries in Asia might provide a more substantial sector-wide analysis, undertaking fieldwork in three or more countries would not have been feasible within the available time and resource constraints. Choosing only one country would have provided a thorough, in-depth analysis, but the necessarily

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[2] Pangasius (*Pangasius spp*); Prawns (*Macrobrachium rosenbergii*); Shrimps (*Penaeus monodon, Penaeus vannamei*); Tilapa (*Oreochromis niloticus*). The term 'tropical shrimps' comprises a large group of shrimps of various species that originate from South America, Africa and Asia. Some twenty species of the genus Penaid are marketed in Europe, although the African-Asiatic giant tiger prawn (*Penaeus monodon*), known internationally as black tiger shrimp, and the Pacific white shrimp (*Litopenaeus vannamei*), originally South American, are the farmed tropical shrimp selected for consideration. According to the SEAT project, 'shrimp' refers to seawater production (Penaeus monodon and Penaeus vannamei) and 'prawn' refers to fresh water production (Macrobrachium rosenbergii). These definitions are used in this thesis. Commercially, the terms are used interchangeably.

narrower perspective would sacrifice insights drawn from an evaluation of two countries, especially given the potential points of comparison and contrast. The countries were chosen based primarily on three variables. These were: i) extent of development (determined by the Human Development Index ranking[3]); ii) importance of the EU market for seafood exports (as determined by a literature review), and; iii) consolidation of the export value chains according to characteristics such as investment by the public and private sector, the number of nodes in the value chain and the level of traceability that has been established. These variables were chosen to incorporate research that not only reflected large producers, nor simply large exporters, but also the relative development of the value chain within the country.

Table 1.2 Comparison of the different SEAT project countries according to selected variables

Country	HDI Ranking	Importance of the EU market for seafood exports	Consolidation of export value chains
Bangladesh	Low	High	Low
China	Medium	Low	Low
Thailand	Medium	Low	High
Viet Nam	Medium	High	Medium

Source: Author

As Table 1.2 shows, Bangladesh and Thailand reflect the extremes in all three categories. While Bangladesh has the lowest HDI ranking out of the selected countries[4], the EU is its most important seafood[5] export market by value (51.7% in 2007, the year for which latest figures are available). The EU

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[3] The Human Development Index (HDI) is a composite statistic used to rank countries by level of 'human development'. The HDI is a comparative measure of life expectancy, litearcy, education and standards of living in a country and is a standard measure of well-being expressed as a number from 0 to 1; 1 being the best outcome possible.
[4] Bangladesh ranks 146th in the 2011 Rankings of the Human Development Index (HDI), while China, Thailand and Viet Nam rank 101st, 103rd and 128th respectively (UNDP 2011).
[5] Refers to exports of 0301, 0302, 0303, 0304, 0305, 0306 and 0307. See section 3.1 for further details on HS codes.

was also the most important export market by value for Vietnamese seafood (27.8%, 2009) and Chinese (19.1%, 2011[6]), while for Thailand, Japan was the most important seafood export market in 2011 (31.0%), followed by the US (26.6%) and EU (15.5%) (ITC 2012). Therefore, based on the first two variables, Bangladesh and Thailand offer two markedly different situations for research. Furthermore, of the four countries of study, Bangladesh and Thailand have differing value chain characteristics that will provide the greatest contrast between chains. For example, there are differing extents of consolidation, exemplified by widespread involvement of the rural poor in the aquaculture sector in Bangladesh, while in Thailand growth in seafood production has been exponential, resulting in the country become a leading seafood supplier with a highly developed and rigorous private sector and institutional context (see Chapter 5); the number of nodes that products must pass through between producer and consumer (see Chapter 6); and the ways in which actors are able to create value (see Chapter 7). Therefore, the two countries cover a range of different information flows and vantage points for exploring the dynamics of global seafood value chains.

The People's Republic of Bangladesh was the eighth most populous country in the world in 2009, with one of the highest densities of population (United Nations, Department of Economic and Social Affairs, Population Division 2011). However, Bangladesh has maintained an impressive record on growth and development, with the economy growing at nearly 6% per year. While poverty reduction in both urban and rural areas has been significant, the absolute number of people living below the poverty line remains

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[6] Greater detail on discrepancies in trade information is provided in Appendix 1.

significant, and GDP per capita in 2011 was USD 743.4 (The World Bank Group 2013). Sustained growth has generated higher demand for electricity, transport and telecommunication services, as well as highlighted widening infrastructure deficits. Bangladesh currently suffers from a record number of unemployed, estimated at 30 million. There are over 1 million entrants to the job market every year and unemployment is particularly high among young people (European Commission 2007a).

Bangladesh is a flat, deltaic land, with 80% of the country categorised as floodplain and most of the land exposed to monsoon flooding (Ministry of Environment and Forest, Government of the People's Republic of Bangladesh 2005). Cyclones Sidr in November 2007 and Ayla in May 2009 brought wind-driven tidal surges to the southwest region that inundated many freshwater areas with salt water. Nevertheless, aquaculture has made an important contribution to income generation and employment of ordinary rural people. Farmed fisheries products are one of the fastest growing subsectors of the Bangladesh economy, encouraged by three main factors: expansion of land for aquaculture; increased domestic demand and the opening of the international market; and access to inexpensive technologies (Karim et al. 2006).

In contrast, GDP per capita in Thailand in 2011 was USD 4,972.4, leading the World Bank to upgrade Thailand's income categorisation from a lower-middle income economy to an upper-middle income economy in July 2011 (The World Bank Group 2013). This is mostly due to Thailand's progress in social and economic development. Thailand is considered to be a development success story, with sustained strong growth and impressive

poverty reduction. The country benefits from a well-developed infrastructure, a free-enterprise economy, generally pro-investment policies and strong export industries. Thailand's growth from 2000-2007 averaged more than 4% per year and unemployment is less than 1% of the labour force, one of the lowest levels in the world (CIA 2013). Over the last decade, poverty has been reduced from a peak of 21% (a result of the 1997 Asian economic crisis) to around 8% in 2009, and is now primarily a rural phenomenon. Political uncertainty in recent years slowed economic growth, but economic activity is slowly returning to normal although there is still unequal sharing of the benefits with some regions – particularly the North and Northeast – lagging behind. GDP growth is forecast for 5.0% in 2013 (The World Bank Group 2013).

Thailand is the 4th largest producer of aquaculture in the world and the 3rd largest exporter of fish and fish products, contributing around 2% of total world aquaculture by volume in 2007 (FAO 2009a) (Pupphavesa and Tokrisna 2007). Fish is the primary source of animal protein in the Thai diet and cultural attachment to it as a food source is strong (Asian Development Bank 2009). Aquaculture provides quality nourishment and income opportunities to the rural poor as well as employment opportunities through manual labour, feed supply and product distribution (Schwantes, Diana, and Yi, Yang 2009). Around 2.6 million mt or 64% of Thai production came from marine capture fisheries in 2007, while brackish water culture contributed around 18%, fresh water culture 13% and the rest (5%) came from inland fisheries (Pupphavesa and Tokrisna 2007).

When considering the species for study, trade data shows that a total of 43,154 t of black tiger shrimp and 30,636 t of prawn were exported by Bangladesh in 2010[7], but no pangasius or tilapia (FAO 2012b). In Thailand, 566,326 t of shrimp were exported, with less than 1% (0.93%) represented by black tiger shrimp compared to the more popular vannamei. Of second greatest importance in seafood exports by volume from Thailand was tilapia (179,240 t in 2010) followed by prawn (25,606 t) (FAO 2012b). Consequently, shrimp (black tiger) and prawn chains were selected for study in Bangladesh and shrimp (vannamei) and tilapia[8] chains were selected for study in Thailand as these species have export-driven value chains.

The EU is the world's largest single market for imported fish and fishery products (FAO 2012a). In 2010, the total EU seafood supply for consumption, including EU landings and aquaculture products, plus imports and products subsequently exported, grew to 15.132 million t (A.I.P.C.E.-C.E.P. 2011). 5.738 million t were attributed to national landings (excluding non-food use) and aquaculture products, plus 9.394 million t of seafood were imported. Exports amounted to 2.12 million t, leading to an EU dependency on imports of 62% in 2010[9], slightly above 2009 but in keeping with the level of the previous five years since the EU expanded to 27 countries. Imports from suppliers outside of the EU represented 26% of world imports, worth USD 23.7 billion (if intra-EU trade is counted, imports were worth USD 44.6 billion in 2010, representing 40% of total world imports) (FAO 2012a). This growth is due to successive enlargement of the EU, an increasing per capita seafood

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[7] 5.6% of total aquaculture production (87.6% of production was freshwater fish, 5.7% marine fish, and the rest (1.1%) other crustaceans).
[8] Production of these species is 57.3% of total Thai production from aquaculture.
[9] Whitefish dependency is much higher – 89% in 2010 (A.I.P.C.E.-C.E.P. 2011).

consumption and a decline in indigenous marine supplies, resulting in an increased reliance on imports (FAO 2012a; Seafood Choices Alliance 2007).

In the 1980s, markets for seafood commodities were liberalised and since then the trading environment has continued to evolve through incremental changes in the global trading regime, bilateral and regional trade agreements, private and public quality standards, and the rise of non-OECD economies. Radical changes in the food marketing environment have occurred simultaneously, notably: consolidation, centralisation, globalisation, large-scale operations and the establishment of supermarkets as a major form of retailing (Baourakis, Kalogeras, and Mattas 2011). A focus on the production, storage, processing and distribution of durables of largely undifferentiated quality has shifted to increasingly perishable and differentiated products (Shrestha 2010). Rising income and urbanisation have led to changes in demand, not only in diet composition (from staples to non-staples) but also in preferences of food characteristics such as increased demand for safety, quality, convenience, organic and processed foods (Shrestha 2010). A rise of environmental and health standards has also been coupled with increased attention given to the social and economic impact of business operations on societies, both at home and abroad (Oxfam International 2009a).

Within this context, the research that follows makes a contribution to the global value chain literature by examining the market orientation of selected farmed seafood supply chains from Asia to the EU. In particular, this thesis assesses the importance of access to market information, the distribution of this information according to chain structures and the role of

market information in creating value by suppliers. For the purposes of this research, market information is defined as the rules of international seafood trade (such as food safety) and consumer values (such as sustainability). The distinction between information and knowledge in this thesis is that information consists of facts, while knowledge is how to interpret and utilise these facts. The objectives of the research are to:

1. Explore the process of generating market information in seafood value chains from Asia to the EU;

2. Understand under what conditions market information is, is not or is only partially disseminated in seafood value chains;

3. Analyse strategies that create value by chain agents and the role of market information.

The overall aim is to identify whether access to market information is the key to creating value or, alternatively, what other factors are critical in shaping supply chains. In the first part of the following Chapter 2, the analytical foundations of the value chain concept are reviewed and the global value chain (GVC) approach presented. This not only provides a context for the research that follows, but also helps to clarify terminology and identify areas of overlap with similar, often complementary approaches. The addition of the market orientation approach to create an enhanced and combined approach is then justified. Chapter 3 provides an overview of the secondary data available on the value chains of the selected species from the chosen countries to the EU seafood market. This enabled primary data needs to be ascertained. Chapter 4 sets out the methodology used to answer the research

questions while chapters 5, 6 and 7 present the results of the research. Chapter 5 answers the first research question by exploring the generation of market information through external governance in chains, and to what extent the value chains in Asia reflect market information available to EU agents. External governance is comprised of two aspects. The first aspect relates to regulation, the presence of standards and the influence of important agents in the international institutional framework. The second relates to how these aspects are reflected or implemented in a national setting. Chapter 6 focuses on the dissemination of market information, analysing internal value chain governance in order to determine under what conditions information is transferred. Internal governance also has two aspects. The first is governance as driving, which includes the identification of lead firms, levels of driving and the polarity of chains. The second is governance as coordination between value chain nodes. Chapter 7 reveals where improvements in performance or position have taken place in the selected value chains in Bangladesh and Thailand and the role of market information generated through external governance and transmitted through the internal governance of the chain, or from direct assistance and investment by EU value chain agents. Finally, chapter 8 concludes the thesis by presenting the unique findings of the research, how these advance existing understandings of global seafood value chains, the implications of these findings for both GVCs and future policy, and areas for further research.

Chapter 2

A review of the literature on Global Value Chains and the EU seafood market

The aim of this chapter is to review the principal concepts of GVC analysis and introduce the market orientation approach. The addition of market orientation is proposed in light of deficiencies in the GVC conceptual framework when viewed from a marketing perspective. The combined GVC and market orientation methodology will then frame the research that follows.

As globalisation's reach has expanded, the appeal of conceptualising and analysing globalisation using value chains is underscored by the sheer size of the flourishing literature (Bair 2009). A simple search for literature linked to value chains highlights issues of, *inter alia*, innovation, spatialisation, international competition, risk management, game theory in supply chains, network structures, offshoring, standards, consumer values, material flows, power relations and quality innovations. Journals as varied as *Production Economics, Industrial Marketing Management, Ecological Economics, World Development, Research Policy* and *Competition and Change* have all published research on value chains (for literature overviews see, *inter alia,* Bair, 2009; Fogliatto, da Silveira, & Borenstein, 2012; Lindgreen, Hingley, Grant, & Morgan, 2012; Saliola & Zanfei, 2009). Consequently, the review that follows will provide a selective summary of academic research and scholarship on global value chains that is relevant for the preparation of a global value chain analysis of seafood.

The political economy of development discipline is the only discipline to have resulted in a conceptual framework for the analysis of global value chains. Section 2.1 considers this development, while section 2.2 introduces a concurrent body of research that also focuses on global value chains: the strategic management discipline. The strategic management literature encompasses some of the key aspects of the GVC conceptual framework (such as material flows, governance, power relations) but offers one particularly important contribution: the notion of market orientation where consumer demand is the driver of production. In critiquing the GVC approach from this perspective, market orientation and its importance for the analysis of global value chains will be justified, demonstrating how the work that follows in this thesis provides a new understanding of global value chains.

2.1 A conceptual framework for the analysis of global value chains

The primary function of this section is to provide an overview of the basic concepts and ideas that together have come to form the GVC conceptual framework, so that the specific research that follows can be placed in the context of an academic tradition.

One way to understand the relationship between agents and activities that create goods and services in the global economy is to describe them as links in a chain (Bair 2009). Although chains have been international in scope since the emergence of modern capitalism in the 16th century (Wallerstein 2000), the number of different approaches to explain the organisation and geography of production has increased considerably since the 1950s and 1960s, when firms began to outsource large parts of production (Altenburg

2007). In her review of the genealogy of global commodity chains, Bair introduces three approaches that collectively constitute what may be considered the field of global chain studies (Bair 2009). These are: i) the world-systems tradition of macro-and long-range historical analysis of commodity chains (world systems theory); ii) a blend of organisational sociology and comparative development studies called the global commodity chain (GCC) framework; and iii) global value chain (GVC) analysis, which is drawn from the GCC framework but has its own distinct approach that incorporates transaction cost economics (Bair 2009; Sturgeon 2009). Although Bair states that these three approaches can be regarded as stemming from a single intellectual lineage in the sense that the GCC framework grew out of (though modified) world-systems theory, and GVC analysis grew out of (though again modified in important ways) the GCC framework, it is only the GCC approach, and through it GVC analysis, that has led to a conceptual framework for the analysis of international value chains (Bair 2009).

World-systems theory, focusing on world-wide temporal and spatial relations (Hopkins and Wallerstein 1986) was not the only exploration of producer-consumer networks towards the end of the last century. Others were: commodity systems analysis, which focused on national labour organisation and relations (Friedland 1984); the filière approach that focused on national political regulation and institutions, overwhelmingly applied to agricultural commodities (Raikes, Jensen, and Ponte 2000; Vassille 1983); and value chain analysis, whose focus was on the firm, international business organisation and the extraction of profit (Porter 1990). Gereffi (Gereffi 1994)

built on and refined these four traditions to refocus on the strategies and actions of firms, primarily in industrial commodity chains, in light of the restricted influence of states due to trade liberalisation. This analytical development led to global value chain analysis (Raynolds 2002).

The first book-length manuscript on global value chains was edited by Gary Gereffi and Miguel Korzeniewicz (Gereffi and Korzeniewicz 1994). At the time, such chains were referred to as global commodity chains. There is no clear consensus in the literature regarding the analytical relationship between the GCC framework and GVC analysis; described as a purely terminological shift by Gibbon and Ponte (Gibbon and Ponte 2005). The change partly occurred because the term 'global commodity chain' was seen as problematic by some disciplines. For example, the economist Michael Keane highlighted the limitations of the commodity concept, as a commodity purchased by a consumer is a composite of both the primary product and marketing services (Keane 2008; Asche et al. 2002). Fold and Larsen (2008) focused on the suitability of the term 'global value chain analysis' instead, by suggesting that the term is better at enveloping a wider variety of products, some of which lack commodity features. However, Gilbert (2008) pointed out that the term 'GVC' could potentially over-simplify important issues and lead to under-emphasising interactions among products. In the marketing literature, a commodity is seen as a good without qualitative differentiation (McQuiston 2004) and so the addition of the term 'value' captures the presence of differentiated products. In adopting the term 'value chain', emphasis is placed by the GVC conceptual framework on the delivery of value and not solely on logistics. In doing so, the new terminology assumes a marketing approach,

which is concerned with the processes of identification, creation, communication and delivery of values (Young & Muir, 2002). Notwithstanding its potential limitations, in order to ensure consistency in terminological usage, the term *global value chain (GVC) analysis* is used in this thesis to incorporate those elements derived from GCC analysis and developed by the political economy discipline to form the GVC conceptual framework, presented in sections 2.1.1 to 2.1.5.

Most reviewers regard Gereffi and Korzeniewiczas' work as the beginning of GVC analysis (Bair 2009). The most widely cited contribution was an article by Gereffi (Gereffi 1994), where he presented a basic yet operational form of the then-called GCC framework, comprising three main aspects:

i.   An input-output structure that maps the flow of products and services among value-adding economic activities;

ii.   A territorial dimension that characterises the spatial concentration and dispersion of production and distribution networks; and,

iii.   A governance structure that determines the flows and allocation of resources within chains.

Each of these will be discussed in turn in the following sections, followed by two more recent additions that complete the GVC conceptual framework.

2.1.1 Value Chain mapping

At the heart of value chain analysis is the mapping of key sectors and linkages (parts i. and ii. of Gereffi's framework). Descriptive mapping details the input-output structure of a chain including its geographic dimensions and vertical flows of material resources, finance, knowledge and information between buyers and suppliers. This input-output relationship has been criticised within the value chain literature as superficial due to its treatment of flows as linear (Henderson et al. 2002). However, John Humphrey, another prolific author on global value chains, defends Gereffi by pointing out that value chain mapping is an important tool in its own right, as the exercise identifies key processes and stakeholders within chains as well as marketing channels and potential stakeholders (Humphrey 2005). Humphrey also argues that this knowledge is an important basis for subsequent development and analysis (Humphrey 2005). Furthermore, mapping can be analytically rigorous through the use of empirical quantitative assessments (such as employment or profit margins at value chain nodes) in addition to qualitative (geographic) elements (Kaplinsky and Morris 2001; FIAS 2007).

2.1.2 Governance

The innovative aspect of the GCC framework is the third dimension of Gereffi's structure, in which the key analytical notions of chain governance and lead firms are presented. In first examinations of GCC analysis, Gereffi recognised that globalisation and changes in international trade had raised the importance of global buyers, particularly retailers and brand name companies in creating production, distribution and marketing systems (Gereffi

1994). He called these 'buyer-driven global commodity chains' and key agents are referred to as 'lead firms'. In such chains, producers do not export into an anonymous global market but feed into supply chains governed by powerful global agents whose market power may be based on the ownership of well-established brand names, proprietary technology and exclusive information about different product markets (Schmitz 2005). In being difficult to emulate, competitive advantage is gained. This thinking was already a development from much of the literature on globalisation in the 1970s and 1980s, which emphasised the role of transnational manufacturing corporations and not retailers as the main agents of globalisation (Humphrey 2005). Agricultural commodities including seafood tend to fall into buyer-driven chains while producer-driven chains are usually found in sectors with high technological and capital requirements, where companies that control key technology and production facilities exercise chain governance. Lead firms in chains do more than simply place orders but actively create, shape and coordinate supply chains, either directly from Headquarters or through the use of overseas offices or intermediaries (Jespersen et al. 2012). In this way, lead firms 'drive' chains, creating capabilities in developing countries and guiding and controlling key resources. Linking back to the introduction; while trade theory puts the endowments of production factors at the centre of its analysis, the value chain approach focuses its attention on how production and trade are, to a varying degree, coordinated and shaped by lead firms, giving rise to different patterns of industrial organisation and chain configuration.

More recent work on GVC analysis has broadened the term 'buyer' as lead firm to include retailers, processors and international traders (Raikes,

Jensen, and Ponte 2000; Sturgeon 2009). Nevertheless, the idea of trader-driven chains has not gained ground as it neglects the portion of the chain beyond traders where final production and sale to consumers occurs (Talbot 2009) and research has instead focused on retailers (Hamilton and Gereffi 2009; Hamilton, Petrovic, and Senauer 2011). The concept of lead firms is mirrored in the marketing literature but referred to as channel leaders or 'captains' (Mason, Doyle, and Wong 2006; Stern and Weitz 1997). Similarly to the GVC literature, channel leaders influence the strategies of other supply chain members with the objective of controlling various aspects of channel operations (Schul, Pride, and Little Jr. 1983).

The use of the term 'power' is more recent in the GVC literature, where the lead firm role may be attributed to purchasing power (such as large retailers), supplier power (such as arising from technological or market dominance) and competence power (based on technical and service capabilities that are difficult to replace) (Jespersen et al. 2012). Essentially, lead firms are the coordinating entity in chains, organising value chains so that there is a specific allocation of resources and distribution of gains, defining the terms of chain membership and the incorporation or exclusion of other agents accordingly, as well as the allocation of activities that lead firms do not wish to perform, dictating the terms of their participation to immediate suppliers and often all the way to primary producers (Gereffi 1994; Gibbon and Ponte 2005; Mazé 2002; Jespersen et al. 2012). In particular, research and development (R&D), design, marketing and branding tend to be hosted by lead firms in developed countries, while production aspects are often outsourced to developing countries. However, outsourcing by manufacturers

and involvement in production-definition by retailers through private label brands (defined as a brand that is sold exclusively by a specific retail chain, typically developed and standardised by the retailer, and produced by a limited number of suppliers on a contractual basis) may blur the lines between buyers and producers (Nadvi 2008).

There can be considerable costs involved to a firm in specifying, communicating and enforcing organisational ties within value chains (Humphrey and Schmitz 2002; Humphrey 2006). Reducing the costs of organising the chain and coordinating dispersed and varied suppliers lie at the heart of what lead firms do. The more differentiated the product, the higher the coordination required to ensure that products of desired quality and characteristics are available to the consumer at the right time and place. Seafood has particular characteristics that require greater coordination in chains than other food product sectors due to higher levels of complexity (Young and Muir 2002). There is sometimes uncertain supply, variable sourcing locations and high perishability, so that temperature controlled transport systems are crucial to preserving quality. Farming seafood can reduce uncertainty enabling control and prediction of volumes, although even farmed seafood is dependent to some extent on climatic conditions such as optimal temperatures and rainfall. Seafood raw material can be transformed into a wide range of products, some of which are highly processed with high differentiation in quality, safety and convenience, and many of the values incorporated in the final product are intangible (Young and Muir 2002).

Criticism has been levelled at the conceptualisation of producer/buyer-driven chains within the value chain literature as being too simplistic because

'buyer-drivenness' can be quite inaccurate when used as a distinct analytical category and is based on static views of technology and barriers to entry (Fold and Larsen 2008). Furthermore, while 'buyers' in one sense are retailers, marketers and branded manufacturers, 'buying operations' are carried out by multiple agents and enterprises throughout the chain, some of which may also be involved in production i.e. supply activities (Fold and Larsen 2008). Other research has also considered 'unipolar', 'bipolar' or 'twin-driven' chains (Islam 2008). Gereffi, Humphrey and Sturgeon (2005) acknowledge these difficulties and agree that the producer/buyer-driven typology fails to capture newer forms of governance that have arisen. This is particularly important for tropical seafood chains, which are among the most heavily state-regulated chains in the world economy and have also incorporated social movements and NGOs into chain governance (Nadvi 2008). These limitations are overcome through the later addition of the institutional framework to GVC analysis (section 2.1.4).

Hess and Coe (2006) also critiqued the governance framework as being highly stylised as power distribution in chains is not clearly spread and is continuously renegotiated. Instead, they stress that different forms of governance may be apparent at a given point of a chain (Hess and Coe 2006; Nadvi 2008). Hess and Coe differentiate between 'institutional' and 'political' governance, 'inter-firm' governance and 'intra-firm' governance (Hess and Coe 2006), while Gereffi and Mayer distinguish between 'market', 'corporate' and 'industrial' governance (Nadvi 2008). Essentially, what they all seek to do is explain globalisation and its distribution of production, which requires more intensive organisation of ties within global production networks, sometimes

leading to the relative decline of national regulatory governance and the growing significance of both international and private agents (Hess and Coe 2006). This body of work eventually led to a separate school of thought called the Global Production Network (GPN) approach, which was developed independently by several scholars at the University of Manchester. The GPN school, arising from social embeddedness and economic geography, argues that the chain metaphor is inadequate to conceptualise how firms are embedded in societies that display considerable variety, how firms and individuals are influenced by overall power relations, and how knowledge is produced and circulated in multidirectional ways. The school argues that one of the most useful ways of understanding the complexity of the global economy is the concept of a network rather than linear approaches to chain analysis. While the GVC framework focuses more narrowly on the governance of inter-firm transactions, the GPN school attempts to encompass all relevant sets of agents and relationships (Coe, Dicken, and Hess 2007). Clearly, each stage of a production chain is embedded in much wider sets of non-linear relationships. Nevertheless, in practice most of the studies produced by the GPN framework are similar to those generated by GVC analysis (Levy 2008). Therefore, the research presented in this thesis adheres to the GVC framework but also pays attention to broader relationships and not only vertical associations in the chains under consideration. This is also further discussed in section 2.1.4 on the institutional framework.

2.1.3 Coordination

Gibbon and Ponte (2005) responded to the GPN critique of governance and refined the GVC framework by distinguishing between 'modes of governance' (as explained in 2.1.2) and 'forms of coordination'. 'Coordination' examines how buyers and sellers exchange a product, their standards and information, and how they relate to one another. The presence of different forms of coordination within a particular GVC does not rule out a prevalent structure of governance, in particular, the tendency towards global value chains being buyer-driven (Fold and Larsen 2008). Consequently there may be different forms of coordination both along and between agents in different functional positions in value chains within an overarching context of buyer-driven governance. Recent literature has started to combine whole-chain governance (governance as 'driving') and individual-node coordination (Jespersen et al. 2012). Sturgeon (2009) in particular provides some general guidance on how this could take place, recognising that overall value chain governance can be a combination of a variety of forms of coordination at various nodes. Nevertheless, this distinction is somewhat artificial as what happens in one node of the value chain can shape relations elsewhere.

Gereffi, Humphrey and Sturgeon (2005) developed an analytical framework that yields forms of coordination based on a matrix of three independent variables that can each take two values (high and low). These variables are:

i) The complexity of the information and knowledge required to sustain a particular transaction;

ii) The ability to codify and transmit efficiently this information between the parties; and,

iii) The capabilities of the supply base in relation to the requirements of the transaction.

The matrix yields eight combinations, three of which are ruled out in practice[10] (Table 2.1).

Table 2.1 Coordination in Supply Chains

Coordination	Complexity of transactions	Ability to Codify	Capabilities in the supply base
Market	Low	High	High
Modular	High	High	High
Relational	High	Low	High
Captive	High	High	Low
Hierarchy	High	Low	Low

Source: Jespersen et al. (2012)

Market coordination is characterised by spot or repeated market-type inter-firm exchanges where there is low informational complexity, ease of codification of information, and high supplier capabilities. Both parties' costs of switching to new partners are low. In contrast, inter-firm relations in modular coordination are highly specialised, involving suppliers who finance part of production on behalf of the customer but whose technology is sufficiently generic to allow its use by a broad customer base. These transactions are characterised by high informational complexity, ease of codification and high supplier capabilities. Relational coordination involves multiple inter-dependencies, often underwritten by close social ties; characterised by high informational complexity, low ability to codify information and high supplier

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[10] Low informational complexity without codification generates two combinations that are unlikely to occur regardless of supplier competence, high or low. Furthermore, if there is low complexity and a high possibility for codification, and suppliers still do not have the capabilities to meet the requirements of buyers, then it is likely that they will be excluded from the chain (Gereffi, Humphrey, and Sturgeon 2005).

capabilities. Captive inter-firm relations are distinguished by the one-way dependency of suppliers, high levels of supplier monitoring and high costs of switching for suppliers. There is high informational complexity and ease of codification but low supplier capabilities. At the other end of the scale to market coordination, hierarchical coordination exists where there is vertical integration, typified by high informational complexity, difficulty of codification and low capabilities among independent suppliers. The model can be shown schematically (Figure 2.1).

Figure 2.1 Coordination mechanisms in GVC analysis
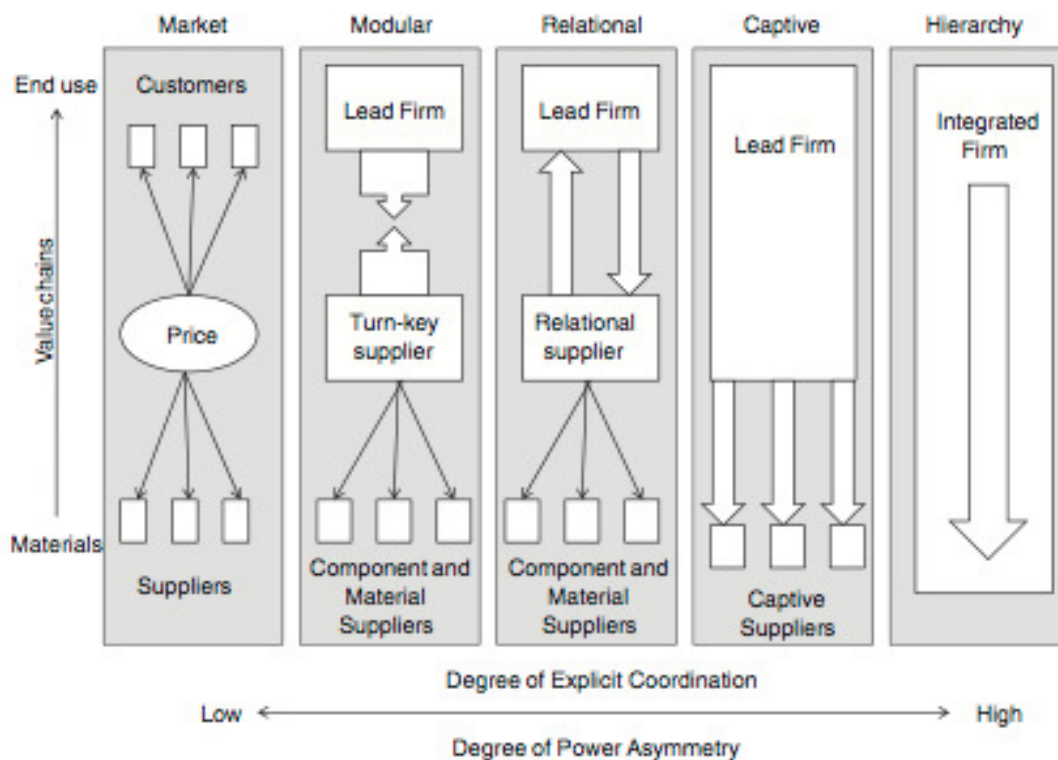
Source: (Gereffi, Humphrey, and Sturgeon 2005)

The model helps to identify specific forms of coordination that may emerge at individual nodes and contributes to an overall view of governance when the variety of forms of coordination at different nodes is taken into account.

2.1.4 Institutional Framework

External regulation entered the conceptual framework as a fourth dimension from the political economy discipline. The so-called 'institutional framework' identifies how local, national and international conditions and policies shape the globalisation process at each stage of the chain (Talbot 2009). Institutions are not organisations (although they can take such a form), but are best understood as a set of formal (e.g. laws) and informal (e.g. norms of social behaviour) rules (Jespersen et al. 2012). In mainstream international political economy, global economic governance is embedded in institutions (WTO, IMF, World Bank, G20 etc), while GVC scholars instead underscore the role played by lead firms in global economic governance (Jespersen et al. 2012). At the same time, institutions impact on the way that lead firms organise value chains; external agents can shape important institutional and organisational features of chains and define the parameters of production processes (Fold and Larsen 2008; Ponte 2007; Humphrey and Memedovic 2006; Islam 2008). For example, various agents interact with the functioning of the value chain that may influence terms of participation, gains or other areas. These include organisations and pressure groups such as industry organisations, lobbies, farmer associations, political parties, certifiers, multi-stakeholder fora, NGOs, expert communities and academics (Jespersen et al. 2012).

In Gereffi's early work the importance of the national regulatory environment is stressed in relation to both producer-driven chains (direct and interventionist involvement by the state) and buyer-driven chains (where the state facilitates mechanisms for private business accumulation without direct

interference). Regulation occurs at multiple levels and includes international, regional and bilateral trade agreements covering tariffs and non-tariff measures such as mandatory sanitary and phytosanitary standards and technical specifications; rules of origin and traceability; national regulations determining food safety, social and environmental standards; industrial policy restricting or facilitating investments in specific sectors; tax regimes and licensing requirements; and voluntary standards and certifications. National policies in developed-country markets are deemed particularly significant in light of how protectionist measures influence the global location pattern of exports and sub-contracting (Jespersen et al. 2012). This is even more the case for private standards that are filling the gap where governments do not wish to or have been unable to act (OECD 2010). The proliferation and development of certification initiatives have been accompanied by a growth in the number of institutions and agents setting standards and assessing conformity; the functions they perform; their institutional structure; the issues they seek to govern; the way their governance is exercised; and the way the governance is audited (Ponte et al. 2011). Increasingly, private agents such as corporations, NGOs and industry associations are involved in negotiating standards for producers, labour and the environment, and for monitoring compliance and certification to these standards. This new form of private governance, a form of privatised governance, has expanded rapidly across industries of critical interest to EU consumers (Ponte et al. 2011).

Although in later work various multilateral and national regulatory institutions are taken into account in some of the empirical studies (for example, apparel chains from developing countries to the UK market (Gereffi

1994; Gereffi 1999)), the institutional framework has not been further elaborated or included as an equally important analytical dimension in subsequent work by Gereffi (Fold and Larsen 2008).

2.1.5 Upgrading

In GVC analysis, upgrading refers to knowledge and information flows within value chains from lead firms to their suppliers (or buyers), which assist with the acquisition of new capabilities and market segments (Gereffi 1999). Upgrading is defined according to two broad orientations within the GVC literature. The first relates to indentifying the source of capabilities that lead to increasing competences and accessing new markets. The second is more explicitly concerned with development and examines the conditions that lead to a better outcome for developing country firms within GVCs (Kelling et al. 2012). Gereffi explains that upgrading does not occur to a random set of capital- or skill-intensive industries or activities, but rather to products that are organisationally related. Therefore, upgrading in various forms could be effectively stimulated through learning from lead firms rather than through interactions between firms in the same functional position. At the very least, some form of participation in GVCs is considered necessary for upgrading in developing countries and researchers employing a GVC approach examine the circumstances necessary to ensure that participation in global value chains contributes to the development of poorer nations (Fold and Larsen 2008). These discussions focus on the possibilities for the global redistribution of benefits or increasing the range of activities undertaken in producing countries (Fold and Larsen 2008; Hale and Opondo 2005).

Analytically, Gereffi distinguished between four different 'levels' of upgrading:

i)   Within factories (towards more expensive and complex products and larger orders);

ii)   Within inter-firm enterprise networks (from mass production of standard goods towards flexible production of differentiated merchandise);

iii)   Within local or national economies (from simple assembly towards own equipment manufacturing and own-brand manufacturing with greater local and national linkage effects); and,

iv)   Within regions (from bilateral, asymmetrical and inter-regional trade flows towards an intra-regional division of labour, including all segments of the particular GVCs) (Gereffi 1999).

These categories try to incorporate technological and organisational processes at firm and industry levels in addition to changes in the geographical and input-output dimensions, resulting in a broad vertical (between nodes) conceptualisation of the upgrading process (Fold and Larsen 2008). Humphrey and Schmitz (in Fold & Larsen, 2008), with revisions by Keane (2008), provide a more analytically rigid set of horizontal (within each node) upgrading types. They distinguish between:

i)   Process upgrading (inputs are transformed more efficiently by reorganising the production system or introducing superior technology);

ii)   Product upgrading (production is moved into more sophisticated product lines);

iii) Functional upgrading (new functions are acquired - or existing functions abandoned - leading to the increased skill content of activities;

iv)   Inter-sectoral upgrading (using the knowledge acquired in particular chain functions to move into different sectors).

This typology is more focused on organisational dimensions at the company or industry level and explicitly links different forms of chain governance with different upgrading implications (Gibbon 2003; Gibbon 2008; Keane 2008). For example, the requirements of final product markets in high-income countries may require capabilities that are outside the reach of poor countries, and lead firms may soon find themselves working to upgrade producers in lower income countries (Bolwig et al. 2010). Kaplinsky refers to this type of assistance to value chain participants as 'executive governance' or 'proactive governance' (Kaplinsky 2004). Success in upgrading is therefore dependent on a mix of factors that include the particular value chain, the strategic objective of the industry (or government) and the specific structure of the industry (Kelling et al. 2012).

The normative expectation in the GVC literature is that developing country firms should 'move up' the value chain - leading to performing functions that have more skill and knowledge content (functional upgrading). At the same time, empirical studies point to a more complex set of upgrading strategies (Giuliani, Pietrobelli, and Rabellotti 2005; Kelling et al. 2012). Some

of these trajectories suggest that volume, economies of scale and dynamics that would otherwise be termed 'downgrading' (performing functions that have less skill and knowledge content) or 'outgrading' (into new chains) may co-exist with more traditional upgrading paths for developing country firms (Gibbon and Ponte 2005; Riisgaard et al. 2008).

Figure 2.2 summarises the GVC conceptual framework as set out in this chapter.

Figure 2.2 The Value Chain
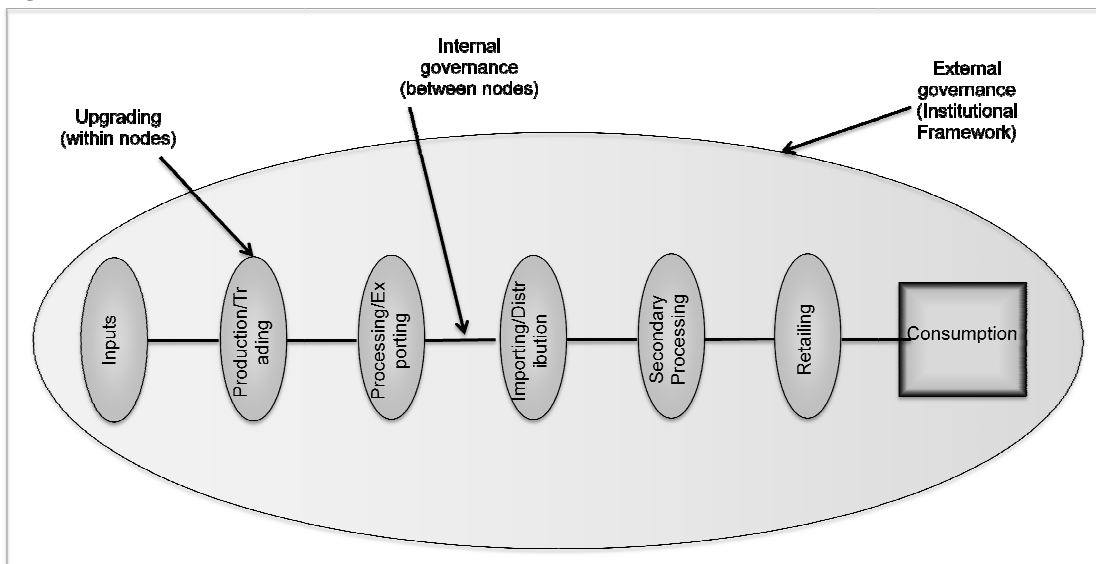
Source: Author

2.2 The market orientation approach

As the previous overview has shown, the value chain approach is not a fully coherent theory but a research tradition that is still developing. There are certain deficiencies in GVC analyses when viewed from a marketing perspective, and the GVC approach can be enriched by some of the insights gained from the marketing literature.

The assumption that GVC analysis makes - and one of its strengths - is that analysis can take place along the entire length of the value chain. Despite this, a result of the emergence of the GVC analytical framework from the political economy of development (and underdevelopment) approach is that GVC analysis has traditionally maintained a production orientation to study the workings and impacts of value chains (Raynolds 2002). The aim of this thesis is to challenge the prevailing focus on production and introduce a new way of thinking about global value chains.

The most cited and influential management strategist was Michael Porter, who introduced a number of new concepts to strategic management, the most important being the idea of the value chain (Porter 1985). Before Porter, the supply chain management literature was already beginning to view chains as a single entity instead of disparate functions (Oliver and Webber 1982; Laseter and Oliver 2003). However, its focus tended to be on efficient supply and was consequently cost-oriented. Porter added the customer value-based theory of the firm and argued that superior performance is a result of providing superior customer value; a major determinant of competitive advantage (Grunert et al. 2005; Guenzi and Troilo 2007). Providing superior customer value through knowledge about the market, especially about customers as a basis for decision-making on what to produce, how to produce it and how to market it, is called market orientation in the literature (Kohli and Jaworski 1990; Jaworski and Kohli 1993; Jaworski and Kohli 1996). Market orientation can lead to innovative products that foster customer loyalty, leading to sustainable competitive advantage (Guenzi and Troilo 2007; Mason, Doyle, and Wong 2006; Reid and Brady 2012). By contrast, the focus

of the GVC literature is on relationships through which global buyers organise their transactions along value chains and the effect of these on developing countries and development (Saliola and Zanfei 2009). The marketing literature therefore supplants this focus with a whole-chain orientation towards value delivery.

As the introduction noted, it is the *combined* activities of value chains that determine the extent and type of value created in the eyes of the end consumer. Therefore, the definition of the degree of market orientation of a value chain is the extent to which the combined activities of chain members generate market intelligence, disseminate this intelligence, and respond to it. Kohli & Jaworski's initial definition is extended by Grunert et al. in defining the market orientation of a value chain as: chain members' generation of intelligence pertaining to current and future end-user needs, dissemination of this intelligence across chain members and chain-wide responsiveness to it (Grunert et al. 2002; Grunert et al. 2005; Grunert et al. 2010). Consequently, information generation refers to the sum of activities by all chain members focused on gaining information about end users (usually consumers); dissemination includes all exchanges of information about end users between and among chain members; and responsiveness refers to the actions of the chain members to create superior value for end-users (Grunert et al. 2010). A chain can be said to have a high level of market orientation when market oriented activities are distributed across the chain and not just one or two (usually downstream) agents (Grunert et al. 2004). However, information need not be evenly distributed across the chain; for example, a downstream actor

may be responsible for information generation whereas suppliers may be responsible for responding to this intelligence (Grunert et al. 2010).

Orienting a firm around understanding customer needs makes important assumptions about how information is accessed, used, passed along the value chain and responded to by value chain agents. While all value chain relationships do imply some transmission of information between the parties, the extent to which knowledge is created, transferred and adopted along the chain varies (Saliola and Zanfei 2009). In the GVC literature, little emphasis is placed on these aspects, which has important implications for the exploration of governance and upgrading in value chains in particular.

A key premise underlying the market orientation construct asserts that a firm's capability to obtain information on consumer preferences, customer actions and channel members determines its ability to govern its supply chain (Burt 2000; Cairncross 2002; Ottesen and Grønhaug 2002b; Langabeer and Rose 2001; Pereira 2001). In order to govern competitively, value chain agents (and particularly lead firms) need relevant and timely information about the market (Kohli and Jaworski 1990). As opportunities and threats are continuously evolving due to the emergence of new technology, actions by competitors, or shifts in customer preferences and behaviour, market information must be generated almost constantly. This stream of market data must be collected, interpreted, distributed among chain members and adequately utilised and exploited in order to stay competitive (Ottesen and Grønhaug 2002a). As a result of obtaining such information, lead firms gain the impetus to reconfigure roles, functions and tasks that will support the most cost-effective and value-enhancing methods of meeting market demands and

creating customer value (Narver and Slater 1990). Access to market information at all levels of the value chain has an impact on the chain's ability to produce products that match consumer values. The research that follows explores how this knowledge is gained, the power it entails and implications for value chain agents.

Attempts have previously been made to integrate the relationship between consumption and production into the analysis of agro-food chains by GVC scholars; for example, Hamilton and Gereffi identified demand-responsive economies that are economically organised 'backwards' from final demand. Nevertheless, by the authors' own admission, market processes are assumed at the demand end rather than understood (Hamilton and Gereffi 2009).

Extending GVC analysis by adding the market orientation approach will result in an analysis of value chains from a market-centric perspective, looking from the market upstream towards production. Specifically, as value chains are embedded in social norms and values and specific consumer preferences, the addition of the market orientation approach to the existing GVC analytical framework will enable an examination of the ways in which seafood value chains are shaped by value chain agents' abilities to generate, disseminate and respond to market information. This will result in three particular improvements to the existing methodology in light of the emphasis of the market orientation literature. First, a combined approach will focus on what consumers perceive as valuable. This will permit the analysis to identify both the source and topic of market information and how this is generated along the length of the selected value chains. Second, a combined approach will

enable an examination of the governance and coordination conditions under which information is disseminated. Not all value chain relationships are equally conducive to knowledge transfer (Saliola and Zanfei 2009). Varying value chain structures may lead to information asymmetry in value chains, potentially undermining the chain's competitive advantage. Finally, this thesis enlarges existing examinations of upgrading by analysing strategies by value chain agents that create value, and the role of market information.

In combining these two approaches, the strength of GVC analysis is acknowledged while market orientation leads to the study of how firms active in international markets structure their supply chains and organise the generation, transfer and response to complex and strategic information. These activities lead to specific implications for value chain agents regarding knowledge and power in farmed seafood supply.

Specifically, the objectives of the research are to:

1. Explore the process of generating market information in seafood value chains from Asia to the EU;

2. Understand under what conditions market information is, is not or is only partially disseminated in seafood value chains;

3. Analyse responses that create value by chain agents and the role of market information.

To summarise, the premise of this literature review is that gaps in GVC analysis as seen from the perspective of the marketing literature are resolved through the addition of the market orientation approach, which focuses on the generation, dissemination and response to market information in value chains.

(the topic of the analytical chapters 5, 6 and 7). First, chapter 3 will capture available knowledge that answers the research questions. This will lead to the identification of knowledge gaps to be filled through fieldwork. The research methodology for fieldwork is presented in chapter 4.

Chapter 3

Seafood Value Chains from Asia to the EU

Having identified the research objectives in Chapter 2, the purpose of Chapter 3 is to: first, identify the data required for meeting the research objectives and; second, review the secondary data available on seafood value chains from the selected countries in Asia to the EU in order to synthesise existing knowledge on the selected value chains and identify data gaps that will need to be filled through fieldwork.

The five main areas of examination in the GVC approach are: mapping, governance, coordination, the institutional framework and upgrading. This is the conceptual framework that will be utilised to analyse the seafood value chains under consideration. Adding the market orientation approach requires looking at value chains through the lens of market information generation, dissemination and response, as explained in Chapter 2.

In order to answer the first research objective on exploring the process of generating market information in seafood value chains, data are required on:

- The EU seafood market, in particular consumer values.

- The *institutional framework* in which chains operate. The institutional framework is part of market information as it constitutes the rules and regulations that determine access to markets. Private and public

standards are also part of market information flows that shape the value chain.

In order to answer the second research objective on the dissemination of information in seafood value chains, data are required on:

- Product flows. A product flow *map* of the shrimp and prawn chains from Bangladesh and shrimp and tilapia chains from Thailand through EU supply channels is required in order to introduce common terminology as well as identify chain structures, including important nodes and agents through which information is disseminated. Value chain maps help create a quick overview of complex realities and highlight networks and interdependencies between agents and processes in the value chain (McCormick and Schmitz 2002; Herr and Muzira 2009).

- Information flows in chains. This will require analysing the *governance* and *coordination* mechanisms that exist in seafood supply chains in order to understand under which conditions market information is disseminated. In order to achieve this, lead firms will need to be identified, how they 'drive' the chain, and coordination strategies employed at different nodes.

Finally, analysing responses that create value by chain agents and the role of market information requires analysing:

- Upgrading strategies in the selected value chains.

The remainder of this chapter will assess the suitability of existing literature to answer these questions. This will lead to the identification of gaps to be filled through fieldwork subsequently.

3.1 The generation of market information in seafood value chains

Information on the EU seafood market is important to value chain agents throughout the chain as it is the basis of implementing a market orientation approach. Being market oriented means having an in-depth understanding of customers in order to meet and exceed expectations, better than the competition (Moloney, Fahy, and McAleer 2005). Value chains whose firms are able to respond to market information can produce product attributes that match consumer values, gaining competitive advantages. These competitive advantages may reduce risks or increase rewards for value chain members, resulting in higher value returns.

The EU is an economic and political union of 27 member states[11] (EU-27) (Figure 3.1). In the EU, the seafood industry is a sector with a long tradition and history, initially based on capture fisheries and landings from coastal and international waters. The EU is not a homogenous market and the relative importance of seafood to differing national markets as well as sub-markets and product categories means that consumer values may also differ (Holmyard 2010). It is therefore important to identify end markets for the selected products in order to better understand this differentiation.

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[11] Members of the EU-27 are: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

Figure 3.1 Member States of the EU
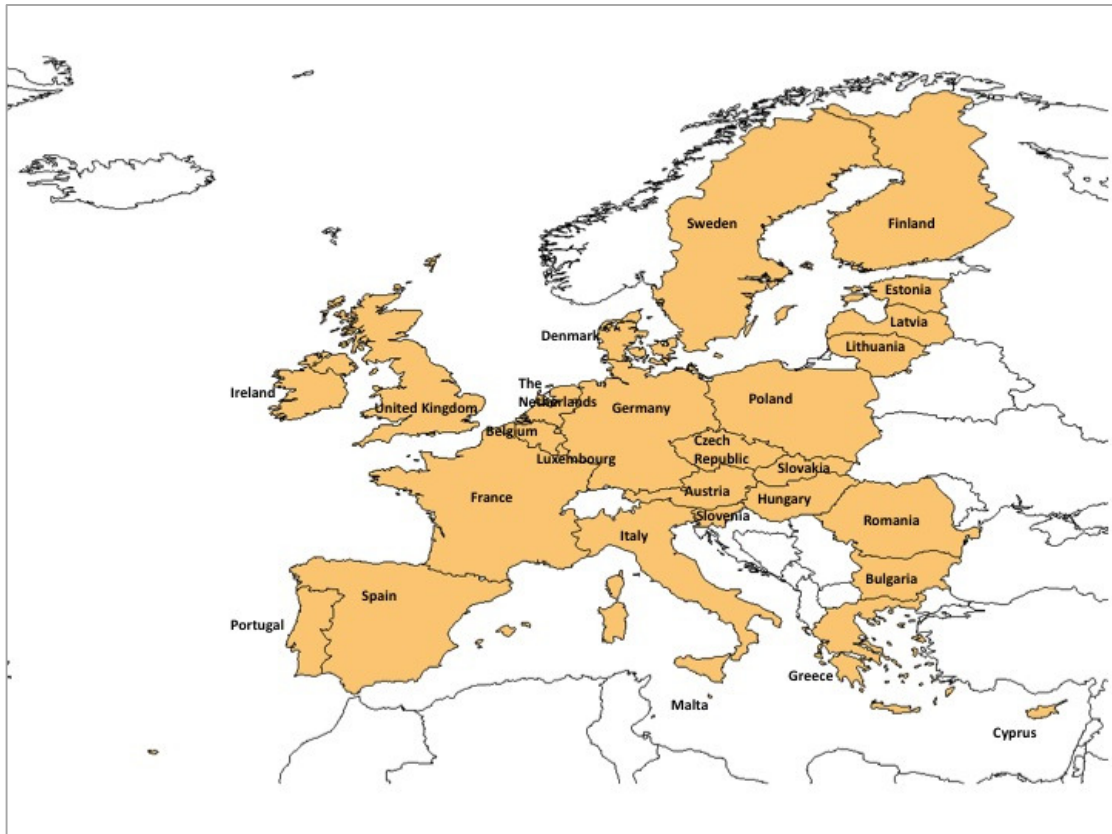
Source: (European Commission 2012b)

Consumption per capita data is an indicator of the relative importance of seafood to national markets and the approximate size of the market. Total apparent consumption per capita is calculated by taking domestic production figures (product weight) in the EU-27 countries, adding imports and subtracting exports, and dividing by the number of inhabitants per country. Consumption figures for 2010 are presented in Figure 3.2. The figure shows low seafood consumption by eastern European countries and high consumption by southern European and Baltic states.

Figure 3.2 Consumption per capita in 2010 (kg/capita/annum)
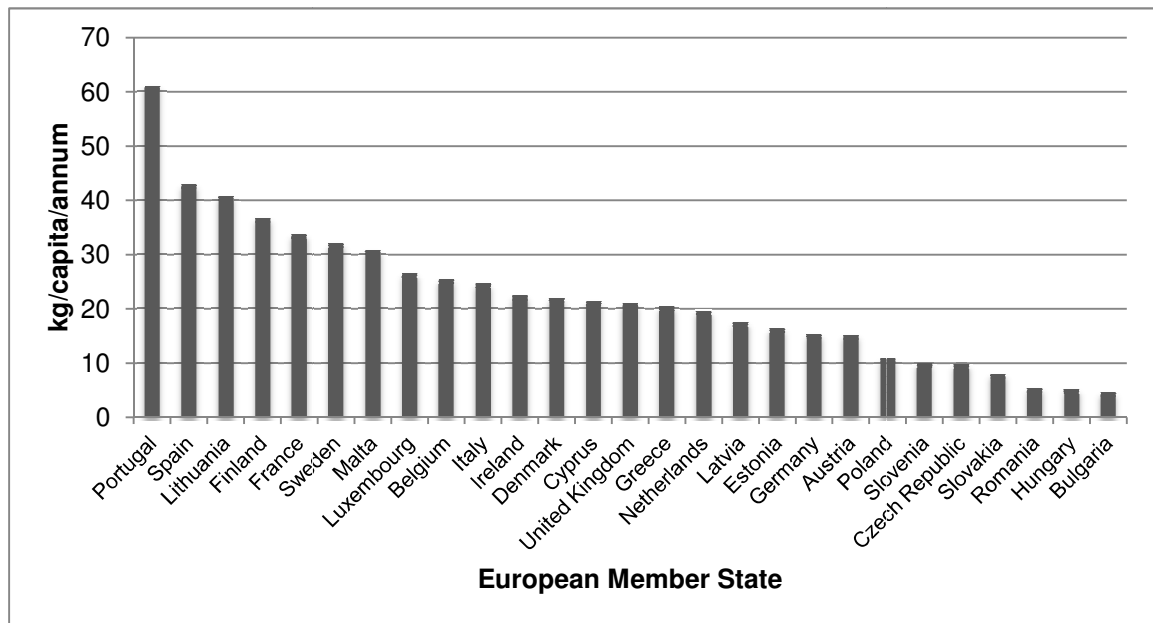
Source: (European Commission 2012a)

However, seafood consumption per capita does not necessarily reflect the most important markets for the species under consideration. Instead, international trade statistics can identify important EU importing countries for specific products. International trade in goods is recorded using standardised six-digit codes under the World Customs Organisation's internationally agreed "Harmonised System" (HS) for commodity groups. In the EU, statistics on exports and imports are available through the EC's statistics database (EUROSTAT). Eurostat uses the CN (Combined Nomenclature) system to identify products. The CN system is itself based on the HS system, but permits 8-digit rather than only 6-digit codes[12]. The first six digits are identical to the HS system, but as the EU requires greater detail for statistical or tariff reasons, HS codes may undergo a further 'split' into 8-digit CN codes. Beyond

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[12] A third system is in use, called the Standard International Trade Classification (SITC), established by the United Nations. Until the HS was adopted, the SITC was the only trade classification that enabled comparisons to be made on a worldwide basis. The third revision of the SITC, introduced on 1 January 1988 is the one currently in use, and provides headings that correspond directly to those of the HS declarations. Consequently, the SITC system is not discussed further.

six digits, countries are free to use their own definitions according to their individual requirements as presented in the tables below[13] (Tables 3.1 and 3.2).

Table 3.1 HS Codes for Shrimp and Prawn

Section	Chapter	Heading	Code	Additional digits	Description
I					Live Animals; animal products (chapter 1-5)
I	03				Fish and Crustaceans, Molluscs and other aquatic invertebrates
I	03	06			Crustaceans, whether in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or by boiling in water, whether or not chilled, frozen, dried, salted or in brine; flours, meals and pellets of crustaceans, fit for human consumption
I	03	06	11		Frozen (all)*
I	03	06	13	50 00	Frozen Shrimps of the genus Panaeus
			23		Shrimps and prawns
IV					Prepared foodstuffs; beverages, spirits and vinegar; tobacco and manufactured tobacco substitutes (chapter 16-24)
IV	16				Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates
IV	16	05			Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved
IV	16	05	20		Shrimps and prawns (all)
IV	16	05	20	10 20	Shelled and Frozen

* The use of the term 'all' is added by the author to clearly show where HS codes cover all types of shrimps and prawns and not just those of the genus 'Panaeus'
⑦The terms shaded in grey denote levels of disaggregation that cannot be compared internationally.

Source: http://online.businesslink.gov.uk[14]

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[13] www.wcoomd.org
[14] http://tariff.businesslink.gov.uk/tariff-bl/export/heading.html?export=false&from=list&id=0306&simulationDate=15/08/12; http://tariff.businesslink.gov.uk/tariff-bl/export/heading.html?export=false&from=list&id=1605&simulationDate=15/08/12

Member States of the EU do not always use the same codes to define products beyond six digits and therefore six digits is the most detailed product level that can be consistently compared internationally. The HS is updated (addition or removal of codes, aggregation or disaggregation of products) every 5-6 years. The most recent revision took effect from 1 January 2012.

Species of the genus 'Panaeus' are only given a specific product code in international trade denoting their genus when frozen. All types of 'prepared and preserved' product forms are only disaggregated to the level of 'shrimps and prawns'. In contrast, shrimps and prawns of the species '*Pandalus borealis*' (cold water species) are given disaggregated product codes by the method of preparation or preservation e.g. shelled, boiled, frozen, cooked and peeled etc. This reflects traditional species important to the EU. The lack of standardisation of product codes and their dynamism can lead to serious problems when attempting to make temporal comparisons.

According to EUROSTAT (Figure 3.3), the five principal importers by volume of shrimp and prawn from Bangladesh are Germany, the United Kingdom, France, the Netherlands and Belgium. The most significant importing EU Member States of Thai shrimp and prawn are France, the United Kingdom, the Netherlands, Germany and Italy. Figure 3.3 also shows the comparative quantities imported (all shrimp and prawn commodities) from Bangladesh and Thailand by each EU Member State.

Figure 3.3 Imports of shrimp and prawn (0306, 1605) from Bangladesh and Thailand by EU Member States, 2010
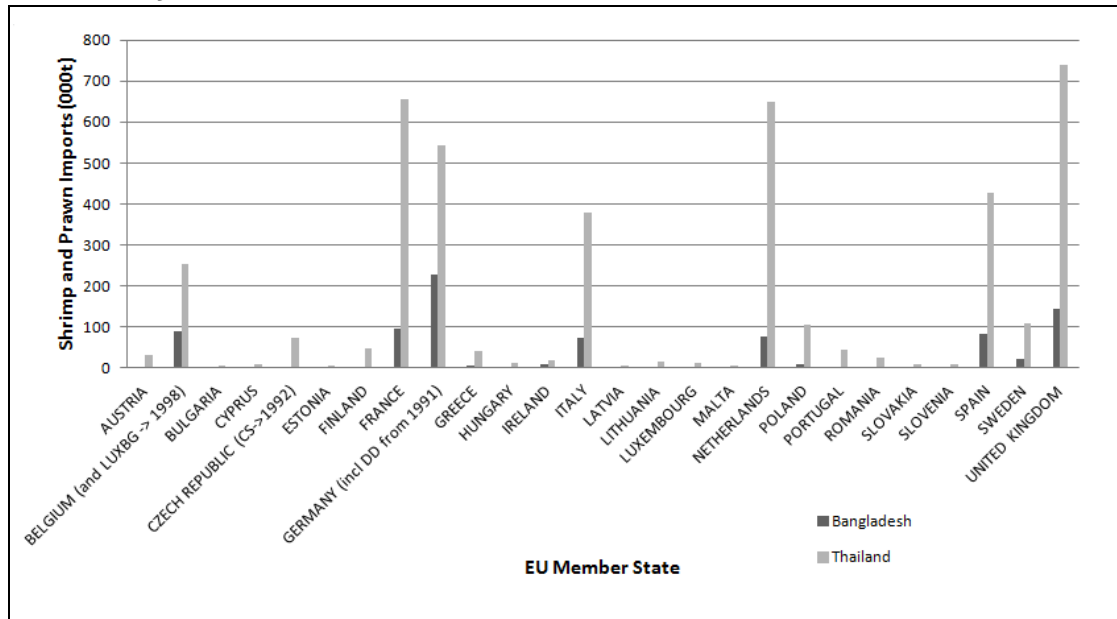
Source: (European Commission 2012a)

Nevertheless, just because a country is a key importer, this does not necessarily mean that it is also an important end market. In the EU, trade data is provided by the importing country but identification of final markets can only take place with the insights provided by intra-EU trade data. Intra-EU trade means seafood sold by one EU Member State to another. The largest intra-EU exporters of shrimp and prawn are shown in Figure 3.4. These are Belgium, Spain, Denmark, the Netherlands, the UK and France. An important point to note is that eastern European countries are not yet very important in the processing and re-export of shrimp and prawn, although they are for other species.

Figure 3.4 Intra-EU trade in shrimp and prawn (0306, 1605), 2010
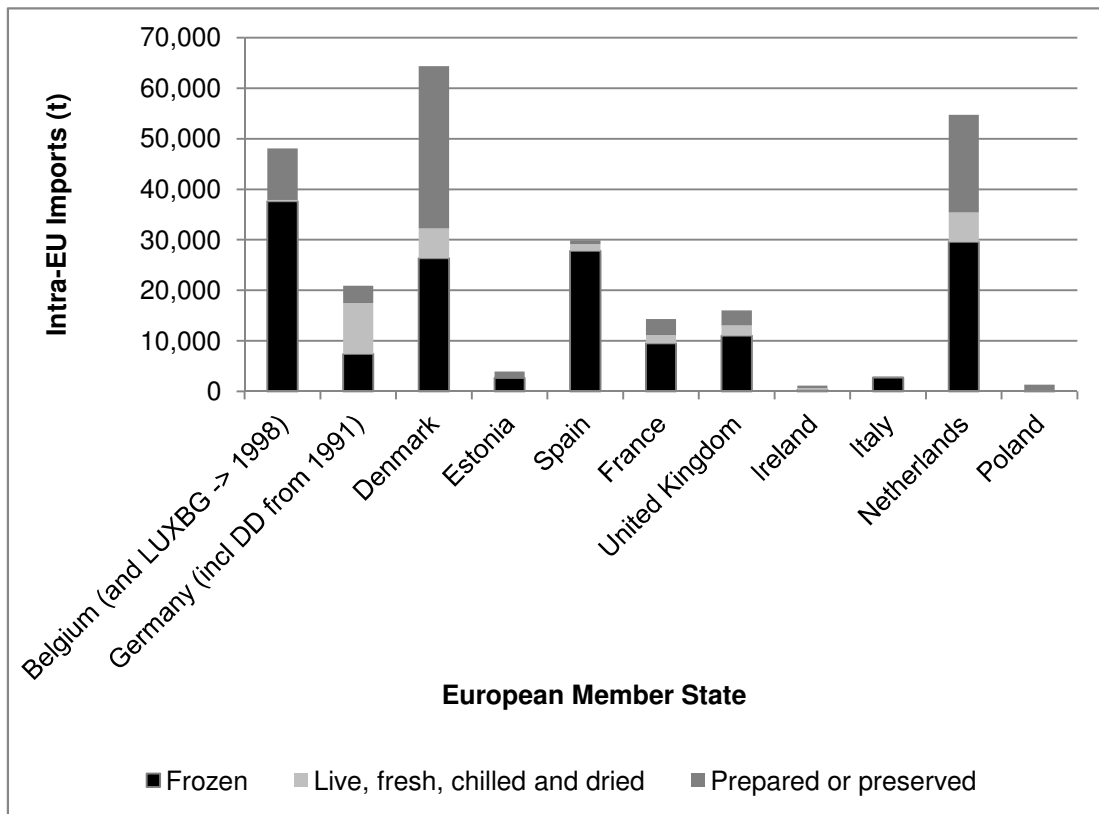
Source: (European Commission 2012a)

Although a more detailed picture of important end markets for shrimp and prawn has been built up, an even more accurate picture is obtained when imports are analysed by commodity type. Frozen shrimp and prawn dominate EU imports from Bangladesh (Figure 3.5), with Belgium (Antwerp) the most important import hub.

Figure 3.5 Intra-EU trade in shrimp and prawn from Bangladesh (0306, 1605), 2010
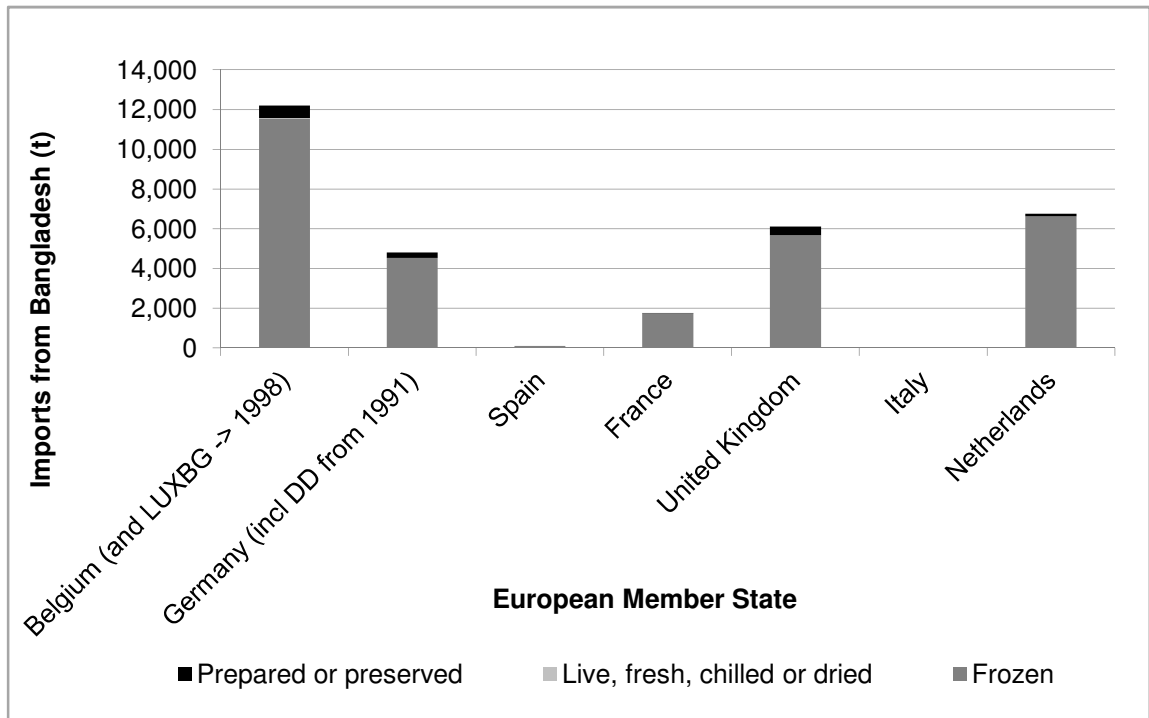
Source: (European Commission 2012a)

By contrast, imports of shrimp and prawn from Thailand have a higher proportion of prepared or preserved products to the EU market (Figure 3.6).

Figure 3.6 Intra-EU trade in shrimp and prawn from Thailand (0306, 1605), 2010
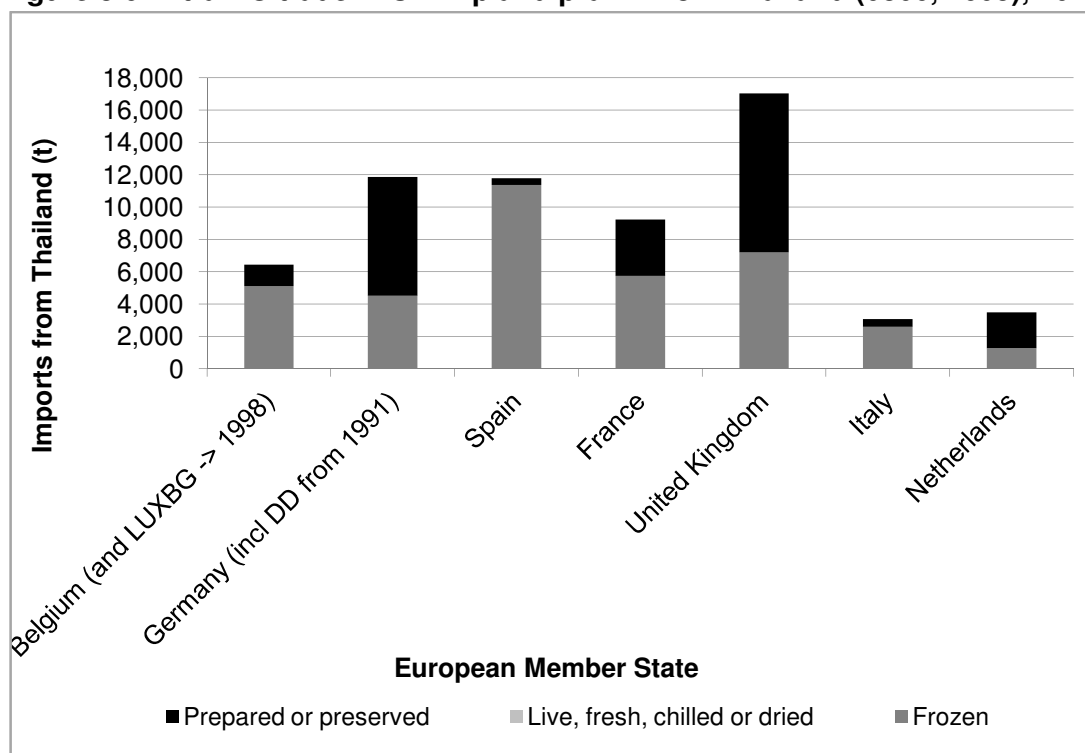
Source: (European Commission 2012a)

Tilapia is even more difficult to follow in international or national trade statistics using HS Codes as tilapia is often amalgamated with other freshwater fish species (Table 3.2). Since 2002, the FAO has collected specific data on trade in tilapia. However, imports of tilapia to the EU cannot be determined by country of origin using this database. According to trade data produced by the Thai Frozen Foods Association, the EU was the largest market by value for fresh, chilled and frozen tilapia from Thailand in 2010 and second largest by volume after the Middle East.[15] The 3,651 t exported to the EU was worth USD 5.72 million. France was the largest market (1,056 t) followed by the UK (825 t), the Netherlands (624 t), Belgium (554 t), Italy (455 t) and Germany (14 t). Italy was the largest market for fresh, chilled and frozen tilapia fillets over the same time period, followed by France and the UK.

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[15] http://www.thai-frozen.or.th/webdatas/stats_ex_im/551.pdf

Apparent consumption suggests the EU market for whitefish is around 4 million t (product weight). Tilapia's share is estimated to be around 25 000 t or 0.6% (European Commission 2012a).

Table 3.2 HS Codes for Tilapia

Section	Chapter	Heading	Code	Additional digits	Description
I					Live Animals; animal products (chapter 1-5)
I	03				Fish and Crustaceans, Molluscs and other aquatic invertebrates
I	03	02			Fish, fresh or chilled, excluding fish fillets and other fish meat of heading 0304
I	03	02	69		Fresh or Chilled Freshwater and Saltwater Fish (excl. salmon)
I	03	02	69	15 00	Tilapia (Oreochromis spp.)
I	03	03			Fish, frozen, excluding fish fillets and other fish meat of heading 0304 (all)
I	03	04			Fish fillets and other meat (whether or not minced), fresh, chilled or frozen (all)
I	03	04	29	05 00	Tilapia (Oreochromis spp.)
				03 00	Pangasius
I	03	05			Fish, dried, salted or in brine; smoked fish, whether or not cooked before or during the smoking process; flours, meals and pellets of fish, fit for human consumption (all)
IV					Prepared foodstuffs; beverages, spirits and vinegar; tobacco and manufactured tobacco substitutes (chapter 16-24)
IV	16				Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates
IV	16	04			Prepared or preserved fish; caviar and caviar substitutes prepared from fish eggs
IV	16	04	20		Other prepared or preserved fish

* The use of the term 'all' is added by the author to clearly show where HS codes cover all types of freshwater fish and not just tilapia.
⑦The terms shaded in grey denote levels of disaggregation that cannot be compared internationally.

Source: http://online.businesslink.gov.uk

As is clear from the tables and figures above, internationally comparable data on trade flows are highly aggregated according to commodity type, but not uniformly. Identifying product categories by terms

such as 'prepared', with few further subdivisions, does not adequately represent the complexities of international trade in seafood. For the species under consideration, the level of disaggregation is extremely low, with disaggregated HS codes favouring traditional species of the EU, such as salmon, cod, herring and tuna. This is similar for tilapia, which is almost all but hidden as a distinguishable category in internationally comparable trade data. Yet producers and marketers identify products according to highly precise categories that go beyond method of preparation such as 'smoked' or 'canned' (which is already aggregated for the species under consideration) to, *inter alia,* whole[16], drawn[17], dressed[18], steaks[19], fillets[20], butterfly[21], cured[22], cold-smoked[23], hot-smoked[24], dried[25], and salted[26], the presence of skin, whether shrimp and prawn have tails on or not, are in sauce, skewered; by weight, portion size, pack size and type of packaging. Such depth of data is entirely lost within international trade statistics and yet is the sort of market information that needs to be generated for chain participants in order to identify niche markets, meet consumer demands, respond to market trends and drive new product development (NPD). The combined nomenclature arguably does not accurately represent international trade in seafood and even hides important categorisations that would be useful for and valued by chain agents in order to understand their final market. This obviously raises

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[16] Marketed as caught.
[17] Only entrails removed.
[18] Scaled and entrails removed (ready to cook).
[19] Slices cut crosswise.
[20] Boneless pieces cut from the sides.
[21] Two sides cut away from the backbone.
[22] Cured by smoking, drying, salting or pickling.
[23] Cured and partially-dried.
[24] Partially or wholly cooked.
[25] Air or heat-dried and salted.
[26] Dry-salted or brine-cured.

questions about the ability of developing country producers and other value chain agents to access, understand and make use of such information.

Questions are also raised about the ability of chain members to identify consumer values. Sub-markets and product categories important to certain consumers have to be understood by producers in order to provide product attributes that meet consumer values. This is a crucial aspect for the generation of accurate market information. Appendix 1 reviews European, national and industry-level literature on the EU seafood supply chain in an attempt to use this literature to identify consumer values attached to final product categories. The Appendix shows that problems of disaggregation, a lack of data availability in general and inconsistent depth and breadth of information for certain value chains nodes, mean that final markets, essential to understanding consumer values, cannot be identified.

Overall, this section, combined with Appendix 1, demonstrates the varying degree of information and disaggregation available on seafood supply chains in the EU and hence, final product markets and consumer values associated with product attributes. There are important gaps that will need to be filled through fieldwork in order to conduct a value chain analysis that emphasises market orientation in chains.

3.2 Institutional Framework governing seafood trade

The institutional framework in value chain analysis examines those external factors that interact with the functioning of the value chain. These include regulations (national, regional, international), organisations and pressure groups (industry organisations, government departments, lobbies,

farmer associations, political parties) and other kinds of institutions (standards, multi-stakeholder fora, NGOs, expert communities etc). The institutional framework for farmed seafood trade is provided in Appendix 2, and summarised in Table 3.3 below.

Table 3.3 Summary of the Institutional Framework governing seafood trade between Bangladesh, Thailand and the EU

Place of Origin	Regulation	Voluntary Standards and Certification	Influential actors and Institutions
International	WTO Agreements and Regional or Bilateral/Multilateral agreements on tariffs, non-tariff measures, standard setting	International certifications	WTO, FAO, ISO, certifying organisations
EU	Import duties and GSP preferences, food safety rules, marketing and technical standards	Soil Association, AB, BioSuisse, KRAV, GlobalGAP, Freedom Food, ASC, Naturland, internal responsible sourcing programmes, Fairtrade	European Commission, some Member State governments, NGOs (e.g. IFOAM, WWF, ETI, RSPCA), media, consumer groups, development aid orgs
Bangladesh	GSP Preferences, EBA, mandatory 100% testing of shrimp exports and 20% testing of shrimp imports	ISO, BRC, HACCP, BTSI (Bangladesh Standard Testing Institution), IFS, ACC, BAP, SSOP, SOP	Donor framework, especially the EC, USAID, UN; International NGOs
Thailand	GSP Preferences	ISO, HAL-Q, GMP, BRC, IFS, SQF, HACCP, GlobalGAP, BAP, ACC	Thai Government (DOF), NGOs, large processors
Domestic			
Bangladesh	Export subsidies	A small amount of certified organic production	Local NGOs, government and supporting bodies
Thailand	MD, GAP Thai, GAP+,	Organic Thai certification, GAP Thai, GAP+, CoC, ACC	Government, NACA, Industry (particularly large processors)

Source: Adapted from Jespersen et al. (2012)

The table summarises the international trading environment within which all seafood trade takes place as well as the numerous official requirements for importing to the EU, some of which are specific to products from aquaculture. Imports may be subject to systematic documentary,

identification and physical checks upon arrival in the EU, depending on the risk profile of the product and the results of previous checks. In addition to meeting the requirements of governments, producers may also be required to meet additional buyer requirements. The global market for seafood is becoming increasingly demanding in terms of standards and labels in the context of growing consumer awareness about quality, safety, traceability, sustainability, the environment, animal health and welfare and socioeconomic aspects along the entire value chain. Though standards and labels may be less restrictive than other regulatory measures, poorly designed and differing standards and labels between countries could form market access barriers, with potential effects on the livelihoods of producers. On the other hand, the presence of standards and associated labels may also provide an opportunity for some suppliers to add value.

Appendix 2 highlights the wealth of information available on the international institutional framework from official sources, combined with secondary literature on applicable regulations, voluntary public and private standards, and influential agents and institutions that contribute to the generation of market information. As Appendix 2 also elaborates, value chains within Bangladesh and Thailand operate within a domestic institutional context that is a critical factor in the generation of market information, its dissemination and response. Appendix 2 provides details on the relevant national regulatory frameworks and how they contribute to the commercialisation of product and export competitiveness; standards in the supply chain and how they strengthen governance; and influential agents and how they have contributed to the development of the industry as a whole.

To summarise, a lack of strong domestic regulatory frameworks in Bangladesh may be detrimentally impacting the export competitiveness of shrimp and prawn, such as the availability of only one antibiotic testing machine, a lack of disease-free brood shrimp, feed contamination, and a lack of documentation and traceability. This means there is no strong regulatory basis on which to build standards and other quality and sustainability credentials that could aid the creation of greater value. Instead, the sector relies heavily on technical and financial support by local and international NGOs, which is limited to promoting sector-wide developments and may be reliant on insecure funding. Within this framework, farmers and other value chain agents may themselves be locked-in to debt and credit cycles.

In Thailand, the role of government in assisting the industry to meet international export standards through early intervention and technical assistance led to a high quality product and supported the introduction of labels and certification that contribute to value added production. Alongside these developments, an engaged private sector, extensive research and development by firms in shrimp production, and the presence of overseas development agencies and NGOs, have contributed to aquaculture production's trajectory. These are features of a strong domestic institutional framework that have promoted the shrimp and tilapia export chains from Thailand. However, links between the role of regulation, voluntary standards and important agents, and the generation of market information in chains was not explicit in the literature for either country, requiring the addition of primary research data.

3.3 The Seafood Value Chain

In order to examine the dissemination of information in seafood supply chains, it is necessary to identify product flows, key agents in the value chains and chain configuration. The purpose of this section is to map the shrimp and prawn chains from Bangladesh and shrimp and tilapia chains from Thailand through EU supply channels using the available literature. As the EU seafood supply chain is explained in Appendix 1, this section will focus in particular on the value chains in Bangladesh and Thailand.

The first step in value chain mapping is the identification of the core processes in the value chain, and the agents involved in these processes. Typical nodes in natural resource-based value chains are: primary production (including service provision such as feed and seed), primary trading and processing, exporting, importing, retailing, and consumption (Riisgaard et al. 2010). After mapping the main processes, identifying the main agents is the next step in value chain analysis. Each process has its own set of agents associated with it, although the same agents may be involved in several processes. In addition to direct agents, other agents such as feed mill operators, service providers, intermediate input suppliers, support institutions and physical infrastructure also play an important role. Table 3.4 provides an overview of key value chain agents in the selected value chains.

Table 3.4 Overview of key value chain agents in the Bangladesh and Thai seafood value chains

Country	Species	Key agents[27]
Bangladesh	Prawn	Hatcheries/Fry catchers, Nurseries, PL traders, Farmers, Faria, Aratdar (Chatal), Depots, Commission Agents, Processors.
	Shrimp	Hatcheries/Fry catchers, Nurseries, PL traders, Farmers, Faria, Aratdar (Chatal), Depots, Commission Agents, Processors.
Thailand	Shrimp	Domestic: Hatcheries, Nurseries, Farmers, Brokers, Processors. Exports: Hatcheries, Nurseries, Farmers, Brokers, Processors. Contract farming: Fry (from processor), Farmers, Processor.
	Tilapia	Domestic: Hatcheries/Nurseries, PL traders, Farmers, Brokers, Processors, Retail (mostly domestic). Contract farming: Fry (from processor), Farmers, Processor, Retail (mostly domestic).
EU	All seafood	Service providers, Importers, Distributors, Secondary processors, Wholesalers, Retailers/Foodservice

Note: Retail includes retailers and the foodservice industry. Some agents may not feature in all chains (such as wholesalers in the EU).

Source: (Kruijssen et al. 2012)

A review of the literature on the value chains from Bangladesh and Thailand to the EU is provided in Appendix 3. Based on this literature, Figures 3.7 and 3.8 provide a schematic overview of the value chains from the two countries.

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[27] See the Glossary for a definition of terms.

Figure 3.7 The Bangladesh shrimp and prawn export value chains
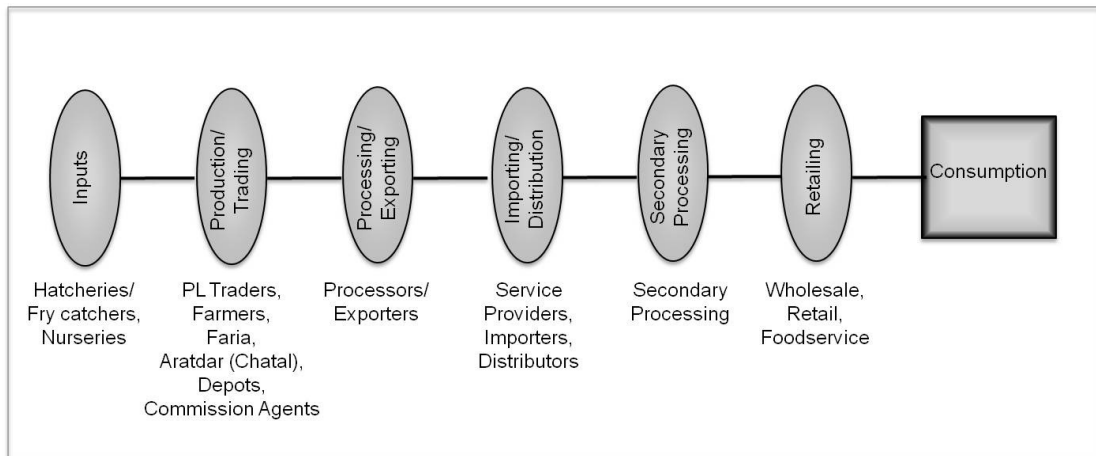
Source: Author

Figure 3.8 The Thai shrimp and tilapia export value chains
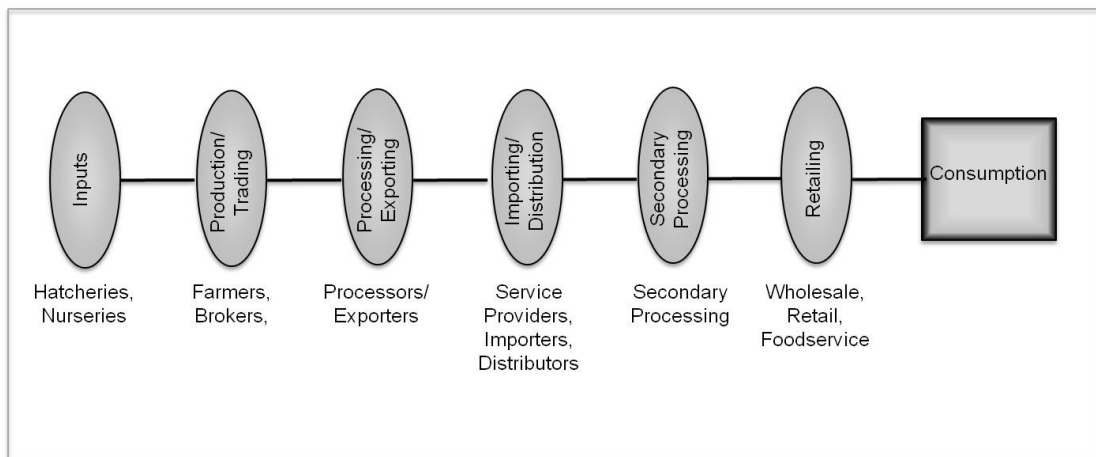
Source: Author

Appendix 3 reveals that the documented knowledge available on the value chains of the different species from the different countries varies substantially. While there are many literature sources for shrimp and prawn chains in Bangladesh, there is less (English language) information available on the chains in Thailand. It is also worth noting that while there are many publications focusing on Bangladesh, the differentiation between freshwater prawn and marine shrimp is often not clearly made and the terms prawn and shrimp are used interchangeably. There are also many conflicting estimates published, for example on the number of farms and employment generated by

the sector (Kruijssen et al. 2012). Focus during data collection will therefore be on filling information gaps, updating existing knowledge on product flows in disaggregated strands, and verifying conflicting results from other studies.

3.4 Governance and coordination mechanisms in seafood value chains

The literature available on governance and coordination mechanisms in seafood value chains in both Bangladesh and Thailand is slight. In Bangladesh, a 2006 study by USAID reviewed some of the relationships found in chains (USAID Bangladesh 2006). For the most part, relationships indicate the presence of captive coordination in the chain in Bangladesh, primarily due to coercive lending and contracting relationships. A number of value chain agents must borrow money from middlemen in advance of production and commit to selling the product at a particular price to a specific intermediary determined by the buyer. The amount of credit extended within the chain not only binds two nodes together until the debt is repaid, but creates long-term credit dependency as farmers may have to continue borrowing, particularly during lean periods. Consequently, many workers spend years in cycles of dependency on credit and debt, enforced by strong social codes (USAID Bangladesh 2006). Evidence on how lead firms drive chains or relationships between other value chain nodes was not found in the literature. Clearly, the extent of information available is inadequate to enable analysis of governance and coordination mechanisms along the full length of the Bangladesh value chain. Filling this gap will need to be an important and explicit part of fieldwork.

In Thailand, the presence of vertical coordination is clearer due to the business practices of Thailand's largest shrimp producer, Charoen Pokphand Group (CP), which has enormous power in the value chain. CP was founded in 1921 in Bangkok and began trading in seeds and other agricultural imports before expanding into the production of animal feed. By the late 1960s, CP was operating two feedmills but acknowledged it could only grow to the extent that Thai farmers emerged from extensive agriculture. To this end, CP began to vertically integrate the chain of production and also organised contract farming (Goss, Burch, and Rickson 2000). CP's coordinating and governing role has meant that Thai shrimp aquaculture production is characterised by a high degree of vertical integration (direct ownership) and contracted production (Humphrey 2005). The terms of contract farming often result in the supply of feed and seed, a promise to buy 100% of the product at a fixed price, preferred suppliers of probiotics, on-going training and technical support, and advice on disease prevention (Belton and Little 2008). The size and range of the most dominant companies mean that they control fry production, feed and prices and can exert a large influence along the chain, even for those not contracted to them (Goss, Burch, and Rickson 2000). This may lead to captive coordination between input suppliers, farmers and the processor. At the same time, CP is extending its role downstream in the value chain by operating buying offices within importing countries from where they gain a clearer view of competition, prices and product availability.

Chapter 2 presented the two approaches to governance in value chain analysis i.e. driving and coordination. Accessible literature on these topics is very limited for the selected value chains and information available in existing

references will require updating. In addition, lead firms and value chain coordination mechanisms will need to be identified as they are missing among most nodes in the literature and particularly within the EU. As these issues are key for understanding why and when information is disseminated in seafood supply chains, primary data collection will need to focus on these aspects.

3.5 Upgrading strategies

Since the 1990s, Bangladesh has undertaken a number of initiatives towards trade liberalisation and trade promotion to stimulate exports and encourage investment in export-oriented activities. To some extent these have been extremely successful and the rise of the farmed seafood export sector has transformed the economy of Bangladesh (Khatun 2004). However, there are a number of barriers that prevent the full realisation of the benefits of shrimp exports from reaching the poor. Certification is one example as the costs of conforming to regulations have been largely transferred to producers (USAID Bangladesh 2006). Not all producers can afford to meet requirements or have the cultural, social and technical knowledge required (Islam 2008). At lower (upstream) ends of the chain among fry collectors and middlemen, bargaining is limited and agents are price-takers. At higher ends there is more scope for negotiation, particularly in relationships between exporters and importers that give the seller some leverage (USAID Bangladesh 2006). The expansion of standards and quality regulations also provides opportunities for upgrading and one of the key arguments in defense of aquaculture is the benefit that this export industry can bring to rural development and poverty alleviation (USAID Bangladesh 2006). Upgrading can also be assisted

through government and NGO investments in domestic production of feed, extension services along the chain, the organisation of farmer associations, improving terms of trade and exchange, increased labour rights and benefits, and increased stakeholder dialogue within the chain (USAID Bangladesh 2006).

The literature on upgrading in Bangladesh seafood value chains is severely limited and fieldwork will be necessary to establish the up- (or down- or out-) grading taking place, how this is linked to the institutional framework, and the impact of governance and coordination arrangements in order to evaluate upgrading strategies in Bangladesh and whether access to market information is the most critical factor in creating value. While the USAID study cited in this section does provide an initial overview, there is little differentiation into the four-type category presented by Humphrey and Schmitz in section 2.1.5.

By way of contrast, Thailand has capitalised on the growth of shrimp farming and has been a key player in the globalisation of the shrimp industry. Nevertheless, some of the externalities associated with shrimp farming can have negative consequences for livelihoods and upgrading possibilities. In particular, shrimp farms use local water resources with great intensity, and salinity problems due to seepage into neighbouring fields and freshwater systems are a problem (Nissapa et al. 2002). This makes alternative cropping (such as rice) on which the poor rely very difficult. The conversion of coastal systems into monoculture areas has also had detrimental long-term social and ecological effects. As the lifespan of an intensive shrimp farm is between 5 and 10 years, the land is difficult to convert into other uses (Goss, Burch, and

Rickson 2000). Other environmental issues include disease outbreaks, where rapidly spreading viruses can have a devastating impact, particularly in densely stocked shrimp ponds. To combat diseases, growers have used pesticides and chemicals (Pongthanapanich and Roth 2006). While around a dozen Thai agribusiness giants financially dominate the Thai shrimp industry, the structure of shrimp processing means that much of the labour-intensive work is contracted out to small independent firms that can quickly produce or process high volumes of shrimp (LRPN 2007). Downward pressure on costs is passed down to workers in the form of long hours, low pay and lax health and safety standards (SAFE, 2012). While some demands to address these issues have resulted in attempts at regulation or standardisation, they are difficult to enforce (Solidarity Center 2008).

While the literature on upgrading in Thai seafood value chains is more extensive than in Bangladesh, there is little information on the upgrading possibilities that exist and the impact of the institutional framework, governance and coordination, either from the chain within Thailand or from lead firms in the EU. Data on upgrading and its links to other aspects of value chain analysis will be particularly dependent on fieldwork.

3.6 Data gaps

The review of literature and secondary data presented here in Chapter 3, along with Appendices 1 to 3, have provided a synthesis of existing knowledge on the selected seafood value chains from Asia to the EU. However, as explained throughout the chapter, there are clear limitations regarding data availability, aggregation of statistics, conflicting data, data that

needs to be updated and missing data. Table 3.5 summarises the areas of information deficit that are relevant and essential in meeting the research objectives of the thesis.

Table 3.5 Information Deficits

Research Question	Information Required	Key Areas of Information Deficits
1. Generation of market information	i) Consumer values ii) Institutional Framework	i) Identification of end markets ii) Consistent and comparable information on Bangladesh and Thailand
2. Dissemination of market information	iii) Product flows iv) Governance and coordination mechanisms	iii) Product flows in disaggregated strands iv) Relationships along the length of the chain and the effect of these on information flows
3. Response to market information	v) Upgrading strategies	v) Links between upgrading and chain configuration

While substantial quantitative data on the EU seafood market and its supply chains was reviewed in the evaluation of secondary data on seafood value chains (section 3.1), the data were highly aggregated and product attributes associated with individual chains could not be traced through EU supply chains using these statistics. Although data gaps could be filled to some extent through the search for further quantitative data, of greater interest is to understand how accessible market information is to value chain agents, particularly those not based in the EU. Linked to this, analysing the role that the institutional framework plays in generating and accessing market information will highlight the access producers have to market information. Such data are not of a quantitative nature. Instead, qualitative data can identify the reasons behind the statistics and highlight values that are not apparent in those statistics.

Although, in general, the seafood supply chains can be followed, there is a wealth of information about products and consumer values hidden in individual chain strands. As trade data will not be able to help, qualitative data can assist with updating knowledge in this area and in particular the different chain configurations that may exist within one value chain. As these chains may be governed differently, further information is required on relationships at nodes along the chain, particularly in the EU. Information on relationships is unlikely to be evident through quantitative statistics, leading to greater emphasis on qualitative fieldwork. In particular, information on how lead firms drive their chains and promote certain coordination strategies will identify information flows that are not evident through the literature review.

Finally, in order to understand the abilities of developing country producers to respond to market information, greater depths of knowledge are required on the type of upgrading taking place along value chains and the role of information in determining these strategies. Crucially, how upgrading is affected by the institutional framework, governance and coordination mechanisms needs to be captured. This also places an emphasis on qualitative fieldwork where information can be gleaned on the reasons for certain chain configurations and their impact on firms and individuals.

Consequently, the type and method of fieldwork undertaken will need to reflect these findings, and this is the topic of chapter 4.

Chapter 4

Research Methodology

The aim of chapter 4 is to present the methodology used to fill the data gaps identified in chapter 3.

PART 1. METHODOLOGICAL APPROACH

4.1 Primary data collection

4.1.1 Rationale

The fact that seafood value chains between Asia and the EU have not been studied within the GVC framework indicates apparent freedom in the research design process. Indeed, Kaplinsky and Morris stress that there is no 'correct' way to conduct a value-chain analysis: rather, the approach taken fundamentally rests upon the research questions that are being answered (Market Strategy Ltd 2008). The entry point and orientation of value chain analysis in this thesis is looking from the market (EU) backwards towards production (in Bangladesh and Thailand) in order to examine the generation of market information, dissemination and response by value chain agents in the selected seafood value chains.

4.1.2 Research approach

Qualitative data collection techniques explore incentives and actions that are not captured in quantitative statistics. Chapter 3 identified the importance of qualitative approaches to understanding how market information is generated, the conditions under which it is disseminated and its

role in determining upgrading strategies. These elements cannot be captured in fieldwork through quantitative methods. Furthermore, in the absence of hard data on value and product flows at a micro level, qualitative fieldwork is the best way to proceed. However, this method does suffer from the drawback of being quite subjective. In order to ensure consistency in the research approach, all of the countries in which fieldwork took place were treated in the same way, as described below.

4.1.3 Selection of data collection methods

A structured survey is inappropriate for a large range of stakeholders with differing interests. Instead, open-ended interview questions provide insights into why quantitative data display certain phenomena and enable the exploration of particular responses by key informants that would otherwise not be captured through a structured questionnaire. A further advantage of using interviews as a tool for data collection is that observations can also take place prior to or at the same time as interviews, adding richness to enquiries. Observations also prove useful when it is otherwise inappropriate to ask questions or the circumstances mean that misleading information might be obtained. Observations are particularly useful when making inferences about the mechanisation of production and sub-markets within countries.

4.2 Sampling technique

4.2.1 Selection of informants

In Asia, due to the importance of networks and relationships within the two cultures as well as the remoteness of some outlying production areas,

informants were more likely to agree to be interviewed if recommended by a contact (snowball sampling). Even if only one interview has been pre-arranged, recommendations can enable multiple interviews to take place on such visits. This type of sampling technique could introduce a sampling bias, as some key informants may not necessarily be representative of other stakeholders. Key informants through this method may also be the most educated in a group of stakeholders or who the contact believes would provide the best 'story'. Nevertheless, snowball sampling was particularly appropriate in the Asian context as some value chain stakeholders would otherwise be difficult to locate, only available at certain times, or in certain seasons. Snowball sampling also highlights the social network connecting value chain members and provides access to key informants that may not have been included otherwise and in locations such as villages that are spread over a large area.

Interviewing a range of respondents from a range of scales of production helped develop an overview of supply chain issues. As there was limited time for fieldwork, informants were selected according to their ability to provide efficient (i.e. with first-hand experience) and accurate information about the value chains. Within firms it is most effective to interview informants who have responsibilities for seafood purchasing and supply choices, access to and potentially responsible for dissemination of market information, and those who make decisions about sustainability programmes for seafood and suppliers. Labourers were able to provide insights on particular issues such as labour conditions, while project managers and Directors provided an overview of the sector as a whole and also the organisation's position within it.

4.2.2 Farm Scale

At the farm level, the SEAT project defined farm scale, which was also appropriate for this research (Table 4.1).

Table 4.1 SEAT Project Farm-Scale Definitions

Definition	Small-Scale	Medium-Scale	Large-Scale
Ownership	Household or extended family	Household or absentee owner	Corporate
Management	Household or extended family	Owner or salaried manager	Salaried manager
Trading Name	None (family name)	Yes/No	Registered
*Full-time Labour (non-family)	No	Yes	Yes
**Vertically Integrated	No	No	Yes
Marketing	Mainly spot	Spot or contract	Integrated processing

* Labour recruited and remunerated by salary, accommodation, bonus etc. for general/daily farm-management tasks over the last production cycle of the visited farm
** I.e. including feed production, hatchery, farms and processing

Source: Field survey and key informant interviews

In other value chain nodes, interviewing powerful players who drive changes in the market and shape value chains for their purposes provide some representation of these developments for the sector as a whole. Other important attributes of firms that may illuminate particular anomalies in the market and lead to a more accurate overview of trends include innovative enterprises, niche-market specialists and those supplying a particular market segment such as ethnic markets or luxury markets.

4.3 Procedures for data collection

4.3.1 Interview procedures

For interviews in rural areas, particularly in Asia, a translator who could also arrange interviews was necessary. In both Bangladesh and Thailand, a translator was funded by the SEAT project. Their role was to make contact with a potential informant by mobile phone, explain the research objectives, arrange a meeting and provide translation services if required.

An interview guide with key topics assisted with the structuring of the discussion, which began with a presentation of the research aims. Questions for value chain agents were based on the GVC analysis areas of mapping, governance and coordination, the institutional framework and upgrading, with an emphasis on the generation and dissemination of information in chains and upgrading responses by value chain members. The aim of the interviews was to gather information, critically question the information supplied and verify answers given by other respondents.

Observations were used in each of the research locations. Table 4.2 highlights locations where observations took place, key attributes recorded and method of recording. Information on observations in each of the individual countries is provided under the relevant country section.

Table 4.2 Location of Fieldwork Observations

Observation Locations	Observations	Data Recording
Hatchery and Nursery	Production methods	Written notes
Farms	Hygiene	Photographs
NGO Training of farmers	Harvest methods	
Wholesale markets	Information flows	
Wholesalers	Methods of sale	
Processing factories	Availability	
Supermarkets	Range	
Trade shows	Size	
	Packaging	
	Price	

4.3.2 Commercial confidentiality

An area of sensitivity that was expected to arise in interviews, particularly in the EU, was that of commercially important data. Accessing retail data that are collected by private companies is difficult. In addition, vertical channel issues and the management of these issues often form the basis of competitive advantage for companies. Therefore, companies may be reluctant to divulge information relating to these issues. Confirmation of anonymity and information from research conducted upstream in chains in Bangladesh and Thailand circumvented such issues by leading to a mutually beneficial discussion in interviews. Offering commercial confidentiality and anonymous interviews is typical of business and marketing management research, and will have gone some way to encouraging respondent honesty. Explaining the research purpose clearly and being careful with controversial or sensitive subjects also helped. All information was recorded anonymously in written reports and publications in order to minimise any risk of unintended commercial gain during the research process and in the subsequent course of reporting and publications.

4.3.3 Gender and cultural dimensions

Undertaking research in the Asian context required an awareness of, and respect for, prevalent cultural, ethnic and gender expectations. In rural areas of Bangladesh, the majority of interviews at the farm level were with Hindus, while it is mostly Muslims who hold positions of authority in processing factories. Muslim women are usually confined to the house, particularly in rural areas, while Hindu women on farms may hold responsibility for certain aspects of cultivation (such as feeding). It was therefore important to be aware of the cultural and religious context within which the research took place. This meant dressing in local garments in Bangladesh and maintaining cultural norms, such as not shaking hands with a man unless he proferred his hand first. Normally, men with a Western education had adopted such practices. Being a young, white women attracted substantial attention in rural areas of Bangladesh, particularly from men. This attention was not threatening and had certain advantages such as ensuring a system of verification of the information provided by an informant (section 4.4.2.4).

Although Thailand is regarded as a country open to foreigners as evidenced by the number of tourists visiting Thailand each year, the hierarchical nature of society sometimes places women in positions where substantial deference to male superiors is expected. The level of deference required within the SEAT project team environment in Thailand meant that barriers to working independently were frequently erected. Bureaucratic demands and frequent reporting to the SEAT project team were used as tools to maintain control over the research. This was overcome to some extent

through the use of personal networks and the support of the wider SEAT project that identified discrimatory attitudes as an area of concern. However, one outcome of the number of interviews arranged independently was to increase demands made by the project team in Thailand to the extent that data gaps could not be filled (section 4.4.3.3). Nevertheless, it was still important to dress respectfully and abide by local customs.

In neither country was I aware of any discrimination by informants due to my age, ethnicity or gender.

PART 2. APPLICATION TO THE COUNTRY CASE STUDIES

4.4 Country case studies

4.4.1 Timeframe for the data collection period

An overview of the research tasks, location and timing is given in Figure 4.1. Preparation for fieldwork and the writing of fieldwork reports took place at the WorldFish Center, Penang, Malaysia, a SEAT project partner. This facilitated coordination with Asian partners of the SEAT project in Bangladesh and Thailand before fieldwork, and easier verification with value chain agents during the Asian report writing stage. Preparation for fieldwork in the EU was undertaken at Stirling University, Scotland, with fieldwork and report-writing undertaken in various EU countries (see section 4.3.4.1).

Figure 4.1 Research tasks, location and timing

Location	Tasks		2010					2011											
	Year		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Penang	Methodology Bangladesh		▓																
Bangladesh	Fieldwork Bangladesh			▓	▓	▓													
Penang	Analysis Bangladesh						▓												
Penang	Methodology Thailand							▓											
Thailand	Fieldwork Thailand								▓	▓	▓								
Penang	Analysis Thailand											▓							
Stirling	Methodology EU												▓	▓	▓				
EU	Fieldwork EU															▓	▓	▓	
EU	Analysis EU Fieldwork																		▓

4.4.2 Bangladesh

4.4.2.1 Research locations

Bangladesh was selected as the first data collection country as surveys for the SEAT project were ongoing at the same time. The primary data collection site was Khulna district in the southwest of Bangladesh (large circle on Figure 4.2), which provides 75% of the country's shrimp and prawn production. Khulna district includes the sub-districts of Bagerhat with 38% of production, Khulna with 32% and Satkhira with 26% (Fisheries Resources Survey System 2010). 21% of production comes from the southeast of Bangladesh in Chittagong district, but this was excluded as a fieldwork site due to its distance from the SEAT field office in Khulna.

Figure 4.2 Map of Bangladesh highlighting field sites
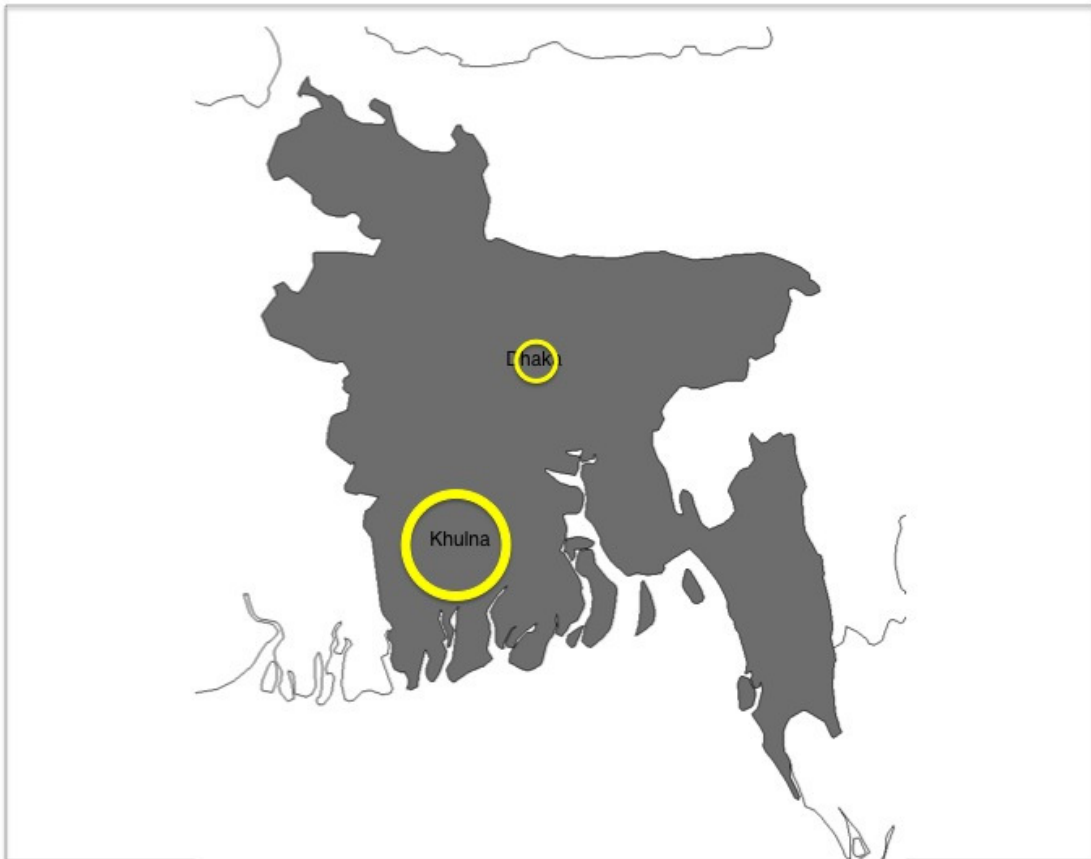
4.4.2.2 Selection of informants

Before fieldwork began, a list of value chain agents was developed, based on the USAID value chain analysis of 2006 (USAID Bangladesh 2006). High priority was given to individuals in nodes of the chain through which seafood is transferred (such as hatcheries, growout, processors and intermediaries), while medium priority was given to individuals in service and support organisations such as marketing, training and financial assistance as well as trade associations. Low priority was given to additional inputs to the chain such as labourers harvesting snails for prawn feed, ice labourers and van drivers.

4.4.2.3 Firm Scale

At the hatchery, intermediary trading (aruts, chatals, depots), and processing/exporting levels, informants generally knew their production/trading volumes by day or year. However, other producers such as famers or input suppliers (e.g. ice, feed) classified themselves as 'small' or 'medium' without knowing exact volumes, making it difficult to find and interview different scales of enterprise. According to the definition provided in Table 4.1, all the farmers interviewed in Bangladesh were small-scale. Traders (such as PL, feed, arut) and suppliers of hatchery PL were owners of their businesses, but interviews with growout farmers contained a mix of those who own their own ponds and those working as permanent or day labourers on a pond owned by an absentee landlord.

30 (of 84) interviews were with informants employed by an organisation. This included two Directors of NGOs, project managers at the international, national government and NGO level, a public quality assurance official and labourers in ice factories and processing plants. All interviews with senior managers in processing plants were with Managing Directors. The enterprises had separate finance departments and sometimes marketing departments, but Managing Directors were the only employees willing to be interviewed on-site.

4.4.2.4 Interview procedures

In Bangladesh, two translators provided assistance during the primary data collection period. Both were funded by the SEAT project, with one assisting for 10 weeks and the other for 2 weeks. All interviews in Dhaka took

place in English, while translation was essential in rural areas. Although every attempt was made to conduct interviews in private, the choice of sampling method, culture and the interview locations, often in open shops, resulted in large audiences for almost all the interviews in Bangladesh. While some members of this group were just curious passersby, on many occasions the group was comprised of value chain stakeholders, not always of similar status to the respondent. This may have led to a 'self-check' system where the group could verify or disregard the comments of the respondent, or it may have led to an exaggeration of profits or losses for the benefit of those listening. Triangulation was used as a method to verify responses. Privacy issues in the other countries where interviews took place were not a concern.

Three weeks were initially spent in Khulna District conducting interviews with informants initially identified through the USAID survey. One week was then spent in Dhaka and began with a SEAT project workshop that brought together individuals interested in the shrimp and prawn value chains in Bangladesh. This included international (EU) and domestic government representatives at the Department of Fisheries (DOF), and members of NGOs working on shrimp supply chain issues. Interviews were arranged in Dhaka with these informants and additional recommendations of informants in Khulna were also provided during interviews. A further six weeks were then spent in Khulna District undertaking the bulk of the interviews. During this period, local NGO workers were accompanied on a field visit, which provided access to their contacts and reduced fieldwork costs. At the end of the data collection period, two further weeks were spent in Dhaka meeting with Bangladesh trade associations, international organisations and NGOs with

different interests (e.g. technical assistance, financial assistance, land rights issues), providing national and international contexts and insights.

In total, 84 interviews took place and 6 observations (Table 4.3). 12 of the interviews took place in Dhaka and the rest in Khulna District.

Table 4.3 Key Informant Interviews (KII) and Observations (Obs) in Bangladesh, September-December 2010

Chain	Type of Interview	Stakeholder	Production*	Total number	No. of Interviews
Prawn	KII	Fry collectors	Unknown	400 000+	1
		Hatchery	2.5 million	60	3
			3 million		
			7.5 million		
		Growout	Unknown	Unknown	3
		Snail production and trade	Unknown	Unknown	4
		Commission Agent**	Varied	19	2
		NGO	Training	Unknown	1
	Obs	Growout (small)	Unknown	2	6
		Growout (CST)			
		Chatal	Unknown	4	
Shrimp	KII	Hatchery and nursery	Unknown	Unknown	1
		Growout	Small	Unknown	2
			Medium		1
		Seed Traders	30% of all sales in Khulna	Unknown	1
			150 million		1
			Unknown		2
		Depot	Unknown	Unknown	1
		NGO	Technical Assistance	Unknown	1
			Land rights		2
			Technical & financial		1
		Importer	Unknown	Unknown	1
Both Chains	KII	Growout	Small-scale	Unknown	4
			CST		1
		Faria	Unknown	Unknown	4
		Depot	Unknown	Unknown	2
		Arut	5 t per day	Unknown	1
			1.5 t per day		1
			0.4-0.5 t per day		1
			0.2-0.3 t per day		1
		Chatal	5 t per day	Unknown	1
		Commission Agent	Unknown	Unknown	3
		Processor Labour	Unknown	Unknown	3

			500 containers	100 operational	1
		Processor***	200 containers		1
			183 containers		1
			120 containers		1
			Remainder unknown		5
		Importer	1 container/week	Unknown	1
		Feed trade	Unknown	Unknown	5
		Ice production and trade	250 blocks/day	Unknown	3
			Unknown		
		Public Quality Assurance	Unknown	Unknown	1
		Public Sector	International	Unknown	3
		NGO	Technical Assistance	7	9
			Labour Issues	2	
		National Trade Association	Varied	3	3
Total Number of Interviews					**84**
Total Number of Observations					**6**

* Per annum unless otherwise stated
** Sometimes commission agents are also depot owners
*** Processors and exporters are mostly the same company

Due to the high number of different types of stakeholders involved in the Bangladesh shrimp and prawn chains, the numbers interviewed in some nodes are quite small. In general, interviewing a few select people is not always indicative of actual trends within a group. Notwithstanding efforts to ensure representation of the sector through the interviews, it was on occasion difficult to fill gaps. This was mostly due to seasonality (fry catchers work in other employment outside the fry-catching season) and distance of informants from the field office e.g. snail harvesters in the north of Bangladesh.

Only one interview at the farmer level was with a woman but three female processing plant labourers agreed to be interviewed in a local community centre, rather than the processing plant. A local NGO working on labour issues assisted with facilitating the meeting. One Director of an NGO interviewed in Dhaka was female.

4.4.3 Thailand

4.4.3.1 Research locations

The largest concentration of inland shrimp farming is in the central provinces around Bangkok and in the south of the country (Figure 4.3). Provinces for data collection were Surat Thani (south), Chachoengsao and Chanthaburi (central provinces) for shrimp, and Chachoengsao, Nakon Pathom, Chonburi, Pathuthani and Suphanburi for tilapia (all central provinces). In addition, Chonburi province for shrimp and Phetchaburi province for tilapia were also visited, due to the presence of clusters in these locations. The area known colloquially as Mahachai market (or Talaythai market) in Samut Sakhon (central province) was visited on numerous occasions, as it is the largest wholesale seafood market in Thailand where processing plants are clustered. Some visits were made in tandem with the SEAT Project Thai survey team in order to optimise resources, particularly in Surat Thani.

Figure 4.3 Map of Thailand with study sites

4.4.3.2 Selection of Informants

Thailand was the second country in which data collection took place. Before fieldwork began, a list of value chain agents was developed, based on a review of the literature of Thai seafood value chains. High, medium and low priority interviews were assigned in the same way as for Bangladesh. This information was shared with and refined by the Thai SEAT project team.

4.4.3.3 Firm Scale

Producers in Thailand had a better concept of whether they were small, medium or large, and respondents from different scales of production were interviewed. In comparison with Bangladesh, fieldwork in Thailand was more constrained by bureaucracy as interviews, particularly in rural locations, had

to be arranged through official channels, which generally involved letters signed by the Thai SEAT project team and advance notice. In Bangladesh, a phone call would be sufficient to arrange an interview for the same or following day. The extent of bureaucracy meant that personal contacts were used to a greater extent in Thailand than Bangladesh. This was aided by the fact that Bangkok is an important centre for seafood research as well as a Southeast Asian base for multiple international organisations. These points are reflected in the range and calibre of expertise of informants in Thailand. Informants in Thailand had a better understanding of overall seafood supply, chain issues beyond their nodes, and governance trends. In Bangladesh, rural informants appeared to be significantly poorer than their Thai counterparts but also more hopeful that the SEAT project could bring about change that would lead to greater income and livelihood security.

4.4.3.4 Interview procedures

Interviews in Thailand generally took place on-site (processing plant, farm, broker's office etc) except with academics, consultants and auditors, when a mutually convenient location was agreed, or during field visits when some interviews took place on transport between locations.

All interviews in Bangkok took place in English, while translation was more important in rural areas. The translator provided by the SEAT project in Thailand had only limited experience in aquaculture. Personal and professional seafood industry contacts in Thailand facilitated communication with potential key informants using the snowball sampling method. The advantage of this method was that such interviews could be conducted in

English without the need for a translator and could be arranged for periods when waiting for interviews in rural locations. This latter point is important due to the two-week advance notice periods required for official letters to be sent and permission for field visits to be granted. These were both SEAT project requirements in Thailand and the expectations of key informants. The levels of official approval made it difficult to complete gaps that were revealed at the end of the fieldwork period, such as the number of hatcheries interviewed, due to a lack of time for the required procedures.

Initial meetings in Bangkok were held with two large processing companies. The first company held a 17% market share of the Thai shrimp export market in 2010 and produced a range of frozen products, including seafood. The Marketing Executive Director, the Marketing Manager for Shrimp and the Director of Product Research and Development were interviewed. An owner and Managing Director of a smaller and family-owned processing company that focused on shrimp was also interviewed. Alongside an interview with a specialist in aquaculture in a regional research organisation and the former Thai Purchase Manager for a UK-based shrimp importer and processor, interviews in the first two weeks in Thailand identified product flows, raised critical issues facing the industry and highlighted marketing and information flows from the perspective of processors, exporters and EU importers. Informants also provided further contacts upstream in the supply chain. Over the following two weeks, nine interviews took place with a range of value chain agents in Surat Thani, the largest shrimp producing area in the south of Thailand. Informants included two contract farmers supplying processors interviewed earlier near Bangkok, a processing agent, a feed

supplier, a local government official, a broker, an ice supplier, a shrimp association representative and the Director of a Thai shrimp genetic research centre. These interviews provided perspectives from production and triangulated earlier information on product flows, links between nodes and the extent of marketing information received by producers. With this initial comprehensive view of the chain, further interviews were arranged in Bangkok, including with the Quality Assurance Director, Marketing Department, Research and Development Department and an integrated farm at one of Thailand's global agro-industrial conglomerates. Over the following weeks, although based in Bangkok, 3-day visits to provinces enabled ongoing triangulation between the views of institutional agents and the processing industry based in and around Bangkok, and provincial value chain members.

Interviews in Bangkok included a Senior Advisor at a Thai trade association, the Executive Director of an international shipping company in order to learn more about distribution and import requirements, an import-government's trade delegation, a Research Director at DOF as well as a Coastal Aquaculture Specialist in organic production, a Director of a government certifying body, academics researching shrimp and tilapia, and an auditor. In the provinces, interviews were held with independent farmers, Purchase Managers at local processors, small-scale farmers (landowners or landless), polyculture farmers, feed suppliers, hatchery and nursery producers, and brokers of feed and seed. Two smaller processors in rural areas were also interviewed including visits to their factories. A day trip was undertaken with an NGO linking a cluster farm association to an international seafood buyer and an interview was also obtained with the importer. In the

final week, value chain agents for which there was still weak information were targeted. This included tilapia growout ponds and cages as well as a visit to the largest Thai wholesale market in Samut Sakorn province in order to identify quality, price and product flow issues in domestic chains as a comparison to export chains.

In total, 75 interviews took place and 12 observations (Table 4.4).

Figure 4.4 Key Informant Interviews (KII) and Observations (Obs) in Thailand, February-May 2011

Chain	Type of Interview	Stakeholder	Production*	Total no.	No. of Interviews
Shrimp	KII	Hatchery and nursery	90 million	Unknown	1
			10-12 million		1
		Growout	<20 t	33,500	3
			21-50 t		2
			51- 100 t		1
			101-200 t		2
			>200 t		1
			Organic	Unknown	1
		Processor**	Unknown	175 EU approved	2
		Broker	Unknown	Unknown	2
		Importer (EU)	8,500 t	Unknown	2
			30 t		
		Feed Supplier	200 t	Unknown	1
		Farmer Associations	-	30	5
		Research	-	22	1
		DOF	Organic	-	1
			Cluster Farm Certification		1
	Obs	Contract Farm	-	-	1
		Tilapia Hatchery and Nursery	-	-	1
		Processing Plant	-	-	2
		Cluster Farm	-	-	1
Tilapia	KII	Hatchery and nursery	1.2 million	1,000	3
			3.4 million		
			42 million		
		Growout (pond)	70 t	1,500	1
			0.5 t		1
		Growout (cages)	< 10 t	Unknown	3
			10 - 50 t		1
			> 50 t		1
		Feed Broker	182 t	Unknown	1
		DOF	Provincial Level	-	2
			Research and		1

			Development		
			Cluster Certification		1
	Obs	Hatchery and nursery	-	-	1
		Harvest		-	1
Tilapia and Shrimp	KII	Hatchery and nursery	Unknown	Unknown	1
		Growout	3 t tilapia, 1 t shrimp	Unknown	1
			9 t tilapia, 0.6 t shrimp		1
			13 t total		1
			500 t shrimp, 600 t tilapia		1
			Unknown		1
		Processor	1 container	175 EU Approved	2
			8 containers		1
			220 containers		1
			1,800 containers		1
			Unknown		6
		Ice production and trade	Unknown	Unknown	1
			1,600 t		1
		Broker	1 t shrimp 10 t tilapia	Unknown	2
			2 t tilapia		
		Feed Trader	2,000 t	Unknown	1
		DOF	Certification	-	3
		NGO	-	-	2
		International governmental organisation	-	-	1
		National Trade Organisation	-	-	2
		National Research Centre	-	-	1
		Academic	-		1
		Independent Consultant	-	-	2
	Obs	International Trade Show	-	-	1
		National Supermarket	-	-	1
		Wholesale Market	-	-	2
		Training Workshop	-	-	1
Total Number of Interviews					**75**
Total Number of Observations					**12**

* Unless otherwise stated
** Sometimes commission agents are also depot owners
*** Processors and exporters are mostly the same company

Nineteen (25%) of the interviews were with women. Eight interviews were with female intermediaries (feed, ice, seed, harvest agents and brokers) while five were with farmers. Four of these women called themselves the farm owners and one called herself the owner's wife. Three female managers in processing plants were interviewed (one from the Quality Assurance department of a large processor and two from Marketing departments in a large and a small company, one of which was a Senior Marketing Manager), two senior officials in DOF and one Director of a shipping company.

4.4.4 EU

4.4.4.1 Research locations

Chapter 3, combined with Appendix 1, provided an overview of data availability on the EU market and seafood supply chains. Based on this review, important EU countries for the import and consumption of seafood from Bangladesh and Thailand, as well as those that play a significant role in intra-EU trade of the selected products, are: Belgium, Denmark, France, Germany, Italy, the Netherlands, Poland, Spain and the United Kingdom. In order to determine the most appropriate countries for examining seafood supply chains from Bangladesh and Thailand, available secondary information on these national supply chains, particularly with reference to the species under consideration, is summarised below (Table 4.4).

Table 4.4 Summary of available data for the selected species:
(x = non-existent; * = Some availability but aggregated; ** = good coverage but aggregated; * disaggregated)**

Country	Availability and disaggregation of statistical sources of Information				
	Imports/ Exports	Wholesale and Distribution	Processing	Retail	Foodservice
Belgium	*	*	*	*	*
Denmark	*	***	***	*	**
France	*	***	***	***	**
Germany	*	***	***	***	**
Italy	*	*	*	*	*
Netherlands	*	*	*	*	*
Poland	*	*	x	x	x
Spain	*	**	***	***	**
United Kingdom	*	***	***	***	**

Source: Author

In light of evident data deficiencies it was impossible to provide an in-depth analysis for the nine countries given the time and resources available. As there was a need to gather qualitative data in particular, resources are more efficiently and effectively utilised and a greater depth of analysis obtained when the number of countries in the analysis is reduced. Selection criteria were those countries that are important import hubs or key final markets, with easily accessible distribution networks and where government and secondary data can support the analysis. According to Table 4.3 above, France, Germany and the United Kingdom were deemed the most appropriate EU countries for primary data collection. France, Germany and the United Kingdom are the biggest markets in the EU for shrimp and prawn from Bangladesh (54%) and for shrimp and tilapia from Thailand (47% and 52% respectively). Furthermore, there is significant secondary data available for these countries. Given the importance of Belgium and the Netherlands as

import hubs, these countries were also chosen to form a second tier of analysis in order to cover supply channels. The award of a DAAD (German Academic Exchange Service) scholarship at the Johann Heinrich von Thünen-Institute (vTI) in Hamburg meant that further benefits were gained from being primarily based in Hamburg during the fieldwork period due to its close proximity to important seafood importing and consuming countries. The vTI has experience in value chain analysis, particularly value creation within chains, and analysis of seafood markets in the EU. As these data are often only commercially available, collaborating with the vTI helped ensure an accurate and well-contextualised analysis.

4.4.4.2 Selection of informants

In total, 6 weeks were spent in Hamburg, Germany. Two weeks at the beginning of the fieldwork period resulted in an interview by Skype with a UK-based auditor to triangulate information obtained in Asia and to discuss EU market seafood certification requirements and auditing techniques. Interviews were then held with a German importer, the CEO of a German Wholesalers and Processors Association and a seafood buyer for a foodservice supplier. These were followed by interviews in the Netherlands and Belgium and included the President of a Dutch Processors and Trade Association, a Trade and Quality Affairs Manager in the same organisation, and two officials at the EU Commission with expertise in trade and market issues. Two weeks were then spent in France. The Quality Manager of a French seafood importing company was interviewed, as was the seafood buyer for another French importer, a Senior Brand Manager at a seafood processing company with its

own brand, the EU seafood buyer for a French retailer and the EU Purchasing Director for a large EU foodservice company. In France, supporting evidence as well as quantitative statistics were also provided through discussions with informants at an international government organisation, a French auditor operating in Asia, an academic specialising in seafood value chains and the EU Director of an NGO. While in France, an interview was also held with the Director for Sustainable Development for a French retailer that hosts France's oldest own-brand ecolabel. A visit to Rungis, France's largest and most important wholesale market, also took place at this time. Two further weeks were spent in Germany in order to triangulate information. This trip included a visit to a German port. As well as interviewing a Veterinarian Fish & Shellfish Hygiene expert to learn about import procedures and seafood violations, a visit was made to the factory of the largest processor and distributor of seafood in Germany, followed by a smaller processor. Although attempts were made to interview discounters[28] in Germany as they are important market agents, this proved unsuccessful. Instead, an interview was arranged with the CEO of the seafood-packaging supplier for one discounter, enabling some conclusions about the priorities of the retailer to be drawn. An interview also took place with an NGO that frequently collaborates with retailers on sustainable sourcing policies. Interviews then began in the UK with the Director of Sourcing of the largest importer of seafood in the UK, the Head of CSR for a UK retailer, the Technical Director of a processor, the Chief Technical, Sustainability and External Affairs Officer for a brand manufacturer, the Chief Executive of a trade association located in a key importing region, a

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[28] Characterised by few product lines, little variety of choice within each product line and a no-frills environment that dominates German retailing (Wortmann 2011)

Foodservice Manager for an NGO with an ecolabel and two ethical trading NGOs: the Director of one and the Category Leader (food and farming) for the other. The final two weeks of fieldwork were spent in Germany where interviews took place with the Technical Director of a German importer, the Head of Division for Sustainable Purchasing/CSR at a German retailer and a Senior Project Manager for Standards/Regulations and General Shrimp Aquaculture at an environmental NGO with a shrimp standard.

4.4.4.3 Firm Scale

During fieldwork in the EU, enterprises with high market shares were sought as they were considered likely to wield high market power and therefore determine the functional division of labour within their supply chains. Informants in senior positions were sought and those representing different segments of the market, as indicated in section 4.2.2.

4.4.4.4 Interview procedures

37 interviews were undertaken with stakeholders in the EU (Table 4.5). 11 in the UK, 10 in France, 12 in Germany and 2 each in the Netherlands and Belgium.

**Table 4.5 Key Informant Interviews (KII) and Observations (Obs) in the EU,
September- December 2011**

Type of Interview	Stakeholder	Number of Interviews
Key Informant Interviews	Importer/Wholesaler	5
	Processor	7
	Retailer	3
	Foodservice	2
	Regulator	5
	Auditor	2
	Trade association	4
	NGO	6
	Academic	1
	Consultant	2
Observations	Processing Plant	1
	Wholesale Markets	1
	Retail Stores	3
Total Number of Interviews		**37**
Total Number of Observations		**7**

Snowball sampling was equally successful in the EU and 31 informants were interviewed after recommendations. The others responded positively to 'cold-calling' as they were informants interested in the outcomes of the research. They included the Senior Brand Manager of a processor in France, the European Director of an NGO based in France, the Head of CSR at a UK retailer, the Technical Director of a processor in the UK, a Manager at a UK-based NGO and the Head of Division for Sustainability of a German retailer.

In comparison to interviews in Asia, EU informants were particularly open about their perceptions of seafood supply in the EU, differences between the competencies of supplier countries, the value of trends such as sustainability in the EU market and the extent of information gathered and passed on in chains. Interviews generally took around two hours compared to the usual one hour in Asia.

Eight interviews were via Skype, one interview was in French, one in German and the rest in English. Translation was not required for interviews in languages other than English. Seven observations also took place including two processing factory visits (one small, one large), two visits to wholesale markets (in France and the UK) and three visits to retail stores (one in Germany and two in the UK).

Eight interviews were with women (22%). One ran her own seafood consultancy business in France, four worked for NGOs (one as a fish expert for an environmental NGO in Germany, one as EU Director, one as Foodservice Manager and one as Category Leader), two were Heads of Division at retailers and their departments were involved in sustainability (one German retailer and one French retailer), and one was EU Director for seafood purchasing for a French foodservice company.

PART 3. DATA VERIFICATION AND ANALYSIS
4.5. Data verification and analysis

4.5.1 Recording of data

Interview notes were taken by hand. The decision to not record interviews was taken for three reasons. First, interviews generally took place at the place of work, which were often live and dynamic settings that would have interfered with sound quality. Second, the use of a recording device may be an advantage in terms of providing a 'backup', but could also have led to an over-reliance on technology. Trusting in technology could have led to a lack of concentration in the interview and potential inefficiency if there was a recording or download problem. The time taken to transcribe interviews would

also have reduced available time for interviews. Third, key informants were generally those with commercial interests. The presence of a recording device could have made some reticent to share information or even refuse the interview. Instead, writing notes allowed conversations to flow freely and enabled secondary impressions, such as body language, to emerge.

4.5.2 Data verification

Data for triangulation were obtained through interviews with multiple key informants from the same stakeholder group (where possible), interviews with informants from different stakeholder groups, secondary data reviews and external references to the chain, such as donor support sectors. Triangulation was also used to identify some areas where perceptions on identical issues differed, such as the percentage of Thai imports that are randomly sampled upon arrival in the EU, and further interviews and web-based research were used to verify these areas.

4.5.3 Data analysis

On the day of the interview, notes made by hand and any observations were typed into a Word Document. On a regular basis, information from the interviews was then transferred to an Excel document. The Excel document had various column headings relating to the topics of the GVC conceptual framework and the three aspects of market orientation, as well as any other issues that required follow up, triangulation or were of interest. Inputting the data in this way later enabled responses to be filtered by topic, respondent, country, gender or keyword in order to conduct the analysis. Responses were

then coded (see Tables 4.6, 4.7 and 4.8). Conclusions in the thesis are supported by direct quotes taken from the interviews and are numbered accordingly.

Some quantitative data was collected on seafood prices along the chain, revenue distribution in the chain and other values relating to the farm and firm level. However, it became clear that there was insufficient data that was inadequately representative and unsatisfactorily verifiable in order to permit its usage in the analysis that follows. Such topics, although very interesting, are outside the scope of this thesis. Focus on such data collection in the future will contribute to the examination of seafood value chains.

Table 4.6 Interview Key for Bangladesh

Stakeholder	Interview Number
Inputs	
Snail production and trade	BD 17, BD 18, BD 72, BD 73
Seed Trade	BD 14, BD 40, BD 50
Ice production and trade	BD 12, BD 66, BD 68
Feed trade	BD 29, BD 44, BD 45, BD 62, BD 69
Fry catcher	BD 55
Value Chain	
Hatchery/Nursery production	BD 13, BD 19, BD 32, BD 49
Producer	BD 1, BD 5, BD 20, BD 33, BD 34, BD 36, BD 37, BD 38, BD 39, BD 43, BD 56, BD 59
Faria	BD 10, BD 27, BD 67, BD 74
Arut/Chatal	BD 2, BD 3, BD 26, BD 70, BD 71
Depot	BD 58, BD 65
Commission Agent	BD 6, BD 7, BD 9, BD 11, BD 28, BD 75
Processor	BD 8, BD 25, BD 30, BD 35, BD 47, BD 48, BD 60
Processor labour	BD 52, BD 53, BD 54
Importers (DEU, GBR)	BD 31, BD 79
Institutional Framework	
Domestic institution	BD 4
Trade association	BD 61, BD 78, BD 82
International Institution	BD 41, BD 42,
NGO	BD 15, BD 16, BD 21, BD 22, BD 23, BD 24, BD 46, BD 51, BD 57, BD 63, BD 64, BD 76, BD 77, BD 80, BD 81

Table 4.7 Interview Key for Thailand

Stakeholder	Interview Number
Inputs	
Ice production and trade	TH 9
Feed production and trade	TH 40, TH 51, TH 69
Value Chain	
Hatchery/Nursery production	TH 30, TH 31, TH 46, TH 47, TH 70
Producer	TH 6, TH 16, TH 17, TH 19, TH 20, TH 21, TH 23, TH 24, TH 29, TH 32, TH 42, TH 45, TH 48, TH 49, TH 50, TH 56, TH 62, TH 65, TH 67, TH 68, TH 73, TH 74, TH 75
Broker	TH 8, TH 25, TH 41, TH 60, TH 61
Processor	TH 1, TH 3, TH 4, TH 5, TH 13, TH 14, TH 15, TH 22, TH 55, TH 57, TH 58, TH 72
Importer (DEU, FRA)	TH 39, TH 71
Institutional Framework	
NGO	TH 2, TH 37
DOF	TH 7, TH 26, TH 33, TH 34, TH 43, TH 52, TH 63
Producer Association	TH 10, TH 18, TH 44, TH 59, TH 66,
Trade Association	TH 35, TH 36
Research and Development	TH 11, TH 12, TH 27, TH 28
International governmental organisation	TH 38
Seafood consultant	TH 53, TH 64
Academic	TH 54

Table 4.8 Interview Key for the EU value chain

Stakeholder	Interview Number
Regulator, auditor, trade association	BEL 1, BEL 2 DEU 1, DEU 3, DEU 6 FRA 1, FRA 6, GBR 4, GBR 7 NDL 1, NDL 2
NGO, academic, consultant	DEU 2, DEU 9, DEU 11 FRA 5, FRA 8, FRA 10 GBR 2, GBR 3, GBR 8
Processor	DEU 4, DEU 7, FRA 2 GBR 5, GBR 6, GBR 10, GBR 11
Retailer	DEU 5 FRA 4, GBR 1
Importer/Wholesaler	DEU 8, DEU 12 FRA 3, FRA 7 GBR 9
Foodservice	DEU 10 FRA 9

Chapter 5

The Generation of Market Information in Seafood Value Chains

The basic assumption on which the market orientation approach rests is that information has strategic value. The better information that a firm has about a particular consumer, the more that firm will potentially be able to provide the consumer with a product that satisfies his or her demands (Pereira 2001). The generation of market information is particularly important in a rapidly changing and highly differentiated market such as seafood; the greater the differences in end-user demands, the higher the levels of accurate information required. The more precisely that demand is satisfied, the more value a firm can extract through higher prices (contingent on whether the consumer is willing to pay). Information generation is therefore critical to extracting value, thereby potentially enabling the maximising of profits.

This chapter will answer the first research question, which is to explore the process of generating market information. As mentioned in Chapter 1, there are two main aspects of market information. The first is that market information consists of regulations to be complied with, particularly for importation to the EU. The second aspect of market information is consumer demand, and particularly the product attributes that meet consumer values. This chapter examines external governance in the value chains (section 5.1), identifies consumer values in the EU seafood market (section 5.2), and then examines the generation of market information in the value chains in Asia

(section 5.3). This will lead to conclusions about the extent to which the generation of information differs in the chains in Asia compared to the EU, and the power dynamics this leads to (section 5.4).

5.1 The institutional framework and international seafood trade

Table 3.3 and Appendix 2 together provided a descriptive account of the institutional framework (external governance) for farmed seafood trade between Asia and the EU. International seafood trade is governed by rules and regulations that are sources of market information as they highlight values that are associated with this trade, such as food safety, traceability and quality. Other agents and institutions without regulatory power also form part of the institutional framework as they influence the actions of others using methods such as voluntary standards, financing and media pressure. The various linkages of regulation and influence in the institutional framework surrounding seafood trade can be summarised schematically (Figure 5.1).

Figure 5.1 The institutional framework relating to seafood trade between Asia and the EU
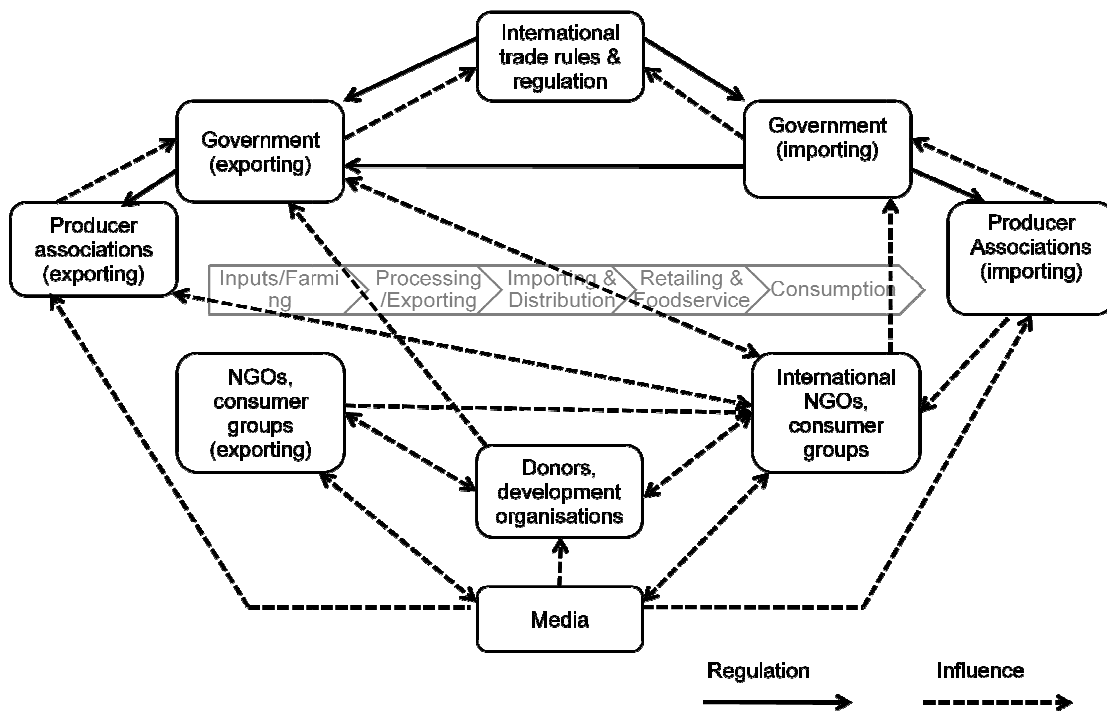
Source: Author, based on key informant interviews

The above figure shows how various organisations important to international trade in seafood are regulated or influenced, and how they in turn can regulate and influence others. Regulation is imposed on both exporting and importing governments by international trade rules and regulations (as detailed in Appendix 2) and importing governments can also directly regulate exporting governments through bilateral agreements. Both importing and exporting governments have an influence on the formation of international trade rules and regulations, and are in turn influenced by national producer associations and international NGOs. Exporting governments may also try to influence international NGOs, particularly when it comes to the creation of seafood standards. Although the primary focus of NGOs is on changing consumer purchasing drivers and decisions, they may also exert influence on governments through environmental and social standards in

producing countries, producer associations, donors and development organisations, and the media. Overall, the figure highlights the role of governmental institutions in generating regulation, and portrays the extensive and complex influence exerted by other agents on seafood trade. In particular, some agents such as developing country governments may find themselves subject to substantial influence by a wide variety of agents including international NGOs and the media, in comparison to the limited influence they can exert themselves. This could lead to imbalances that favour certain more powerful agents in international seafood trade.

The institutional framework is of interest to this research as individuals and agents regulate and influence seafood value chains between Asia and the EU, generating information about market values as they do so (Figure 5.2).

Figure 5.2 The institutional framework and its influence on seafood value chains between Asia and the EU
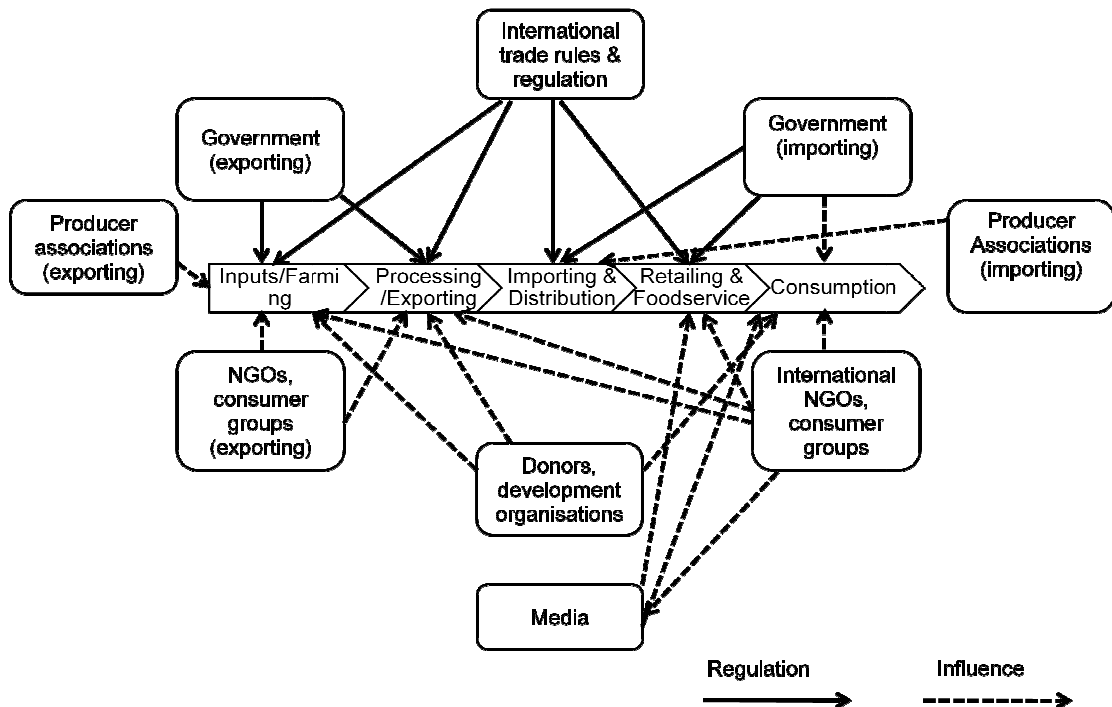
Source: Author, based on key informant interviews

International trade rules and regulations affect almost every value chain node by dictating the attributes of seafood products to be traded. Exporting and importing governments translate EU legislation reflecting market values into domestic regulatory frameworks. Importing governments may also influence consumption through government campaigns, such as increasing seafood consumption for health reasons. The influence that other agents exert on value chain nodes also generates market information. For example, international NGOs help influence consumer interpretation of information received from other sources. In particular, NGO influence on retailers and the foodservice industry came about because, "NGOs believe that by changing procurement decisions rather than relying on consumer preferences, sustainable seafood consumption will increase more quickly", according to a fisheries expert in an international NGO (DEU 11, 2011). A German retailer highlighted the two methods most commonly used by NGOs to bring about change to a retailer or foodservice company's sustainability sourcing policy: "There are NGOs who campaign and fundraise using scandals, and there are NGOs who are serious and scientific and try to work with us to solve problems" (DEU 5, 2011). Seafood buyers and other informants in the EU expressed generally positive views regarding the influence of the most well-known NGOs, making comments such as, "They are on our side" (NLD 2, 2011), "They are trying to understand the science", and, "We have developed sourcing policies together" (DEU 5, 2011).

The media also plays an important role as a transmitter of information and may convey information on production practices to consumers, or the sustainability of retailer sourcing policies based on conclusions drawn by

NGOs, for example. Media outlets may be used as a conduit for NGO campaigns that influence aspects of production, such as certification schemes. However, views expressed by value chain agents regarding the influence of the media were overwhelmingly negative. All seafood buyers for retailers interviewed blamed sensationalist television programmes and print media for a negative image of seafood and particularly of aquaculture. A German informant in the retail sector noted that it became very difficult to sell pangasius in Germany after a 2011 TV programme aired on pangasius farming in Vietnam[29] (DEU 5, 2011). In this case, reporting was assisted by an NGO who was praised in interviews with other informants as the NGO had worked closely with the industry. This is an example of potentially inconsistent messaging and the mixed role the media and NGOs sometimes have. In some cases this has led to a negative influence on seafood consumption and deteriorating relationships with industry (NDL 1, 2011).

Donors and development organisations influence consumers through the generation of information surrounding environmental and developmental impacts of farmed seafood production. National NGOs alongside producer organisations influence value chains in the individual country, but without links to international agents and institutions they may struggle to generate information on the European market.

5.2 The generation of market information in the EU

Having established regulation and influence through the international institutional framework on seafood trade, this section will focus on consumer

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[29] *Die Pangasius Lüge*, NRD Channel, 9 March 2011

values in the EU seafood market. However, exploring existing standards was not the aim of the research, as there are comprehensive reviews provided in other sources[30]. Instead, interviews revealed the most important consumer values, as expressed by EU seafood professionals (Table 5.1). The country of origin of the respondent is highlighted in brackets[31].

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[30] See, for example, (FSIG/MRAG 2009)
[31] BEL = Belgium; DEU = Germany; FRA = France; GBR = United Kingdom; NLD = The Netherlands

Table 5.1 Consumer Values in the EU Seafood Market

Value Chain Actor	Low Price	Food & Brand Safety	Portion Size & Product Range	Traceability	Quality	Sustainability	Innovation	JIT* Supply, Availability & Uniformity	Market Fit
Importer (FRA)	✓				✓		✓		
Importer A (DEU)	✓	✓		✓	✓			✓	✓
Importer B (DEU)	✓		✓		✓	✓	✓	✓	
Importer (GBR)	✓				✓				
Processor (DEU)	✓				✓	✓			
Processor A (FRA)	✓					✓	✓	✓	
Processor B (FRA)			✓		✓				
Processor (GBR)	✓		✓		✓	✓	✓	✓	
Retailer (DEU)			✓			✓			
Retailer (FRA)		✓		✓	✓				
Retailer (GBR)		✓	✓		✓	✓		✓	✓
Foodservice Company (FRA)	✓		✓	✓	✓	✓		✓	
Institution** (BEL)	✓			✓					
Institution** (DEU)	✓	✓	✓			✓	✓	✓	
Institution** (FRA)					✓				
Institution** (GBR)	✓		✓						
Institution (NDL)	✓	✓	✓	✓		✓		✓	
NGO*** (FRA)	✓		✓		✓			✓	✓
NGO*** (GBR)						✓			
Total	13	5	10	5	12	10	5	9	3

* Just In Time supply
** Institutions, regulators, auditor, trade associations
*** NGO, academic, consultant

Source: Author, based on key informant interviews

Each of the values will now be discussed in turn in order to understand their importance.

Low Price

Low-priced seafood is an important consumer value in seafood markets at the current time, evidenced by the large number of respondents who mentioned it. The importance of low prices for seafood was summarised by an informant from an EU institution who recognised current purchasing priorities as, "Price, price and convenience" (BEL 1, 2011). Low prices are a more important issue for importers and processors than they are for retailers, according to informant responses in Table 5.1. This seems to suggest that retailers may be squeezing margins in their supply chains while maintaining their own margins. Comments made by respondents provided some nuances to this conclusion. One German importer said, "The disadvantage of supplying retail chains is that margins are squeezed, but volumes are larger" (DEU 8, 2011). A French foodservice company echoed this remark by saying that they also demand low prices but this is balanced with high volumes in their sector (FRA 9, 2011). Nevertheless, a UK processor pointed out that low price is not every company's strategy: "If you sell too cheaply, people think [the product] is bad" (GBR 10, 2011). Therefore, low prices might not be to the advantage of brand positioning or even the image of the retailer. Both of these ideas will be discussed in the sections that follow.

Food & Brand Safety

Respondents viewed food safety as a mandatory aspect of seafood trade and as the most basic attribute on which other values are built. As a UK retailer pointed out, "No consumer is willing to pay for a product that is *less* safe" (GBR 1, 2011). Therefore, despite low-price values, there may be a minimum price that consumers expect to pay as an indicator that sufficient research has gone into producing a safe product. As a result, the safety of brands and brand communication, rather than food safety, was discussed at greater length in interviews. Retail brands, sometimes referred to as "own-brands" or private labels reflect and represent the image of the retailer. As changing consumer values have focused attention on elements of competition other than simply price, the role and nature of the retailer's own-brand has changed. Retailers have begun to emphasise the quality and service aspects of their operations through retail brands as well as using these brands to differentiate themselves from competitors. Added to this, a modern phenomenon in retailing is the importance of the retailer as a brand in itself: the retail name is synonymous with certain values that reflect the retailer's market position and strategies. This means that retailers have a substantial interest in governing and coordinating their supply chains, which will be explored in Chapter 6.

Portion Size & Product Range

According to a French seafood consultant, EU eating habits have substantially changed as a result of important social and economic

developments (FRA 5, 2011). Social and demographic trends such as extended working hours have significantly reduced the time available for the preparation of meals within the household. Ready-to-cook, ready-to-eat meals and pre-packaged food have increased their market share, as has out of home (OOH) consumption. Changing family structures have also resulted in diet changes among developed country consumers, stimulating demand for portion-sized products for one. Portion size is particularly important for the foodservice industry and is partially linked to product convenience. These changes require a continuous stream of information in order to anticipate, respond to and pre-empt market trends. Changes also require resources such as capital and investments in technology in processing factories and distribution services (such as delivering chilled products daily).

Product ranges are important to retailers and foodservice companies who wish to offer a large choice that will cater for different market preferences. As one UK processor said, "Preferred suppliers are likely to be those who can provide consolidated, integrated supply with a high range" (GBR 10, 2011). Sourcing a large variety of products from a single importer can result in competitive advantages and logistical benefits for the importer while reducing transaction costs for the buyer. However, one German retailer highlighted how information on product ranges can be limited. For example, the most important shrimp product differentiation in their supermarket is whether shrimp is farmed or not (DEU 5, 2011).

Traceability

According to a respondent from a trade association, "Traceability is about knowing who gave you the product and to whom you are giving it to" (NLD 2, 2011). In the EU, this is often referred to as a "one up-one down" traceability policy, according to a respondent from an EU institution (BEL 1, 2011). A foodservice company informant in France stated that firms are, "Willing to pay more to know the whole chain" (FRA 9, 2011), demonstrating the importance of this attribute. Traceability is also important as the basis of certification schemes because only by following the product at each step of the chain can its attributes be verified – and products be recalled in the event of a product safety issue.

Quality

Value chain members highlighted quality as an important consumer value but quality means different things in different markets. This is applicable to various countries as well as value chain strands where quality attributes may be valued differently. One auditor in France defined quality as, "Freshness, colour, texture, flavour, weighting and grading, trimming, method of production/processing, testing procedures, packaging, and the cold chain" (FRA 1, 2011). This emphasises the role of the value chain itself in maintaining product quality. For one retailer, quality is particularly important in retail chains as a product differentiator and to support brand messages (FRA 4, 2011). This is perhaps why two importers highlighted the need for

persistent and *consistent* quality in retail supply chains (DEU 8, 2011; FRA 7, 2011).

For a German processor interviewed, commitment to quality goes beyond "doing" to ways of "being" (DEU 4, 2011). For example, the processor pointed out that decisions about quality are made at the time of selection of suppliers. In this way, choosing the "right" suppliers to work with is the first quality check. Quality for the processor requires information from suppliers on quality assurance processes in factories in Asia, as well as on child labour practices, employee contracts, overtime payments and holidays (DEU 4, 2011).

The high response by value chain respondents to the consumer values of "low price" and "quality" would appear to be mutually exclusive. Indeed, this was raised in interviews. Three processors responded by saying that it is impossible to produce a product of equal quality at a lower price, and yet suppliers feel under intense commercial pressure to do so (DEU 4, 2011; FRA 2, 2011; GBR 6, 2011).

Sustainability

In response to consumer demands for increased product information, a proliferation of certification schemes and recommendation lists for seafood products has evolved. These seek to influence market demand for seafood by encouraging compliance with a varied mix of rules, regulations and recommended practices. However, respondents across all the countries and at different value chain nodes agreed that it is only a very small minority of

consumers that genuinely care about seafood sourcing. A Dutch trade association said this is potentially due to time constraints: "Consumers have three seconds to make a choice," (NLD 1, 2011) or because price overrides the value for sustainability, as a German retailer said: "Consumers do pay for sustainability, but only when they can't get the product cheaper somewhere else" (DEU 5, 2011). At the same time, every seafood company interviewed had an internal sustainable sourcing policy.

So if it is not a consumer value, what values are driving sustainability sourcing strategies? Three reasons were given by respondents. The first is brand protection and retail reputation. A retail buyer in the UK said, "Retailers are trying to insure against the story that would undermine their business" (GBR 1, 2011), while a processor said, "Certification is insurance for brand protection" (GBR 10, 2011). One NGO respondent added that, "Risk management and reputation management are important retail values" (DEU 11, 2011). This was echoed by a UK processor who said, "While it's only a tiny majority of consumers that care, retailers spend money on sustainability as a defensive strategy, for reputation management and because the consumer trusts the retailer to take care of this" (GBR 6, 2011). Seafood is an area in which, "Sustainability points can be scored easily" due to, "Low and broad knowledge that consumers have about seafood", said a Dutch trade association respondent (NLD 2, 2011). The management of reputation is important for all retailers and responsible sourcing is therefore a defensive strategy. As one UK retail buyer put it, "Everyone is trying to avoid ending up with Greenpeace on their roof" (GBR 1, 2011), in reference to negative

publicity a retailer obtained after the NGO campaigned about its sourcing policy from the roof of one of its stores[32].

Second, purchasing certified seafood shifts responsibility and costs for sustainability to others. One NGO noted some buyers wish only to, "Tick the box" and are not genuinely committed to sustainability (DEU 11, 2011). This means that within the industry there is substantial scepticism about the rise of sustainable and responsible sourcing strategies, with a German importer calling them, "Hot air with no fire", and more related to risk management, reputation management and marketing in response to NGO pressure (as mentioned in 5.1) than genuine sustainability by retailers (DEU 10, 2011). Of course, some suppliers such as a German retailer did view their commitment to sustainability as, "An essential part of doing business" (DEU 5, 2011), while, in contrast, others mentioned colleagues who view sustainability as a constraint to their sourcing mandate to provide what customers want (i.e. low-cost seafood) (GBR 10, 2011).

Third, certification is an easy way of demonstrating sustainability. A UK NGO pointed out that, "Standards identify a commitment and show a defensible target" (GBR 3, 2011), and for one German retailer interviewed, "Certification makes things easy. Either a supplier has it or doesn't" (DEU 5, 2011). However, certification may be costly and not directly related to quality, according to a UK retailer. Instead, what makes a product into a product of quality may be "counter-intuitive". For example, a processor in the UK elaborated further from his own experience of a visual check of certified compared to non-certified fish, where the certified fish displayed a clear and

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[32] For one example of the media attention, see
http://www.eurocbc.org/asda_seafood_policy_turnaround17jan2006page1851.html

detrimental difference in skin quality and shine compared to the non-certified fish (GBR 4, 2011).

Despite the usefulness of certification schemes some value chain members no longer advertise sustainability credentials using product logos, even though product certification may exist. A UK processor said, "We have certification but we don't use the logo. The brand name itself means quality" (GBR 5, 2011). A French processor also believed their brand told a better quality and sustainability story than simply adding a label, even though their value chains were certified (FRA 2, 2011). A German importer admitted, simply, "Sustainability is too expensive to communicate to consumers", thereby supplying one reason why product logos may not be used (FRA 4, 2011). Overall, value chain agents place a lot of emphasis on sustainability in supply chains, even if it is not caused directly by consumer demand, but rather by retail and foodservice strategies.

Innovation

Two processors, one French and one British, spoke at length about product innovation. Both felt under pressure by retailers to, "Be ahead of the curve", and outperform competitors in terms of innovative product solutions in order to guarantee retail shelf-space (FRA 2, 2011, GBR 6, 2011). Packaging innovation is also increasing in importance as one importer mentioned exploring the possibility of supplying windows on frozen food packaging so that a quality product can be better seen (DEU 8, 2011). According to

informants, innovation requires a strong system of data storage that may be cost prohibitive, as well as product uniqueness (DEU 2, 2011).

JIT Supply, Availability & Uniformity

Just In Time (JIT) supply requires, "Tight and well-established logistics that can result in efficiencies that reduce costs", according to a German foodservice importer (DEU 10, 2011). JIT supply may have an impact on the choice of location of processing. For example, an EU processor highlighted how they must, "Play with logistics" in order to gain efficiencies, which may lead to a particular choice of processing location (FRA 3, 2011). Another French processor said they ship frozen shrimp to France and then defrost and cook when an order arrives. This provides the highest quality, "Made to order" product as final processing occurs at points close to distribution and end markets (FRA 7, 2011). The implications of this will be further discussed in Chapter 6.

Availability, especially consistent availability, is an important value for retailers, and consequently for their suppliers. As mentioned in Chapter 1 and supported in interviews (e.g. GBR 5, 2011), farmed seafood production contributes to the provision of consistent volumes due to control over production processes. However, quantities and quality of farmed supply may be affected by disease or unforeseen environmental events such as cyclones or drought. An inability to provide the required supply could lead to a change in status of the relationship between supplier and buyer and even affect the reputation of the supplying country. The availability of high volumes is

particularly important for larger retailers and foodservice companies, according to informants (DEU 10, FRA 2, FRA 5, FRA 9, GBR 6, GBR 10). A French processor said that while they source a small number of species, they also require high volumes and therefore not all suppliers can supply such chains.

Buyers do not only want high volumes but uniformity within the volume required and also between orders. In particular, uniformity refers to the final product characteristics. One importer said, "We want uniformity of size, uniformity of colour and uniformity of appearance" (GBR 9, 2011). This is again more likely to favour large suppliers, the implications of which will be reviewed in chapter 8.

Market Fit

As mentioned in the section on *product range*, sellers of seafood have a current or desired product position, which ranges from the no-frills segment through other ranges to luxury and organic, depending on the production guarantees that can be provided. For example, firms occupying a high market position or niche may not have the same emphasis on low price. Instead, their customers may expect to pay more for a certain higher quality. A French seafood consultant summarised this by saying, "Sellers have to know where their product sits" (FRA 5, 2011). The presence of high, medium or low-end customers within markets requires products that meet certain market strategies that target differentiated customer preferences. This relates to retail brand strategies and is not only applicable to products. For example, a UK

retailer highlighted how their market strategy is to follow trends set by the market leader, but to sell at a cheaper price. The market leader has higher margins and therefore the resources to market sustainability to a greater extent through "product stories", which will be looked at again in chapter 6.

Having established important EU seafood consumer values as reflected by market agents, the following two sections will now explore the generation of market information in seafood value chains in Asia in order to examine to what extent these values are transmitted upstream to production.

5.3 The generation of market information in supply chains in Asia

5.3.1 Bangladesh

This section (5.3.1) and the following section on Thailand (5.3.2) examine the role of the domestic institutional framework (composed of regulation, standards and influential agents) in determining the generation of market information in the seafood chains in Asia and how well knowledge of EU consumer values are reflected at Asian value chain nodes.

5.3.1.1 Regulation

Regulation is the first means by which information is generated in seafood supply chains in Bangladesh. National legislation on production and processing of products of animal origin should be harmonised with the EU (Article 11(4)(a)(i) of Regulation (EC) No. 854/2004) and therefore reflect values related to food safety in particular. In Bangladesh, inefficiencies in the national legal framework, such as the many government agencies involved in planning, research, promotion, development, management and regulation of

the seafood sector (see also Appendix 2), has led to a lack of enforcement of existing regulations. For example, a hatchery respondent complained about the lack of enforcement of the existing wild prawn post-larvae (PL) ban (BD 19, 2010). Not only does catching wild PL undermine the hatchery business, but also it is unsustainable due to large levels of bycatch. For example, a fry catcher interviewed estimated that "Only around 25 of 500 PL caught are shrimp or prawn PL" (BD 57, 2010).

The government's Fish Inspection Quality and Control (FIQC) department establishes and implements national regulations to ensure that fish and fish products placed on the market are of sufficient quality. It is also the FIQC's responsibility to ensure that producers, traders and processors know, understand and comply with regulations through its advisory services. However, increased testing requirements for the EU result in a 30 to 35 day wait for export certificates (BD 22, 2010). As there is no digital database, paperwork must then be sent by mail to the District Fishery Office in Khulna, potentially resulting in lost and mixed paperwork. During a Workshop in Dhaka, the ex-Director of DOF highlighted the current needs of the Department: "They include policy reform, regulatory reform, conformity of law enforcement agencies, greater awareness of food safety laws, capacity building within FIQC, stronger laboratory facilities, better control of imports, HACCP and traceability at all levels, and improved inspection procedures" (Policy Level Stakeholders' Workshop, 28 September 2010, Dhaka, Bangladesh). However, DOF has made other improvements that assist the meeting of production and marketing values, such as infrastructure investment and improving water quality.

Some national regulation in Bangladesh may be suboptimal for industry development. For example, in providing assistance to the shrimp processing export sector, the government of Bangladesh offers subsidies equal to around 20% of the value of production (BD 24, 2010). Processing plants claim these subsidies by submitting Letters of Credit (guarantees of payment in international trade transactions) (BD 63, 2010). These subsidies enable, and arguably encourage, international buyers to depress prices. At the same time, the average utilised processing capacity in Bangladesh is 15% (BD 63, 2010). This leads to further expansion in the scope for downward price negotiation. In response to lower market prices a cost minimisation strategy may be adopted by processing plants. Efforts may then focus on the reduction of variable costs, leading to reduced product quality and standards.

5.3.1.2 Voluntary standards and certification

Quality assurance frameworks that can underpin or inform certification schemes have been conspicuous by their absence in Bangladesh. There is no widespread third-party certification as there is little possibility for traceability, which is essential for certification[33]. At the time of the interviews, all farms were undergoing registration with the assistance of the United Nations Industrial Development Organisation (UNIDO), but chain-of-custody traceability was virtually non-existent. Processors do comply with standards that are required by their most important buyers. For one processor this has

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[33] Attempts are being made on a private and direct basis to export certified organic product. Despite the large role played by donor assistance in supporting the organic standard through extension services for management capacities, technical expertise and marketing knowledge, obtaining the standard has involved significant time, effort and novel ways of thinking to enable traceability in a chain where there is currently little registration or documentation.

meant BRC for the UK market, IFS for the EU market and ACC for the US market (BD 26, 2010). Complying with a mix of standard schemes can raise costs for processors.

5.3.1.3 Influential agents

The influence of the international institutional framework on Bangladesh is particularly unique and has an impact on access to market information. This is because donors from developed countries support the government and industry through extensive intervention aimed at both the regulatory and operational levels, focusing on assisting and improving Bangladesh's export capacities, while significant technical advances are achieved mostly through private and NGO-led projects. Market information is therefore generated by these institutions and is not endogenous. At the same time, an NGO informant noted that, "Donor funding provides many services to people that are actually the responsibility of the state" (BD 82, 2010). This makes donor funding quite complex and subject to the power and interests held by different national politicians. The current international economic environment means that the amount of foreign aid is dwindling while the conditionalities of aid are increasing. Bangladesh is facing an increasingly competitive aid environment where donor assistance is now contingent on implementation of reform programmes and the efficient utilisation of aid. In addition, the nature of donor support has shifted over recent years to aiding NGO activities rather than focusing on the state. As the government is the Competent Authority (CA) for the EU, bypassing the state may limit the

generation of market information that would otherwise come from the EU market through this channel automatically.

Within Bangladesh itself, value chain members have different means of accessing market information. The first is proactively, such as by seeking information on the market by reviewing EU websites. However, internet connections are not reliable, particularly in rural areas. Companies can obtain information on rules and regulations through trade associations. However, trade associations such as the Export Promotion Bureau[34] (EPB), Bangladesh Shrimp and Fish Foundation[35] (BSFF) and the Bangladesh Frozen Food Exporters Association[36] (BFFEA) all claimed in interviews in Bangladesh that they do not have the resources to conduct market analysis or research on EU consumption patterns. The EPB is the national export promotion agency under the Ministry of Commerce, but all EPB publications at the time of the interviews were around 10 years old. The EPB sees the EU as, "A single market, as we don't have the resources to look into specific market analysis" (BD 80, 2010). The BSFF is a private, non-profit research organisation, acting at the interface between the government, private sector and donors. The BSFF mostly obtains information on regulation and quality standards from donors and thereafter supports post-harvest marketing channels in Bangladesh in order to improve compliance. The BFFEA is the trade body for fish processing plants and exporters. Although the BFFEA conducts training and workshops, particularly for processors, the BFFEA, "Is not fully aware of the final markets of [seafood] products" (BD 63, 2010). Although informants

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[34] http://www.epb.gov.bd/
[35] http://www.shrimpfoundation.org/
[36] http://www.bffea.net/

knew the principal importing countries, they were unsure of end markets or the requirements of consumers in those markets. Clearly, the market information that processors can receive from local trade associations is severely limited.

At other levels of the chain, commission agents are often important agents with access to information, although this is mostly related to supply rather than demand. Local trade associations have little vertical contact outside of their value chain node.

5.3.1.4 The source and nature of market information in the selected value chains

Figure 5.3 reveals the topic of information on which value chain agents in Bangladesh obtain information.

Figure 5.3 Topic of information generated in Bangladesh seafood value chains
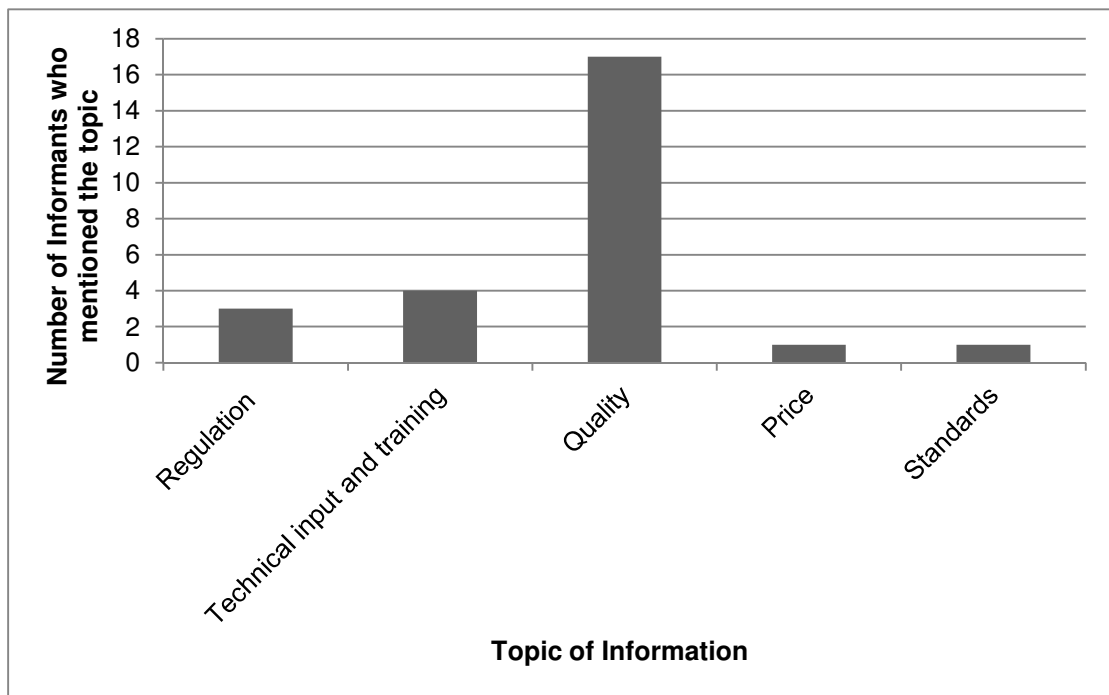
Source: Author, based on key informant interviews

The figure shows how the issue of quality is the main area in which information is provided to chain agents. This is both surprising and unsurprising. It is surprising, as the institutional framework in Bangladesh does not easily support quality control or improvements due to constraints brought about by regulation, donor intervention and weak investment by processors in the chain, limiting third-party certification that are signals of the presence of quality. However, on the other hand, organisations such as NGOs may well be bypassing traditional aspects of the institutional framework such as regulation and standards, and generating information about quality values directly with value chain agents, as reflected by respondents who reported receiving technical assistance and training.

For Bangladesh value chain agents, 'quality' mostly refers to the colour of the shrimp and prawn, presence of disease, hygiene in depots (such as tiles and metal tables), packing (covered baskets), and quality of roads (in order to decrease time between harvest and processing), and not to the definition provided by the French auditor in section 5.2[37]. Seven informants (ranging along the entire length of the value chain from hatchery to exporter) named the presence of ice as the most important factor influencing quality with one producer saying, "If I do not bring my shrimp on ice, the depot will not accept it" (BD 36, 2010). These aspects of quality contribute to, but do not imitate, market values as identified by EU value chain agents.

A number of value chain agents mentioned the importance of price, but always in the context of input and sale price variations through the season.

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[37] Quality is "Freshness, colour, texture, flavour, weighting and grading, trimming, method of production/processing, testing procedures, packaging, and the cold chain" (FRA 1, 2011).

The direct impact of influential agents and institutions outside of the value chain in Bangladesh is seen even more clearly in Figure 5.4. The EU, seafood buyers, international NGOs, international private organisations and international standard-setting organisations all assist with the generation of market information in seafood chains in Bangladesh. One processor obtained information directly from a certifying body. Those respondents who mentioned DOF as a source of information were at the level of depot and commission agents; farmers did not mention assistance from the government, and one Arut said, "DOF provides zero support" (BD 28, 2010).

Figure 5.4 Source of information generation in Bangladesh seafood value chains
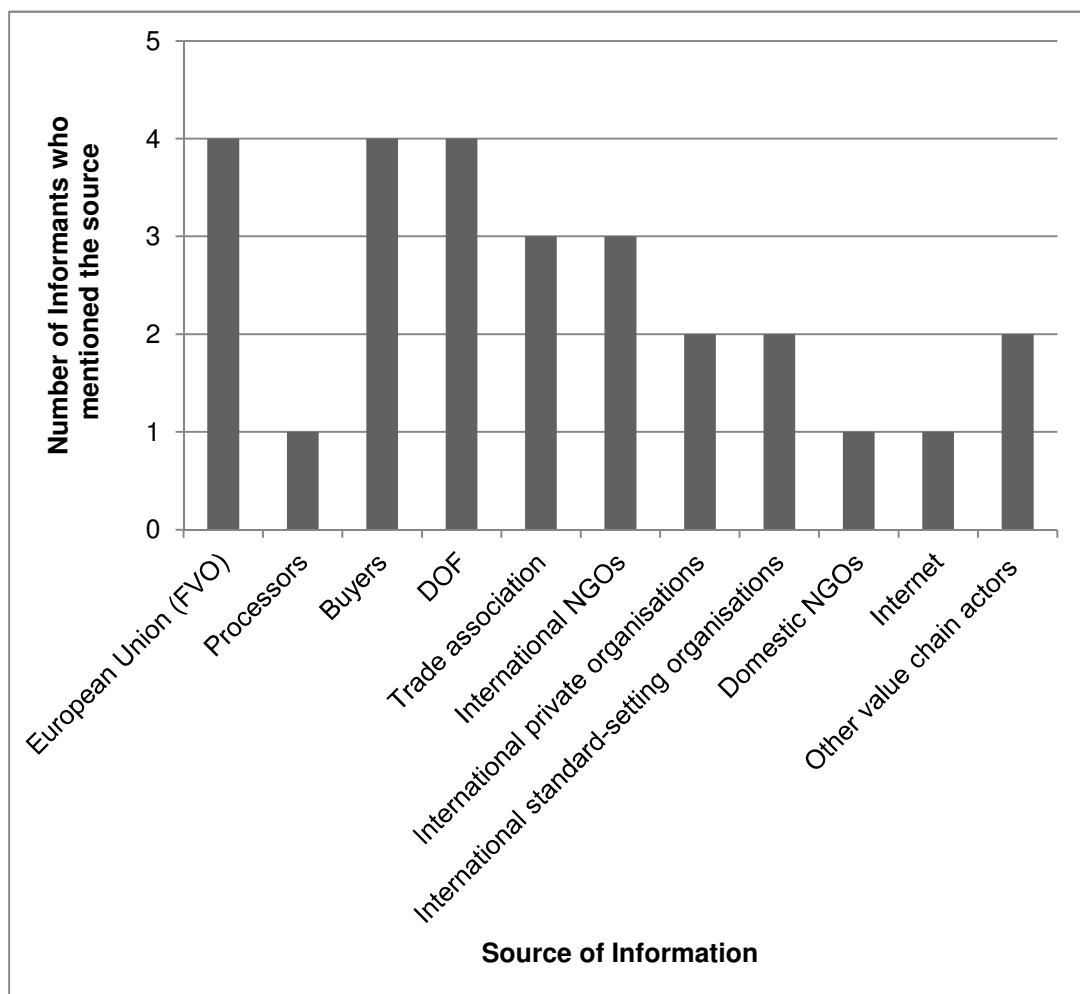
Source: Author, based on key informant interviews

Some buyers provide market information directly to processors through visits to processing plants. While all processors interviewed were aware of their principal end markets, only one processor with extensive international connections was able to identify which product chains the firm supplied.

The international private organistions named as the source of market information were Thai feed companies operating in Bangladesh. Other value chain agents listed as providing information in the chain were neighbours, faria and commission agents as well as hatchery personnel. One hatchery respondent mentioned the internet as a source of his information and assistance received from an international NGO. Large capital investments are required to establish a hatchery and therefore internet access by this respondent is not representative of all value chain agents.

The EU and particularly the Food and Veterinary Office (FVO), which undertakes inspections on compliance with the requirements of the EU import legislation, were frequently mentioned as a source of information. At least one commission agent was aware of, "EU teams coming to inspect the processor who then exerts pressure down the chain" (BD 5, 2010). One processor obtained information directly from FVO who visit his plant once a year. Awareness of the EU Commission and its market requirements may be partly attributable to the work of the EC's representatives in the aquaculture sector in Dhaka. An informant said, "The EU Commission is well aware of the particularities of the Bangladeshi seafood export industry and are sympathetic. These particularities include a lack of capacity, inefficiency, a lack of coordination, a highly complex internal chain structure and the high reliance of producers on the export industry" (BD 22, 2010).

To summarise, in Bangladesh there are numerous constraints to the generation of market information due to the weak nature of both the domestic institutional framework and the characteristics of the industry. This has led to a lack of market information generated in the chain on end markets and customer requirements. Evidence of the generation of market information is primarily from external influences and the government, but these relate mostly to limited quality attributes such as product colour and the use of ice. Furthermore, a trade association informant highlighted the poor availability of information in the local language as a constraint in Bangladesh, but this is only truly problematic if the information is generated in the first place.

5.3.2 Thailand

The Thai aquaculture industry used to be characterised by subsistence and small-scale aquaculture before changes in management practices led to intensification and commercialisation of production and increasing economic returns.

5.3.2.1 Regulation

Overall, the legislative framework in Thailand has resulted in, "A mature, robust and highly disciplined industry", as one NGO representative described it (TH 2, 2011). Identifying elements from multiple interviews, a supportive policy environment in Thailand consists of: poverty alleviation strategies, focusing on small-scale aquaculture; investment in public infrastructure such as convenient and efficient transport facilities; power supplies and local marketing facilities; technical extension services; internet-

based information services; and market facilitation. Other government assistance includes non-financial subsidies, such as exhibition attendance for those at export nodes of the value chain, encouraging direct access to market information. It can therefore be concluded that regulatory support provided by the national institutional framework ensures that production in Thailand is well versed with EU import requirements. One example provided by a DOF official is the way in which the Thai government responded to early market signals about the importance of food safety requirements by implementing a voluntary HACCP fish inspection programme as early as 1991, which became mandatory five years later. DOF continues to regulate inputs such as feed, seed and equipment, and also provides technical assistance such as the dissemination of new aquaculture technologies.

5.3.2.2 Voluntary standards and certification

In particular, DOF's early intervention to ensure farm registration and Movement Documents (MDs), which are the basis of traceability, also supported the introduction of standards and certification in the Thai industry to meet consumer market expectations (Table 5.2). However, as in Bangladesh, costs can sometimes be prohibitive. One processor mentioned they are certified to HACCP but not BRC or ISO, "Due to the high costs of certification but also the substantial documentation required for compliance" (TH 58, 2010).

Table 5.2 National Certification in the Thai Seafood Industry

Name of Standard or Registration	Number of hatcheries (approx.)	Number of Farms (approx.)	Main Aims							
			Food Safety	Sanitation	Environmental Aspects	Social Aspects	CSR	Traceability	Energy Saving	Organic
Registered (Conventional)	1 000	17 000								
GAP Thai	294	14 799	✓	✓						
CoC	47	113	✓	✓	✓	✓				
GAP Plus (7401-5225)	(growout only)	1 certified (10 in progress)[38]	✓	✓	✓	✓	✓	✓	✓	
Organic	-	1 (semi-intensive) 20 (extensive)	✓	✓	✓	✓		✓		✓

Source: Author, based on key informant interviews

Thailand has a national minimum standard for export called GAP Thai, which focuses on food safety and farm (and hatchery) sanitation. GAP Thai was originally introduced by the government in response to the discovery of antibiotics and other chemicals present in shrimp exports (primarily *monodon*, the major species farmed at the time) from Thailand in the 1990s. The aim of the standard is to ensure sustainable production through the introduction of a closed production system and compliance with rules on feed, water quality, chemicals, PL and harvest documentation requirements. During farm visits it was ascertained that while farmers must pay for any improvements that need to be made to the farm in order to achieve certification, DOF provides a free-of-charge testing, analysis and audit service for the standard. Internal control by DOF leads to quality assurances for the EU seafood market regarding

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[38] All are farms linked to a processing company.

seafood products from Thailand, ensuring that rules and regulations for the EU market are adhered to from the beginning of production.

GAP Thai underwent its first major revision in 2009, resulting in the introduction of an "upgraded" farm standard, informally referred to as GAP Plus (GAP+), which farmers can apply for when their current certification expires. The standard will also be applicable to tilapia farms. The objective of introducing GAP Plus is to provide a standard that is sufficient for future export markets in light of changing consumer preferences such as an increase in environmental and social awareness. These issues, as well as energy saving and CSR provision are catered for in the new standard. As with the current GAP Thai standard, training, testing and auditing is intended to be a free service. It is likely that substantial investment costs will be required to upgrade farms. Although there will be no direct benefit to farmers in terms of a price premium or higher production, the standard helps maintain access to markets.

DOF has come under some criticism from processors/exporters within Thailand as well as NGOs and consultants regarding its multiple and sometimes contradictory roles of legislating (standard-setting), auditing, research, and certification. These multiples roles also contravene FAO guidelines for aquaculture certification[39]. As a result, it is likely that DOF will need to outsource auditing in the not too distance future to an independent third-party in order to be fully compliant with international norms. This will provide third-party assurance of compliance and will enable the standard to

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[39] ftp://ftp.fao.org/Fi/DOCUMENT/aquaculture/TGAC/guidelines/Aquaculture%20Certification%20GuidelinesAfterCOFI4-03-11_E.pdf

be used as a marketing tool to inform consumers of product safety and quality.

The government has also introduced Asian-focused quality standards, such as a Thai organic standard, established in 2007 (TH 34, 2011). The Thai standard in many ways imitates other organic standards but is directed at Asian markets that do not require third-party certification as EU markets do. It remains to be seen whether the standard will have an impact on more generic perceptions of Thai seafood products, or whether a different method of governance that leads to a lack of consistency or equivalence between schemes will affect the credibility of these schemes in the eyes of seafood consumers. This is because third-party certification schemes do exist in the Thai seafood industry (Table 5.3). The choice of certification scheme depends on the buyer. The dominant third-party certification scheme is ACC (Aquaculture Certification Council), while GlobalGAP certification is diminishing in importance. ASC (Aquaculture Stewardship Council) certification is likely to be implemented in Thailand once the standard is operational.

Table 5.3 Public and Private Standards in the Thai Seafood Industry

Standard	Objective	Source
Public		
GMP (General Manufacturing Practices)	General Principles to be observed during manufacturing	International
ISO 22000: 2005	International Standard on administration of food safety	International
ISO/IEC 17025: 2005	Mutual Recognition of Calibration and Testing Results	International
ISO 9001	Quality Management Systems	International
HACCP	Systematic prevention approach to food safety	USA
Private		
HAL-Q	Permissible under Islamic Law	Islamic Law
BRC	Administer the food supply chain	UK
IFS	A European Standard for retail food products	Germany
SQF	Food Safety Management System	International
GlobalGAP	Integrated Farm Assurance Standard	European supermarkets
BAP	Integrated Farm Raised Seafood Standards	USA (ACC-logo)

Source: Author, based on key informant interviews

5.3.2.3 Influential agents

The Thai seafood industry is characterised by the dominance of processors, which has both positive and negative aspects. For example, many developments favour large industry suppliers. Farmers and NGOs noted the way in which large processors possess superior quality fry (yield rates are higher), but which can only be purchased if the processor's brand of seed is also used for the duration of the production cycle. A consultant working on shrimp value chain issues estimated that around half of all farms in Thailand are connected through feed and seed purchases to the largest processor in Thailand. On the other hand, control in this way by the industry ensures that information necessary for market success is generated in the

chain and implemented at the production levels. Processors may also control other aspects of production. For example, one large processor interviewed has created an internal audit system to audit its feed suppliers, leading to investment in R&D at feed mills and in quality control systems for feed. The implementation of such measures demonstrates awareness of EU market requirements. Investments by processors also provide efficiencies. For example, farmers make use of a testing service provided by the largest processor in Thailand to farmers prior to harvest. The service is not free-of-charge but results are obtained within three days compared to 10 days for DOF (TH 50, 2011).

All of the processors interviewed have their own Quality Control departments and on-site testing laboratories. These departments in larger processors inform management, marketing, R&D and suppliers about changing institutional requirements as a result of legislation or buyer demands. Processors may also be made aware of market values through pre-audits undertaken by international certifiers, designed to identify any weaknesses before full assessment, or through market and processor visits in the end-market.

Only one exporter with a sister importing company in Germany provided evidence of their own market research in the EU market. Nevertheless, the Director of the company is German with close ties to import and distribution in the EU, and therefore represents a unique case. Two of the largest processors in Thailand also have direct access to information on seafood markets as they have offices located in EU countries. One of them has responded to developments related to standards and certification in EU

seafood markets by developing a food safety label for its own-brand products. The aim of the standard, which includes a consumer-facing label on packaging, is to encompass existing Thai standards in one harmonised standard.

5.3.2.4 The source and nature of market information in the selected value chains

Figure 5.5 identifies sources of information in Thai value chains, from the perspective of informants.

Figure 5.5 Sources of information in the selected Thai value chains
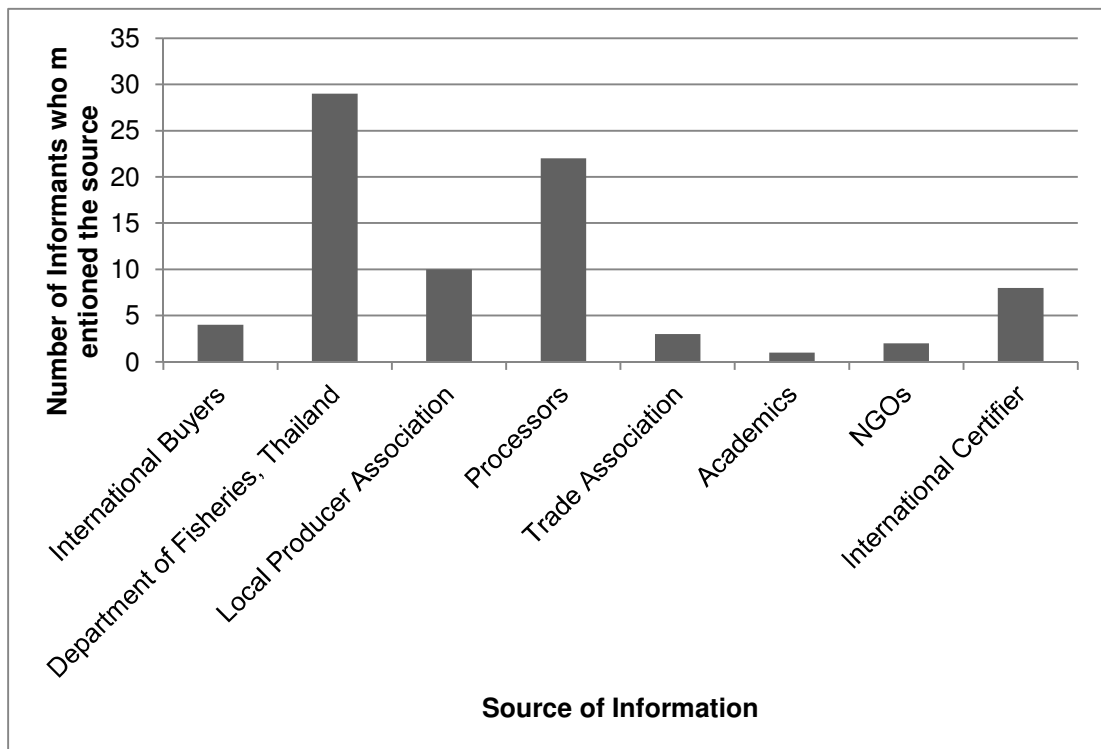
Source: Author, based on key informant interviews

The Thai government features most strongly as a source of information due to its proactive stance on regulating aquaculture farming in Thailand, as mentioned in section 5.2.2.1. The second most important source of information in Thailand according to value chain members is processors.

Investment by processors in the Thai industry has contributed to adherence to international market standards from the earliest stages of production. International certifiers and buyers were important sources of information for processors, but apart from them, only institutional respondents noted the role of international certifiers in generating market information for the chain. Institutional respondents were also the only informants who mentioned the role of academics, trade associations and NGOs in generating information. This seems to indicate that information generated by these agents is not accessible to upstream nodes such as producers.

The strength of horizontal networks in Thailand and particularly producer associations have also helped generate information for the seafood industry. In particular, small-scale and landless farmers rely primarily on local shrimp clubs or tilapia clubs as sources of information, as will be discussed further in section 7.3.1.2.

Figure 5.6 shows that value chain members obtain most information on national legislation, primarily centred on food safety and quality. Although information on standards, international trade regulations and processor specifications is important as these categories reflect EU seafood market values and link directly to product attributes, there is a large contrast between information available on national legislation compared to customer requirements.

Figure 5.6 Topic of information shared in the selected Thai value chains

Y-axis: Number of informants who mentioned the topic

X-axis categories: International trade regulations (5); Standards (8); National Legislation e.g. on soil, water, traceability,.. (23); Processor specifications (8); Sharing of Knowledge/Recommendations (3); Customer Requirements (1)

Topic of Information
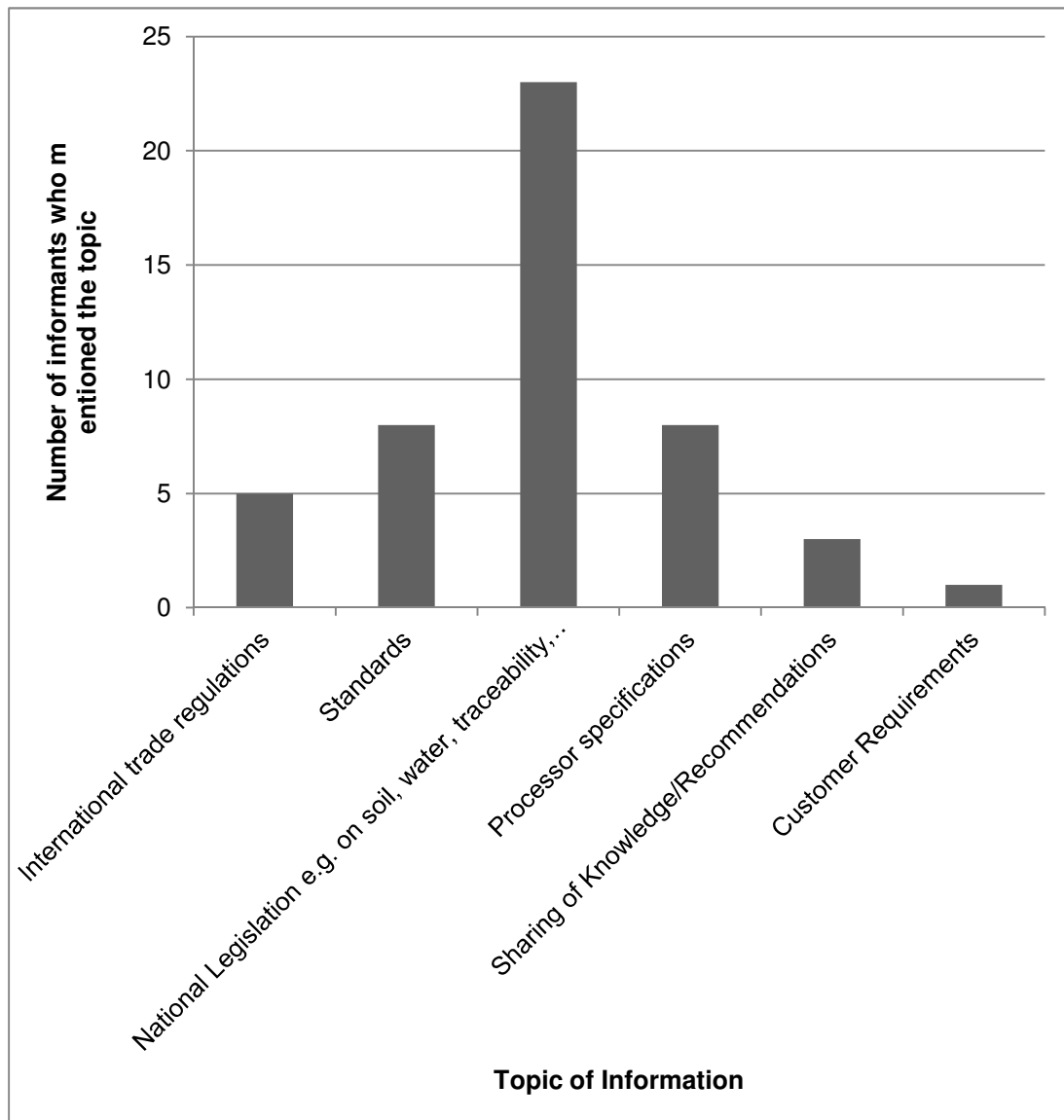
Source: Author, based on key informant interviews

To summarise, in Thailand, the role of government in assisting the industry to meet international export standards through early intervention and technical assistance has led to a high quality product and supported the introduction of labels and certification that contribute to added-value production. Alongside these developments, an engaged private sector and extensive research and development are features of a strong institutional framework that have facilitated the generation of market information in Thailand. This information is primarily related to legislative requirements that

support food and brand safety, quality and sustainability, and availability in the supply chain.

5.4 The generation of market information in seafood value chains

An outcome of today's globalised world, long chains and highly differentiated seafood markets is that not all value chain members have access to the same information. This chapter has shown how value chain agents in the EU typically have access to substantially more and better information on consumer values than agents in Asia. This is because value chain agents in the EU have the largest vested interest in knowing, understanding and responding to the values of consumers with products that satisfy consumer demands, as they have the first point of contact between the market and the rest of the value chain. The evidence indicates that both countries suffer to differing extents from a lack of information on consumer values, compared to EU value chain agents. In Thai value chains, agents are able to generate more and better quality information on consumer values than in Bangladesh chains. Although agents in Bangladesh value chains highlighted access to information on quality, this was limited compared to information on standards and product specifications present in Thai value chains.

The research also found that the domestic institutional framework in the exporting country is critical to the generation of market information. Domestic regulation must be sufficient in scope, depth and enforcement in order to ensure compliance with rules, standards and (where applicable) certification schemes that correspond to consumer values. The evidence

shows that Thailand has been more effective in achieving these outcomes than Bangladesh where there is no strong regulatory basis on which to build standards or more advanced quality and sustainability credentials that could provide greater value to consumers.

Finally, the research found that an engaged private sector (domestic industry) in the exporting country not only supports market information generated by the government in the institutional framework, but also extends it through investment in value chains. This is the case in Thailand. As such an integrated approach has not materialised in Bangladesh, NGOs and other agents in the institutional framework play a larger role in generating market information. This means that market information is latent and relies to a greater extent on external investment with implications for the accuracy and timeliness of information. Sector-wide developments may also be limited within this framework. The institutional framework therefore has a profound effect on Bangladesh's ability to participate in greater market orientation in seafood value chains.

As mentioned in section 2.2, information need not be evenly distributed along the chain. Consequently, value chain agents in Bangladesh and Thailand may be more dependent on the dissemination of information from value chain agents in the EU. The relationships that facilitate or limit this transfer are discussed in chapter 6.

Chapter 6

The dissemination of information in seafood supply chains

This chapter analyses internal governance and coordination to determine under what conditions information is disseminated in the selected value chains. Linking these results with outcomes from chapter 5 will lead to conclusions about knowledge and power.

Governance of value chains has two dimensions in the GVC literature: external (the institutional framework, considered in chapter 5) and internal, which will be considered in this chapter. The first aspect of internal governance is identifying lead firms, their driving mechanisms and the extent of driving. The second aspect of internal governance is coordination that takes place between individual nodes along the value chain. As chapter 2 explained, different coordination mechanisms are the result of varying levels of informational complexity, codification of information, and the capabilities of suppliers. Coordination mechanisms between agents should therefore vary according to access to information.

The internal governance arrangements of the chains from Bangladesh (section 6.1) followed by Thailand (section 6.2) will be examined. Section 6.3 will combine an analysis of internal and external governance mechanisms from chapters 5 and 6 in order to show how access to information and power in value chains are linked.

6.1 Bangladesh: shrimp and prawn

6.1.1 Internal governance

Within the EU market, the research found that shrimp and prawn from Bangladesh are primarily purchased by specialist importing companies. Importers must ensure that the product clears customs in the importing country without document or mandatory standards failures. According to interviews, importers may buy shrimp and prawn in volumes that exceed orders from restaurants, wholesalers and other suppliers, and then sell surpluses on the spot market (BD 31, 2010). After importation, Bangladesh shrimp and prawn can primarily be found in wholesalers supplying ethnic markets (such as London's East End), Indian restaurants and other similar foodservice outlets. A German foodservice importer noted that, "Due to the frequent nature of inclusion of Bangladesh shrimp and prawn in curries, high demands on quality are rare" (DEU 10 2011), leading to low levels of driving behaviour. This was supported by a UK importer who said, "If we are unsure of the quality of the product, the shrimp enters low-end foodservice chains where traceability is more hidden." (BD 31, 2010).

Importers are often employed by downstream agents for the purchasing of aquaculture products from Asia due to higher risks associated with seafood trade. Bangladesh in particular is regarded as a high-risk country as emergency measures are still in place for the testing of shrimp and prawn exports to the EU. Some buyers are willing to take on this risk for a price trade-off, but generally not retailers who have precious reputations to protect.

6.1.2 Coordination mechanisms

Section 2.1.3 highlighted the five types of coordination mechanisms that are possible in chains[40]. Their presence will be examined in the Bangladesh value chain from production to end supplier, followed by Thailand. Only two of the five coordination mechanisms were found in the Bangladesh value chain (Figure 6.1).

Figure 6.1 Types of coordination in selected nodes of the shrimp and prawn value chains from Bangladesh
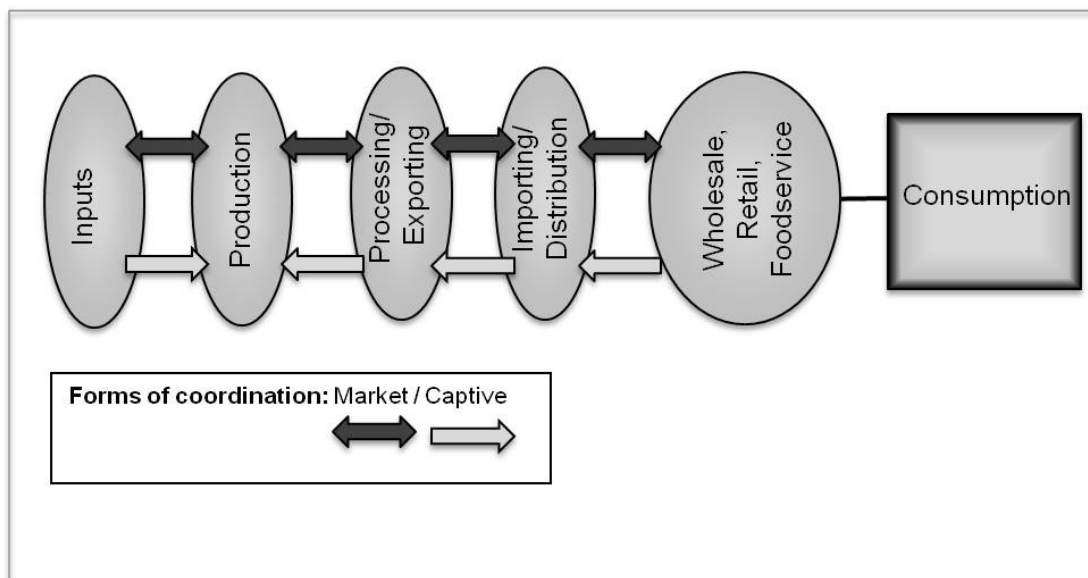
Source: Author, based on key informant interviews.

Production in Bangladesh is characterised by a large number of small-scale producers who regularly sell small amounts to the nearest chatal (auction market), depot (collection centre) or to a faria (middleman) through spot marketing (market coordination). Market coordination is common as there are no fixed contracts in the value chain in Bangladesh and each value chain node sells to the highest bidder with prices between processors and commission agents fixed daily in the harvest season.

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[40] Market, Modular, Relational, Captive and Hierarchical.

There were no examples found of modular or hierarchical coordination in chains in Bangladesh. Instead, there are a number of captive relationships between value chain agents due to debt and credit linkages, such as the informal loan system. Formal loans usually require collateral such as land, which is often difficult for farmers in Bangladesh to provide, as many are landless. Instead, informal loans and microfinance enable farmers to purchase seed and feed on credit, relying on a successful harvest and good prices to pay back debts. Commission agents are important injectors of finance into the chain. Credit is also offered by other value chain agents. According to one hatchery informant, credit to farmers normally amounts to around 50% of the value of the purchase (BD 19, 2010). Farmers carry high risks of defaulting on loans due to low sale prices, natural disasters or disease. All lenders noted that they suffer from non-payment of credit, and feed suppliers, hatcheries, and middlemen all mentioned defaulting on loans as a major challenge to the viability of their business. Both lenders and borrowers indicated that to overcome these problems, they often require additional credit.

Although relational coordination in the value chain in Bangladesh was apparent, this was mostly within and not between value chain nodes. Farmers in Bangladesh regularly communicate with each other by mobile phone in order to discover when PL is ready and at which hatchery, or which medicine to use if there is a disease outbreak. However, key informants indicated that this knowledge is not the result of training or information disseminated from competent agencies, and therefore results are inconsistent.

Market coordination and captive relationships are present between exporters in Bangladesh and importers in the EU due to dependency by suppliers on importers. This is due to reputational risks associated with exports from Bangladesh, which reduces the number of buyers willing to source from Bangladesh. Importers who do source shrimp and prawn from Bangladesh may experience high monitoring costs for import testing. Although testing usually takes place at the time of export, one foodservice importer claimed that, "Anyone can pay for paper" (DEU 10, 2011), and all importers interviewed re-tested Bangladesh seafood imports.

Within the EU value chain, market coordination is present in low-end foodservice chains and wholesalers, where price is important and relationships are characterised by low informational complexity and high supplier capabilities. Both parties' costs of switching to new suppliers under these conditions are low. Examples were provided by a UK importer who explained that they sell through telesales by spot-calling a restaurant or large wholesaler, or through the use of vans where the driver doubles as the salesman and is paid on commission (BD 33, 2010).

6.1.3 Internal governance and information in Bangladesh value chains

To summarise, the Bangladesh shrimp and prawn chains are driven by importers in the EU and destined primarily for wholesale and foodservice buyers; low-end markets where quality and sustainability are perhaps less valued. Due to the international reputation of Bangladesh shrimp and prawn, the reputation of Bangladesh processors, and the presence of low-end buyers, there are only low levels of driving, demonstrated by few demands for

certification beyond essential food safety requirements and chain of custody guarantees.

Relationships between agents in the EU are mainly price-driven transactions where spot purchasing occurs. These relationships are not conducive to the dissemination of information. Between importers in the EU and exporters in Asia, supplier competencies are low and relationships are characterised by captivity, meaning there is little incentive to transfer information related to innovative quality demands or certification.

Within Bangladesh, value chains are characterised by high-fragmentation and weak coordination leading to market and captive relationships that reduce the incentive for the transfer of market information. The presence of a large number of small suppliers and a large number of intermediaries make it difficult to ensure the dissemination of information. By contrast, where only a few transfer points exist in a chain, there is less likelihood of signals becoming distorted through market interference and possible miscommunication. Conversely, where there are more intermediary points, there is a greater likelihood of intended signals not being communicated accurately. In particular, intermediaries are potential constraints for information flows.

The analysis also revealed that a lack of supplier competencies and market demand for improvements are likely to thwart investment in information transfer and undermine potential efforts to bring about improvements through increased market information in the value chain.

6.2 Thailand: shrimp and tilapia

6.2.1 Internal governance

Thailand's reputation as a provider of high quality production and volume, availability, consistency and certification, means that superior Thai exports are primarily destined for retail chains and the high-end foodservice industry in the EU, where these attributes are more highly valued. Within these chains, different channels serve differing levels of quality, determined by the market position of the retailer or foodservice provider; some may drive their chains based on price rather than quality (such as German discounters, for example). Nevertheless, end-buyers in both retail and foodservice chains have strict product and often process specifications. They transfer their requirements to brand manufacturers (producing for retail own-label) or importers who provide product specifications and logistical requirements to Thai processors. Brand manufacturers also purchase for their own brand; transferring demands to importers and/or Thai processors for product attributes that match their requirements. In addition, a feature also identified in high-quality retail supply was the role of importers in providing innovation in "product stories" for high-end retailers. These importers may drive their supply chains in order to provide a unique product for the retailer as part of the retailer's strategy, such as sustainability. As a result, seafood chains from Thailand can be said to be subject to multi-polarity: the presence of multiple lead firms driving chains.

Evidence of how lead firms drive Thai production is shown in three ways. The first is the presence and extent of certification schemes, developed and employed in response to customer values and demands. As the

reputation of retailers is a particularly important aspect of seafood marketing today, retailers have high product specifications, product guarantees, internal codification and sometimes also sustainability programmes for own-brand products, if not linked to external schemes. This means that retailers may have a greater interest in governing and coordinating supply chains, as raised in chapter 5. Searching, verifying, monitoring and enforcement may lead to exceptionally high levels of driving behaviour in chains as buyers maintain tight oversight of products and processes.

The second example of how value chains from Thailand are driven by EU value chain agents is through the location of value addition. For all of the EU brand manufactures interviewed, value addition was primarily undertaken in the EU rather than Asia. As section 5.2 highlighted, one method of supply is shipping frozen blocks for processing in the EU before rapid defrosting and cooking according to customer orders, after which the product is distributed as a chilled product. According to the interviews, the processors believe this is the most effective method of supplying rapidly according to JIT principles. According to importers and brand manufacturers interviewed in the EU, Asian countries do maintain a competitive advantage in processes that require high labour inputs, while some value addition such as IQF shrimp may also occur in the exporting country (IQF shrimp then follow the same value chain as frozen blocks, providing a superior quality product within 24 hours of a customer order being received). Overall, despite exports of pre-packaged and branded products directly to the EU market by exporters in Thailand as mentioned in chapter 5, the cases demonstrate how value chains are predominantly driven by lead firms in the EU.

Third, it is also through innovation that EU lead firms drive chains. A number of large EU suppliers have the marketing competencies and research and development skills to develop new products, either in partnership with retailers or for their own brand. These collaborations lead to multiple firms jointly driving value chains to high degrees. While some large Asian suppliers have a sufficient market presence in the EU and R&D departments to support product innovation, most processors in Asia who are involved in NPD follow specifications set by their buyers rather than experimenting with their own ideas.

Large processors in Thailand may also act as lead firms as they drive their own procurement and input to their supply chains. As processors must deliver consistent and reliable volume and quality to EU buyers, this has led the Thai industry towards intensification of production, driven to a large extent by the industry. For example, processors in Thailand engineered a switch from Panaeus monodon to the faster growing Panaeus vannamei. In addition, contract farms enable the provision of supply at agreed and specified times.

6.2.2 Coordination mechanisms

The following section examines coordination and internal governance mechanisms in the value chains from Thailand. Four types of coordination were found in the selected value chains (Figure 6.2). Shrimp and tilapia follow similar product channels, although tilapia fillets may bypass secondary processing.

Figure 6.2 Types of coordination in selected nodes of the shrimp and tilapia value chains from Thailand
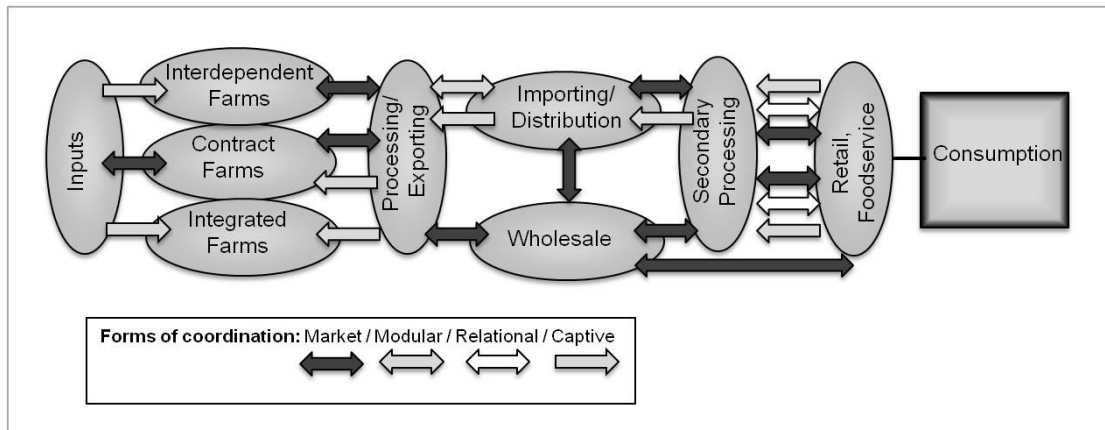
Source: Author, based on key informant interviews

Captive relationships dominate the shrimp and tilapia value chains within Thailand. They are the result of low supplier capabilities but high informational complexity and one-way dependency of suppliers. This is exhibited in relationships between input suppliers and both independent farms and integrated farms, where seed, feed, chemicals and funding may be provided on credit.

Private industry is extremely powerful in Thai farmed shrimp production and the largest companies carefully manage production, even from the research stage. A number of large processors contract farms to produce shrimp or tilapia. The aim of contract farming is to ensure a stable market for the producer and a stable supply for the processor. In contract farming, the price, tonnage and shrimp-size at time of harvest is agreed in advance and the farm produces to the processor's 'order'. An agent contracted by the processor may undertake the actual harvest and transport the shrimp directly to the factory. This is different to a processor employing the services of a broker, where the processor informs the broker of the size of shrimp they want, quantity and price. The broker then sources this order and sends it

directly to the factory. Although relationships between processors and contract farms are meant to be captive, in reality they have the characteristics of market transactions; contracts are verbal and non-enforced, and there is no recourse if a supplier does not honour them. In practice, contracts may be 'looser' for medium-scale farms than large-scale farms. This is because processors may have financed upgrading of large-scale farms for third-party certification, whereas medium-scale farms are contracted through verbal agreements only (TH 3, 2011; TH 20, 2011). Nevertheless, all scales of farmers are not obliged to sell to processors, even when they have received assistance. For this reason, a large Thai processor described contract farming as, "More of a gentleman's agreement" (TH 3, 2011). Contracts by farmers with processors or feed suppliers are generally made when shrimp prices are falling and farmers wish to secure a buyer. However, when prices rise and farmers have strong bargaining positions, as happened in 2010, contracts are waived in favour of selling shrimp to the highest bidder. All processors interviewed stated that they no longer trust their suppliers to honour contracts if prices rise. The most successful contracts (i.e. those that were honoured) were between large farms and large processors, born out of mutual dependence rather than a legally binding agreement.

Integrated farms are farms owned by a processor but managed by farmers and, as a result, captive coordination is evident between the two. There are no integrated farms in the tilapia chain.

Although the vertical integration of farms (where fry production, grow-out and processing are all part of one company operation) may seem the most likely method to source according to the credentials a processor seeks,

in practice key informants at the processor level in Thailand admitted that they did not wish to see hierarchical coordination take place with farms integrated into company operations due to the technical expertise and company oversight required at the growout stage. The research also found that some processors deliberately avoid tight relationships with farmers. One small processor said, "If we order from brokers we do not need to provide quantities or price in advance. This is an advantage to us, as we want small sizes of shrimp early in the season and larger sizes later. We simply order the size we want from the broker" (TH 57, 2011).

At the other end of the scale, market relationships define coordination between independent farms and processors. A number of small-scale farms may also "cluster" around a processor, so that although there are no contracts between them, small-scale farms are, to all intents and purposes, "locked in" to the procurement practices of the processor.

Between EU importers and Asian processors, coordination is rigid and codified, leading to captive relationships in the majority of cases. However, once a quality supplier is located and a trusted relationship exists, Asian processors may benefit from advantageous conditions, such as lower prices, renegotiation of contracts if there is a supply failure, market information and technical assistance and even investments in certain aspects of production. Furthermore, highly competent processors such as those found in Thailand have high supplier capabilities, and offices in the EU facilitate the direct transfer of information from the EU market to the processor. In such cases, relationships are more modular than captive. Despite this, a lack of trust in general between EU importers and Asian suppliers makes relationships

between these agents more captive and legal contracts are common, where they are formal and agreed by email, or verbally via the telephone. According to the research, the type, extent and formality of contracts are dependent on the reputation and reliability of the supplier. Furthermore, these contracts are almost always between exporters and importers, as retailers, foodservice companies and EU processors outsource seafood procurement, even for Thai value chains. Exports direct to wholesalers are typified by market coordination, as are relationships between wholesalers and other value chain agents in the EU.

Within the EU, partnerships and long-term relationships characterise coordination between retailers/foodservice providers, brand manufacturers (who may undertake secondary processing) and importers. This is because value chain agents in the EU have similar access to knowledge of final markets and product segments, which assists with ensuring higher supplier capabilities and balancing power in chains. This leads to an interesting phenomenon according to UK processors: a lack of formal and binding contracts. Instead, verbal agreements take place within long-term partnerships and trusted relationships between importers, distributors, processors, retailers and the foodservice industry in the UK. These relationships enable high levels of information exchange in order to provide mutually beneficial partnerships. Nevertheless, there is still some uncertainty from processors about the benefits of a lack of binding agreements with retailers. Processors in the UK complained that it enables retailers to easily switch suppliers, while retailers argued that once a supplier has been accepted, the level of investment in that relationship is too high to easily

change supplier (due to audits, quality assurances, knowledge of each other's processes and costs, and the time required to build long-term relationships).

In France, modular coordination is more common as the seafood market is less commoditised due to national regulation that supports independent businesses. In Germany, captive relationships may be present even between suppliers in retail chains due to the market power of discounters. All the importers and processors interviewed in Germany supply to both discounters and other retail and foodservice chains, where margins are higher and coordination is more modular. In such cases, highly competent suppliers are present and information is highly codified. Modular coordination is also present where retail demands for innovation that enhance the image of the retailer lead to specialisation by importers and processors who offer retailers small volumes of a highly differentiated product with a product story. Bringing such a product to market requires long-term partnerships between the importer and retailer in which there is high specialisation, high trust and high transfer of information regarding the retailer's needs and the project's value addition. One example of such a project relied on innovation by the importer and investment in production, the identification of a local processor and sometimes-costly oversight to ensure success. An importer makes such an investment when it is part of a mutually beneficial relationship and is rewarded, often with shelf-space and an ongoing trust relationship (FRA 2, 2011).

Some EU agents, used to strong relationships downstream also seek these upstream; it is important for them to meet suppliers in Bangladesh and Thailand and, "See things for themselves", according to a German importer

(DEU 8, 2011). They believe that only by seeing the situation as it is, "on the ground", can they trust a supplier and have faith in the procedures used. Such partnerships with Asian producers were common for a German foodservice importer interviewed who said, "We prefer to meet our suppliers face to face. In this way we find out what's going on" (DEU 10, 2011). The retailer believed this enhanced the working relationship and was more likely to result in compliance by suppliers. The benefits of this type of working relationship for both sides were mostly demonstrated when the supplier had a problem. Often, new terms such as volumes or prices could be negotiated *as long as the importer knew in advance*, thereby strengthening relationships built on trust.

6.2.3 Internal governance and information in Thai value chains

Although, as mentioned in section 6.2.1, large processors within Thailand play an important role in the formation of the industry and often act as lead firms for their suppliers, downstream actors in the EU strongly drive the Thai chains overall through the presence of certification schemes, location of value addition and the extent of innovation. Internal governance is therefore strong in the Thai shrimp and tilapia chains and leads to developments such as value addition and innovation within the industry.

The shrimp and tilapia value chains from Thailand exhibit multipolar internal governance, and are driven by different value chain actors depending on the value chain strand. Processors in the EU may rely on their ownership of leading market brand names to drive chains to meet product specifications, while retailers and the foodservice industry may use their purchasing power to

ensure required levels of sustainability and traceability guarantees. Within the retail segment, discounters drive chains through price, while high-end retailers may value differentiated products from highly competent suppliers.

Coordination in Thai supply chains is determined by the various channels through which shrimp and tilapia are supplied, ranging from partnerships between buyers and suppliers in high-quality production, modular coordination through the provision of value-added production, and more captive coordination in the supply of frozen blocks that are then processed in the EU. Coordination within Thailand is predominantly market and captive coordination, which relies on the independence farmers are able to maintain from both input suppliers and processors. Hierarchical coordination arrangements within Thailand are limited by the large presence of small farmers and skepticism by large processors in controlling all aspects of production.

Although there are credit systems in place in Thailand, these are primarily between processors and farmers, rather than between intermediaries and farmers as in Bangladesh. This leads to the transfer of information directly from processors to production and ensures training and oversight is provided in order to further assist the capabilities of suppliers to create value addition. Larger processors in Thailand have direct contact with the EU market through buyers, visits or satellite offices and therefore can transfer quality control standards that reflect market values in their chains. This also provides an indication that size is a competitive advantage when it comes to processors having the means and the contacts to access market information.

6.3 Information dissemination in seafood value chains

This section combines analysis of internal governance and coordination mechanisms from chapter 6 with the institutional framework from chapter 5 to reveal the conditions for the transfer of information in chains and resulting power dynamics (Table 6.1).

Table 6.1 Governance and the institutional framework

a) Internal governance		
	Bangladesh	Thailand
Main internal drivers in Asian value chains	Processors	Processors
Internal drivers in overall value chain	Importers	Retailers, Foodservice, Brand manufacturers, Importers
Degrees of driving	Low	High
Main kinds of driving mechanisms	Food safety standards	Product specifications, certification, location of value addition, innovation
b) Main coordination mechanisms		
Farmers-Processors	Market Captive	Captive Market
Processors-Importers	Captive	Captive Modular
EU		
Importers-Wholesalers-Retailers-Foodservice	Market	Relational, modular, captive
c) Overall governance		
Key institutional framework agents shaping overall governance	Weak domestic regulatory framework, low investment by industry	Involvement of the industry in Thailand, strong domestic regulatory framework, certification
Degree of influence of institutional agents in shaping overall governance	Low	High

Source: Author, Jespersen et al. (2012)

The analysis shows that as demands (price, volume, logistics, quality, innovation, food safety, sustainability etc.) placed on suppliers increase in number and degree, the type and extent of governance in value chains changes. This is because as suppliers are able to meet increasingly differentiated demand, their access to value-adding chains also increases.

Various buyers act as lead firms depending on the value chain (Table 6.1 a). The research found that products from Bangladesh and Thailand enter different supply channels with differentiated end markets. The shrimp and prawn value chains from Bangladesh cater mainly to markets with few high-quality demands. These value chains are characterised by low levels of driving applied by overseas importers, primarily on Bangladesh and Thai domestic processors. Market demands are mostly related to food safety, reducing incentives to transfer market information. Lead firms in the shrimp and tilapia chains from Thailand may be importers, brand manufacturers retailers and foodservice companies. Levels of driving are high, leading to transfers of information evidenced by increased value addition and innovation within the Thai industry, which has developed a reputation for good quality production, volume, availability, consistency and certification. Overall, demand by end-buyers raises standards in value chains. In addition, large processors within Thailand may act as lead firms due to direct access to EU market information, driving upstream nodes.

The analysis also shows that multiple coordination mechanisms may be at work in value chains (Table 6.1 b). For instance, in the node between farmers and processors, captive and market coordination are present in both the Bangladesh and Thai value chains. In both countries there is high one-way dependency of farmers on processors. Moving downstream, the node between Asian processors and EU importers is mainly still characterised by captive coordination. However, modular coordination is also present in cases where highly competent processors are able to provide high quality and/or value added products to retail chains and the high-end foodservice industry in

the EU, which is evident in the Thai chains examined. In the node between different types of buyers in the EU, coordination ranges from market mechanisms in the Bangladesh value chain due to low costs of switching suppliers, to modular, relational and captive mechanisms in the Thai value chain. Captive mechanisms emerge in cases of one-way dependency of suppliers while modular and relational mechanisms are the result of long-term partnerships characterised by mutual inter-dependencies where retailers rely on importers to supply complex product specifications or innovative products. Coordination where trust is more apparent and firms are mutually dependent is more evident between agents in the EU value chain. These chains have the most access to information, resulting in more equal balances of power.

Table 6.1 c) combines findings with an analysis of external governance in chapter 5 and highlights the importance of the domestic regulatory framework for the overall governance of the value chains studied. In Bangladesh, a weak institutional framework necessitates reliance by agents (usually importers) on supplementary verification and testing to ensure product meets import standards. The low reputation of shrimp and prawn with respect to basic food safety requirements, coupled with the nature of final markets that are mostly low-end wholesale and foodservice chains, means that importers have little incentive to demand specialised product attributes or provide assistance on how to provide more efficient or value-added production. The implications of this can be seen in Bangladesh value chains where importers generally do not engage regularly with suppliers and therefore there is no long-term relationship to warrant the investment of information. At the same time, there are some longer-term relationships

between certain importers in the EU and exporters in Bangladesh. In such relationships, the interviews found that simple recommendations may be offered, such as shaking excess water from shrimp to prevent ice build-up in packaging, which ensures more accurate product weights and makes the product look better, according to a German foodservice importer (DEU 10, 2010). Although importers still drive the value chain through captive or market relationships, there is some information dissemination in these particular chains due to a greater long-term orientation.

The research also found that obtaining trusting relationships between exporters and importers may be difficult. In Thai value chains, a strong institutional framework leading to higher competencies lends itself to meeting specific market demands that aid the capturing of value. However, meeting these demands does not necessarily guarantee long-term partnerships or more equal relationships between Asian exporters and EU importers. This is because costs and benefits associated with information dissemination will underpin all agents' decisions about how much information to generate and disseminate. According to the research, the internal governance mechanisms between EU and Asian agents generally lead to low incentives to share information in value chains. This is evidenced by the use of "hands-off" coordination mechanisms such as certification schemes, the presence of value addition within the EU, and dominance by EU value chain agents over innovation. In contrast, internal governance mechanisms between EU agents, particularly in high-end chains, generally lead to relationships on which mutual trust and partnerships can be built. For example, interviews highlighted

involvement by EU firms in numerous collaborative programmes[41,42]. The presence of extensive collaboration between agents in the seafood industry in the EU is in contrast to relationships with many of their suppliers. Why? The reason could be that costs to EU value chain agents of sharing market information are too great to outweigh the benefits of greater long-term partnerships with suppliers. This must be because sharing market information results in sharing power. The potential benefits to be gained by Asian value chain agents leads to reduced incentives by EU agents to share market information in order to maintain balances of power in supplier-buyer relationships.

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[41] www.gscpnet.com
[42] http://www.legrenelle-environnement.fr/-Version-anglaise-.html

Chapter 7

Responding to market information

The actions of chain members in response to market information are the final aspect of market orientation and the subject of this chapter. As section 2.2 highlighted, value chains whose firms are able to respond to market information can produce product attributes that better match consumer values, thereby gaining competitive advantages. This chapter will analyse supplier responses to market information and whether restricted market information is a critical factor affecting the ability of developing countries to engage in value adding activities. It will do this by exploring the strategic upgrading options available (section 7.1) and examining the upgrading trajectories adopted by value chain agents in Bangladesh and Thailand (section 7.2). Section 7.3 examines methods of improved value chain coordination within Asian value chains and 'proactive governance' (see section 2.1.5), when EU lead firms provide assistance to value chain participants.

7.1 Upgrading strategies

As mentioned in section 2.1.5, upgrading directly improves the performance or position of an actor in the value chain through the capturing of value, such as producing more sophisticated product lines or acquiring new skills. Table 7.1 summarises upgrading strategies and their performance requirements.

Table 7.1 Strategic options for upgrading and performance requirements

Upgrading Strategy		Performance Requirements
Improve product, process, volume and variety	Product	Physical change (due to machine, or hand); adding innovation and design; complying with food safety standards, traceability and packaging; certifying the product to a particular quality standard.
	Process	Efficiencies in production such as delivering on time, reducing wastage and improved client management.
	Volume	Increase the amount of product sold through increases in yield, area or manufacturing capacity.
	Variety	Provide a wide ranging product portfolio or the ability to serve a variety of different target markets.
Change of function	Functional upgrading	Agents take on a new function in the value chain by performing new and higher-value activities, whether upstream or downstream from where they operated initially.
	Functional downgrading	When agents take on a new function that is considered of lower-value added than their previous function, whether upstream or downstream from where they operated originally. Normally leads to vertical integration (when an actor performs more than one value chain function) unless an actor abandons one function for a new one.
	Functional outgrading	Exiting the chain.

Source: Kelling et al. (2012)

7.2 Analysis of existing upgrading trajectories in selected aquaculture value chains

7.2.1 Bangladesh: shrimp and prawn

7.2.1.1 Upgrading at processing level

Improving process, product, volume and variety

The Government of Bangladesh and the shrimp industry invested substantially in process upgrading after the EU imposed an import ban on Bangladesh shrimp in 1997 due to the presence of antibiotics. The Bangladesh government supported upgrades and renovations of facilities,

technology and equipment to be HACCP compliant and implemented Good Manufacturing Practice (GMP), Standard Sanitation Operating Practice (SSOP), and Standard Operating Practice (SOP). These include systems such as mandatory hand-washing, and the use of masks, hair nets, coats, gloves and boots were introduced. Observations during a processing plant visit found these systems in operation and separate male and female toilets and a daycare centre for children. This investment was extended to other nodes of the value chain with a commission agent highlighting that, "Plastic boxes for transporting shrimp, ice, protective clothes, and equipment for hygiene are now common in the chain" (BD 5, 2010).

Exporters processing large volumes of shrimp and prawns for export have invested in QC departments so that testing can be undertaken at the point of processing. The largest processing plants have their own on-site laboratories where microbiology testing for pathogens such as salmonella and internal quality control is undertaken. QC is also promoted in other ways. One processor insisted that, "No more than three hours may pass between harvest and arrival at the processing plant" (BD 37, 2010). This may not always be possible in the rural areas that produce shrimp.

In terms of product upgrading, around two thirds of exported shrimp and prawn were frozen in 2009[43], while just under a quarter were prepared or preserved[44], and only 8.7% were exported as unfrozen[45] (FAO 2012b).

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[43] This category covers all shrimp and prawns that are peeled, deveined, breaded, and then frozen; cooked and frozen; fan tails and frozen; raw and frozen; peeled and frozen; tails and shell on and frozen.
[44] This category relates to shrimp paste; shrimp and prawns prepared or preserved in airtight containers; shrimps and prawns prepared or preserved but not in airtight containers; shrimps, breaded, raw and cooked prepared and preserved; shrimps peeled, cooked, prepared or preserved; and other prepared and preserved.
[45] This includes all fresh, chilled and live categories, including boiled, dried, salted or in brine.

Comparative positions by unit value can be crudely estimated using relative volumes and values for each commodity. Frozen shrimp and prawn had a unit value of 4.3 USD/kg in 2009 compared to 6.4 USD/kg for unfrozen shrimp and prawn. The majority of Bangladesh shrimp and prawn exports are primarily lower value products and do not benefit from higher unit prices associated with increased value-addition. Although there is a place for product downgrading, particularly when high volume, low value-added production can be a product niche, producers who do not have the means to raise the quality of their production may be restricted to low margin segments of the EU seafood market. This has proven to be the case for Bangladesh shrimp and prawn. These markets tend to favour low value addition and have fewer quality standards attached to them (see section 6.1.3). Perhaps buyers have also grown to expect little value-added availability. As a result, upgraded product is not demanded by buyers and therefore not sought in the value chain in Bangladesh.

The research found limited volume upgrading at the processing level in Bangladesh. Instead, all processors complained about insufficient supply as a constraint to increased volumes. This may be predominantly to do with volume constraints at upstream nodes in the chain due to the limited quantities of wild PL available and mortality of shrimp and prawn in the growout phase. Due to the geographic distances between the main shrimp landing centres and shrimp grow-out regions, PL transported by truck are weak and with higher mortality rates (BD 16, 2010). Another element may also include over-investment in processing plants leading to over-capacity. However, processors have been able to upgrade both product portfolios and

diversification of end markets. The presence of chilled exports shows attempts by some processors to move into the production of value-added products. Value addition found in the value chain included IQF production, particular cuts (such as "butterfly"), and breaded "shrimp on a stick" products. One processor interviewed also produces ready-to-cook and ready-to-eat products under its own brand.

All processors mentioned delays in receiving antibiotic test results from the government as a constraint for business, which may be driving expansion into new markets with lower standards that do not require such levels of testing. One exporter said, "We prefer to export to the US as export certificates can be issued more quickly, the US does not check every container and payment terms are immediate" (BD 26, 2010). New markets are predominantly led by Russia, although Dubai and other Middle Eastern countries are also growing in importance. These markets have lower mandatory and voluntary standard requirements.

Change and/or add functions

In general, the large numbers of farmers in the value chain producing small amounts of shrimp and prawn provide an incentive for processors to invest in functional upgrading in order to guarantee availability, volume and quality. However, there was no vertical integration found at the processor level in the value chain in Bangladesh. This may be partly explained by a government promise to provide land free-of-charge to processors in order to establish their own farms, according to a processor (BD 32, 2010). This

promised land has not materialised as yet, but has provided a disincentive for processors to purchase land for integrated growout ponds in the meantime. Instead, one processing factory interviewed has added functions by producing the packaging required for their products (BD 37, 2010). However, in general, shrimp and prawn value chains in Bangladesh are characterised by a lack of investment by processors. Instead, successful processing company owners invest in real estate such as hotels, according to an NGO informant (BD 16, 2010).

Value chain actors at other nodes aspire to undertake functional upgrading. In particular, a commission agent interviewed wished to eventually establish and operate his own processing factory. Although the commission agent was aware of existing overcapacity and lack of supply, he desired the status and benefits attached to owning a processing factory (BD 77, 2010). This potentially means that he will also bring little value-added to the sector. Some vertical integration has taken place by value chain actors who own ponds and run a separate small business such as a chatal, depot or feed store (BD 2, 2010; BD 35, 2010; BD 56, 2010). Alternative income streams reduce some of the risks associated with shrimp farming. However, as capital is required to invest in functional upgrading, which is difficult to obtain (section 6.1.2), it was not very common.

7.2.1.2 Upgrading at farm level
Improving process, product, volume and variety

Process upgrading through quality frameworks in Bangladesh have been conspicuous by their absence. Farms have undergone registration with

the assistance of UNIDO, but chain of custody traceability is still virtually non-existent and so there is no widespread third-party certification in Bangladesh, which is based on traceability (BD 43, 2010). In addition, there is virtually no record kept of inputs, outputs and prices by farmers or depots. Recording such information is important in order to provide a knowledge base, identify problems in the chain and improve processes.

In Bangladesh, there are challenges to product upgrading at all levels of the value chain but they are particularly difficult at the farm level for four reasons. First, both shrimp and prawn fry are found in the same rivers and harvested by hand, despite a ban on collecting wild fry due to the high levels of by-catch. In general, demand for hatchery PL is low as farmers believe that wild fry are stronger and survival rates higher (BD 19, 2010; BD 23, 2010). As prawn fry and PL are often traded through middlemen, reports were given during interviews of mixing with illegal and weaker fry from India (BD 19, 2010). This is another reason for high levels of mortality or disease in shrimp ponds. Shrimp hatchery PL are obtained from broodstock harvested from the deep sea. However, shrimp broodstock may be infected with the white spot syndrome virus. Although screening of PL (PCR-tested) does exist, most farmers are unable or unwilling to pay the higher price and testing certificates are not trusted (BD 42, 2010; BD 59, 2010).

Second, at the growout stage, shrimp are rarely fed directly, although they may benefit from feed given to whitefish grown in polyculture systems. Nevertheless, in a study undertaken by the University of Stirling, antibiotics were quite widely detected in all sample types (shrimp, sediment, water and feed). Nitrofuran metabolites were identified in 70% of shrimp samples taken.

Oxytetracycline was present in Macrobrachium but below acceptable limits (Immink, et al. 2010). Therefore, there still appears to be some antibiotic use by the industry. Results obtained from a survey undertaken by the University of Mymensingh showed that almost all the farmers examined indiscriminately used shrimp feed, fish feed, poultry feed in prawn farming and even poultry litter as a feed ingredient or for pond fertilization. Feeds manufactured and imported by popular feed companies in other areas of Bangladesh contained high levels of banned antibiotics (Islam, Khan and Reza 2009). In prawn farming, farmers use a mix of homemade feed, which includes cooked rice, rice bran, oil cake and fishmeal; industrially-manufactured pellet feed; and apple snail meat.

Third, while farmers in the prawn chain generally harvest and transport the product to market themselves, as much as 90% of shrimp may be transported by intermediaries, according to interviews (BD 9, 2010). This is due to the long distances between some shrimp farms and collection centres or markets. Middlemen have been accused of affecting the quality of shrimp and prawn through undesirable practices.

Fourth, ice is important for maintaining shrimp and prawn quality during transportation from the farm to the processing plant. An increase in the number of local ice factories over the past five years has greatly improved access by value chain agents to ice, particularly in rural areas, and ice has become an important facilitator of quality in the chain. One processor said, "Ice is the key difference. We insist on a ratio of 1kg of shrimp to 1kg of ice" (BD 37, 2010). This comment suggests limited knowledge of temperature control and cold-chain requirements in order to ensure product quality.

Furthermore, inadequacies in cold-chain infrastructure such as a lack of refrigerated trucks and insulated boxes will likely require greater quantities of ice given the warm climatic conditions found in the south of Bangladesh. In addition, there are often large differences in available quality of ice and electricity cuts still constrain production and result in large price hikes. Contamination risks arise due to the relaxed nature of hygiene considerations in ice production and handling. Commonly, there is no quality control in ice production. Microbiological assessment as part of a study by the University of Stirling highlighted that all ice factories examined failed to meet appropriate standards of cleanliness based on the presence of total and fecal coliforms. 44% of the ice factories and 50% of the processing factories had salmonella present in water and ice samples (Immink et al. 2010). Risks may also be associated with the transportation of ice, which is generally by hand or by open cart. Ice often has a yellow colour and may be slid along floors with a metal hook. At neither of the ice making facilities visited were labourers wearing protective clothing. As recorded through observations, much of the ice produced is block ice, which then needs to be crushed. This is less efficient at cooling than flake ice or slurry ice, potentially leading to product deterioration.

Volume upgrading at the farm level in Bangladesh has taken place with the assistance of NGO programmes that focus on, "farm management, quality management, water quality training, marketing and post-harvest handling" (BD 15, 2010), according to an NGO's information. However, according to the respondent, the training has resulted in improved volumes but not increased quality (BD 16, 2010). Farmers outside the NGO's programme continue to use

traditional methods of rearing shrimp and prawn that may keep volumes low. Farmers are aware of the competitive advantages of producing large-sized shrimp and prawn as well as quality expectations by depots, which are usually related to colour (white for shrimp and no black or green prawns) (BD 28, 2010; BD 35, 2010; BD 62, 2010). Some volume upgrading has led to competitive advantages for larger farms, as expressed by one farmer: "I can obtain higher profits, labour savings, input savings, a price premium for higher volumes and I can buy higher quantities of feed and seed on credit" (BD 58, 2010).

Change and/or add functions

There were limited examples of functional upgrading found at the farm level by farmers who were also part-time PL traders. One foreign-owned feed company invested in a closed system technology (CST) farm in Bangladesh. This is the only farm of its kind and is supported by quality inputs provided by the feed company (BD 58, 2010). Cases of outgrading were predominant in the Bangladesh shrimp and prawn chains. An NGO informant noted that some farmers in shrimp areas consider shrimp farming to be a vulnerable livelihood and are returning to integrated farming including prawns, where soil salinity allows, or to rice and livestock production (BD 16, 2010). This type of farming is considered to be more financially sustainable as it provides a year-round income.

7.2.2 Thailand: shrimp and tilapia

7.2.2.1 Upgrading at processing level

Improving process, product, volume and variety

Process upgrading has primarily occurred in Thai processing companies through strict quality control requirements and investments in factories and equipment. Cold-chain-of-custody arrangements designed to guarantee quality and freshness of shrimp and tilapia are particularly important. Factories are often within just a few hours of farms and processors often stipulate maximum production times. However, processors in Thailand went further than those in Bangladesh when thinking about quality. One processor noted that, "Post-harvest handling makes the biggest difference to quality" (TH 39, 2011). For another, responding to market demands for quality permeates early decisions about suppliers: "Decisions about quality are made before you harvest – it's about whom you work with" (TH 5, 2011). This suggests that quality in Thai chains is viewed more comprehensively than in Bangladesh and aligns chain processes around ensuring quality is maintained at all points of the value chain.

The upgrading of processes has also taken place with assistance from the government. When a shipment is ready, DOF randomly samples containers and test results are returned within 10 days. If compliant, an export certificate is also provided. For processors/exporters that have been awarded an "A-grade" by DOF, a DOF official does not need to be present when the random sample is taken. In the case of non-compliance, monitoring increases substantially and a Corrective Action Plan (CAP) is created and followed by the factory (TH 13, 2011). Many factories have their own QC departments and

on-site testing laboratories. In this way, processors are given responsibility for quality and rewarded for ongoing compliance, reducing oversight required by the government. Nevertheless, key informants provided some information on alleged practices within the chain, such as the switching of MDs. Although this used to be more prevalent, a manager at a processing factory cautioned that MDs can only be partially trusted and this is why processors undertake extensive testing themselves before requesting an export certificate (TH 13, 2011). Therefore, although there are mechanisms such as MDs in place to guarantee quality, processors are invested in ensuring these are verifiable.

The EU market is considered by Thai processors to have the strictest standards of all the export markets, which is an incentive to invest in product upgrading. However, even for Thai informants, compliance with EU market standards is difficult and standards are constantly changing, according to the perceptions of key informants (TH 37, 2011). Overall, most stakeholders throughout the chain saw standards as a mixed picture: providing an opportunity for differentiation, competition and expansion of export markets, while acknowledging the constraints posed by the costs, the capacity gap in accessing technology and the financial capacity of stakeholders to meet these standards. For example, the cost of certification schemes may be prohibitively expensive. At least one processor said they would not apply for BRC certification because of the cost (TH 58, 2011). This shows that costs for processors in meeting consumer demands associated with the EU market can sometimes be prohibitive. The Thai organic standard for Asian markets introduced in section 5.3.2.2 presents new market opportunities for some

Asian suppliers while others, particularly large suppliers with many resources, may prefer to continue to supply the high-value EU market.

Producing new forms of existing commodities or innovating to create new products in order to increase unit value are areas of both focus and growth in Thailand. Processing plants have invested substantially in value-added research and development in order to increase product upgrading, particularly in the shrimp value chain. All of the large processors interviewed have on-site R&D departments. Success has been somewhat mixed with EU buyers welcoming efforts but admitting that differing tastes between Asia and the EU sometimes lead to unmarketable suggestions for NPD. One processor said, "We try new products but it doesn't always work so well as we have to meet western ideas of products" (TH 1, 2011). One Thai processor has employed European chefs in an effort to create further value addition and product variety at the point of production (TH 4, 2011). Observed products include breaded and pre-fried fish with different seasoning or herbs such as lemon or barbecue flavours; fish schnitzels; skewered fish, perhaps with fruit, potato or in a marinade; shrimp spring rolls and other dim sum; shrimp fritters; shrimp nuggets; shrimp patties and samosas; shrimp tempura; sushi; and 'popcorn' shrimp with various spices.

Tilapia is mostly sold as frozen fillets in the EU and there is little product upgrading within Thai tilapia chains. This could be an area for further development in the future. In shrimp chains, creating a portfolio of related products has become an important part of product upgrading thanks to investments in technology and the market positioning of Thai shrimp as a high quality product destined for retail chains. In these chains, ready-to-cook and

ready-to-eat products are highly valued. Two large processors interviewed produce convenience products (such as shrimp wanton soup) labelled with their own brand and sold in retail stores both domestically and in the EU (TH 3, 2011; TH 72, 2011). They see this method as a way of increasing value addition, rather than providing larger volumes of less processed products. In addition, Thai processors noted that European retailers often prefer to purchase mixed containers and Thai companies offering this service can attract multiple customers by offering greater flexibility and efficiency. One processor said, "We stock a range of frozen products in order to be a one-stop shop, which is our competitive advantage" (TH 57, 2011). Only one processor interviewed said that he was not interested in pursuing value addition, but in increasing volumes of a high quality commodity product: "We believe we can do a commodity well" (TH 5, 2011). Otherwise, increasing volumes did not feature highly in Thai processing factory upgrading strategies. Although speculative, government policy may not support volume upgrading in order to maintain GSP preferences (see Appendix 2).

Change and/or add functions

Processors are involved in R&D for both shrimp and tilapia, such as breeding programmes, oxygenation techniques, data collection by computer software and auto feeders, and one processor developed and sells PH water-testing kits to farmers (TH 14, 2011). Two processors initially began as companies in other nodes before upgrading into processing. One was a packer for frozen foods who introduced processing in 1992 (TH 57, 2011), while the other processor began as an ice company that developed

processing facilities (TH 5, 2011). Some processors focus on the services they can provide, such as a complaints procedure for suppliers (TH 4, 2011). A different processor established a marketing office in the EU in order to assist with information gathering and dissemination in the supply chain (TH 12, 2011). The company also owns a consumer label, designed to encompass all other labels and denoting the highest quality of production available. This label indicates functional upgrading through attempts at governance in the chain towards consumption, and not just production.

The research discovered that greater functional upgrading could occur in Thai chains as processors have customer brand information on packaging supplied by importers (TH 58, 2011). Processors could exclude importers and make direct contact with buyers. Not utilising the opportunity to contact end-customers directly is due to deeply-held beliefs by some key informants that to communicate with end customers would undermine the trust importers place in their company (TH 58, 2011). Instead, functional upgrading occurred mostly with processes upstream.

As mentioned in section 6.2.2, key informants admitted that they did not wish to see farms integrated into company operations (TH 3, 2011; TH 5, 2011; TH 58, 2011). One processor said, "We don't support full integration as we do not consider growout our area of expertise" (TH 3, 2011) while another said, "It is not our competitive advantage to be involved in growout farming. It is too much work" (TH 58, 2011). However, processors are unable to source all of their supply from large farms. Over 80% of the 12 million aquaculture farmers in Asia are small-scale (FAO 2010), and therefore processors must by necessity procure from small-scale farms. However, there is a preference

by processors for using large-scale farms for contracts as they are perceived to be more reliable and provide larger quantities (TH 2, 2011). Where farms cluster around a processor, small-scale farmers may be tied to the procurement practices of the processor through the use of loans, credit, and a simple imbalance in relative bargaining power (TH 64, 2011).

In Thailand, many processors have progressively included feed and seed production in the functions they perform in-house (TH 3, 2011; TH 13, 2011). Other feed suppliers may also own farms in order to test feed technology. Both an organic farm as well as a tilapia grow-out farm have developed their own feed, believing it to be superior (TH 17, 2011; TH 65, 2011). One shrimp broker interviewed also owned an ice factory (TH 61, 2011) while multiple brokers also owned their own shrimp ponds as a source of extra income. One large farm had also become involved in CSR activities by donating shrimp to local schools and resources to replant mangrove forests (TH 41, 2011). A processor was similarly involved in CSR by providing low-interest loans for workers (TH 4, 2011). Tilapia farmers interviewed were often involved in functional upgrading, particularly hatchery, nursery, growout and feed production (e.g. TH 32, 2011). Finally, functional upgrading of brand development also took place (TH 14, 2011; TH 57, 2011; TH 65, 2011; TH 71, 2011). These processors, importers or feed retailers sold their own brand of products alongside manufacturing for other brands. These examples show that there is significant functional upgrading in the chains. Links between different value chain nodes may explain higher levels of coordination in Thai value chains compared to those in Bangladesh.

7.2.2.2 Upgrading at farm level

Higher unit values of product are the outcome of investment in farm process upgrading, particularly in feed and seed quality, in minimum standards for export, and certification. According to observed practices, shrimp are graded and separated on the pond-side immediately after harvest, usually under cover (either specifically constructed or a roof), before being placed into plastic baskets with ice. Broken shrimp are rejected. Boots, hats and gloves are mandatory at shrimp and tilapia harvests and processors may have contracts with farmers to supply PL, feed, and eventually labour at harvest time. Finally, as mentioned in section 5.3.2.2, GAP Thai is the minimum certification required for farms (and hatcheries) producing for export.

Extensive organic monodon farming has existed for a number of years in Thailand and has been certified by DOF (although not by a third-party). However, recent product upgrading has taken place through the introduction of semi-intensive organic shrimp farming. This is currently limited to one farm and conventional PL are used as there are no organic hatcheries (TH 17, 2011). While there is a domestic programme for organic vannamei in Thailand, producing organic monodon broodstock has not been successful. Densities in organic production are much lower than for conventional production and production costs are high for feed in particular, which must be certified organic where possible and GMO-free, which raises feed costs by 50%. Initially, there was only one company that produced organic feed in Thailand. Now the only semi-intensive organic farm in Thailand produces organic feed themselves, as it is cheaper, although they may not sell it (TH 17, 2011). Semi-intensive organic farming is not yet a highly profitable

business and this has not encouraged new entrants. Only 5-7% of organic production from Thailand is sold as organic in consumer markets, and the rest is sold as conventional shrimp (TH 17, 2011). This is because semi-intensive organic production with its higher production costs (30-40%) competes with extensive production, sold at a lower cost. As there is no branding on organic production that indicates whether it came from extensive or semi-intensive production, customers may not understand why one organic product is more expensive than another (TH 17, 2011). There is no organic tilapia production.

The ability of the Thai industry to meet requests for live shrimp harvests, most often made by Japanese and Italian buyers according to informants, is also due to more general upgrading at the farm level. Live shrimp are of premium quality and require special handling: at the time of harvest, the whole pond is harvested and live shrimp are transferred directly to aerated drums before being graded at the factory according to size and condition. Processors have also assisted with improving general farm standards to meet third-party certification schemes. The processor may pay the ongoing costs of certification as well as the initial certification amount, but not for the improvement of the farm. In the case of non-compliance, farmers may have to re-pay certification costs to the processor.

Certification is likely to continue to grow in the future, particularly if importers and buyers see it as a cost-free method for them to obtain products with responsibly-sourced credentials. Certification provides buyers with assurance and reduced risk, without having to pay for it. At the same time, one importer noted that certification is verification for consumers that the *retailer* and not the producer, is telling the truth (TH 39, 2011). Third-party

standards have brought about physical changes to farms (such as effluent and sediment ponds) and changes in management practices (such as bio-security), which have increased costs (in addition to registration of the scheme, audit and logo-use fees).

Investments in equipment support the production of greater volumes. These include loaders to add oxygen, which enables greater densities of shrimp and tilapia to be reared, and feed machines that precisely measure out required quantities. Other upgraded equipment for ACC-certified farms included biosecure ponds with netting covering the pond, PVC linings and nets at the pond edge. Investments have also been made in marketing participating ponds through websites and real-time cameras (TH 19, 2011; TH 73, 2011). There was little variety in production, although some farmers produced shrimp together with whitefish. These farmers were generally poor or landless and whitefish production was a subsistence crop eaten by the farmer and his family, while the shrimp were sold. The industry still suffers to some extent from MSGS (Monodon Slow Growth Syndrome) and private companies are pursuing research on diversified species such as 'blue shrimp'.

Change and/or add functions

Very few farmers have instigated functional upgrading in chains. One famer said that although the advantage of upgrading her ponds would be reduced prices for feed and seed, she preferred to stay small in able to manage her workers herself, make decisions about the farm, afford investments and evaluate the results of direct managerial decisions (TH 19,

2011). Examples were more often found of hatchery operators who also established growout ponds (TH 30, 2011; TH 32, 2011; TH 46, 2011; TH 47, 2011). Functional outgrading was found in the tilapia chain after a 100% export business was transformed into a 100% live-tilapia business for the local market due to better returns (TH 65, 2011). In shrimp chains, it was difficult to locate farmers who had once been part of chains but were no longer. However, in interviews, a number of key informants noted the reduced presence of small-scale farmers in shrimp farming over the past decade (e.g. TH 2, 2011).

An examination of upgrading trajectories shows that within the chains in the Asian countries, upgrading trajectories are diverse. From the analysis, the biggest difference to upgrading trajectories relates to the extent of investment in the chain by both the government and the industry. A limited ability to create value in the Bangladesh value chain is due to a range of public and private factors that lead to low volumes, poor quality and technical inefficiencies. In Thailand, upgrading trajectories have been the result of extensive investment by both value chain agents and government at all points along the chain. Improved feed and seed quality, processor involvement in the improvement of farm management techniques, research and development for NPD and minimum standards for export all assist with creating value in response to consumer demand. The analysis shows that restricted access to information is not the only limitation to creating value. Instead, supplier abilities to respond to market information may be compromised by both the actions of value chain agents themselves, and the institutional framework within which they are found.

7.3 Improved value chain coordination

As noted in the introduction, it is the *combined* activities of value chains that determine the extent and type of value created in the eyes of the end consumer. In light of potential benefits for all value chain agents through increased chain competitiveness, some value chain agents may improve value chain coordination or provide assistance in order to transfer market information and/or improve supplier competencies.

7.3.1 Within Asia

Building alliances with other agents in the chain may improve performance and increase leverage. Vertical contractualisation occurs between different nodes while horizontal contractualisation occurs among agents in the same node who carry out similar functions.

7.3.1.1 Bangladesh

Processor level

Improved value chain coordination by value chain agents within Bangladesh is still severely limited due to insufficient interest by processors, leading to underinvestment in other value chain nodes. The interest of processors in obtaining subsidies and investing in real estate was summed up by one informant who said, "Businesses have other agendas and processing is not the main motivation" (BD 26, 2010). Some processors interviewed have attempted to engage in vertical contractualisation due to supply shortages, but farmers sold to the highest bidder even where a contract with a processor

existed[46]. The BFFEA is a trade body comprised of members of seafood processing plants in Bangladesh. This BFFEA focuses on promoting the interests of processors both domestically and internationally, but there was no evidence found of genuine cooperation between processor members that might count as horizontal contractualisation.

Farm level

There is currently no vertical contractualisation in Bangladesh at the farm level. According to a local NGO informant this is because, "Farms are too small to make true coordination feasible, although some depots and commission agents may be closely tied to each other through credit schemes" BD 16, 2010). Some horizontal contractualisation takes place through trade associations (BD 10, 2010). For example, an association of ice manufacturers pays the costs of transporting ice from the nearest city to the village in the case of an electricity failure (BD 11, 2010), but this was a very isolated case.

7.3.1.2 Thailand

Processor level

Contract farms are explicitly governed through verbal agreements that specify the provision of supply at particular times, premia to be paid for higher quality, rejection criteria and the provision of inputs such as farm labour for harvesting or ice requirements. Nevertheless, the fragility of these agreements in the shrimp industry was demonstrated in 2010 when rising

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[46] This is a similar situation to that of Thailand, described in section 6.2.2.

shrimp prices resulted in losses for processors as farmers waived contracts in favour of selling shrimp to the highest bidder[47]. The losses experienced by processors in 2010 may lead to new forms of coordination in the chain, such as increased vertical integration by processors, increased financial assistance to farms so that farms are more likely to sell to the processor, or a guaranteed minimum price as currently happens in tilapia chains. This loyalty by the processor to a price agreed in advance may encourage farmers to be equally loyal to the processor even when prices rise. The advantages of vertical contractualisation are greater security of supply for the processor and a guaranteed buyer for the seller. However, given the power of processors in Thailand, tighter contracts could lock producers in to potentially detrimental relationships (see the following section on *Farm level*).

Other forms of contractualisation occur between processing factories that produce seed and feed. These companies often have higher quality PL due to extensive research and development, but PL can only be purchased if feed from the same company is also purchased (section 5.3.2.3). However, full vertical integration is limited in most companies, as processors do not wish to own growout farms due to the technical competencies required for production (section 6.2.2). Again, apart from the TFFA, a trade association promoting Thai frozen food exports, there was no evidence found of horizontal contractualisation at the processor level, nor at nodes between production and processing.

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[47] Prices in the tilapia chain have never fallen below a "minimum guaranteed price' established by the largest processor in Thailand, and therefore tilapia chains mostly see contracts honoured.

Farm level

Intensification of production within Thailand has led to greater dependence by producers on quality inputs such as feed, seed and technologies. Large processing companies tend to have integrated feed, and sometimes seed, operations. This increases dependence by producers on processors. In interviews, some farmers complained that they had "no choice" but to accept terms and conditions dictated by processors, such as quantity of production, size of shrimp/tilapia and time of harvest (TH 37, 2011). This was most clearly shown in examples of procurement in the tilapia sector. The largest private company in Thailand manages production in the locality where key informant interviews took place. The company exercises control over production by stipulating the amount of tilapia that can be grown. If a farmer wishes to grow more, they have to ask permission from the company first. Although advantages to limiting production may result in higher prices, there may be disadvantages to farmers who cannot benefit from opportunities afforded by volume upgrading. The processing company offers a guaranteed minimum price as an incentive for farmers to cooperate, but prices have been sufficiently high recently that this guaranteed price has never been tested (TH 73, 2011). This shows the effects of processor control over production and may be why some shrimp farmers do not wish to enter into tighter contracts.

Horizontal networks such as farmer associations are better established in Thailand for both tilapia and shrimp than coordination between different value chain nodes. For farmers, adopting a collective approach to meeting the requirements of processors decreases risk for individual farmers and increases returns through increased access to markets, better value inputs

and improved disease control. Within associations, farmers can meet to share experiences; obtain cheaper feed and seed supplies from the association; reduce transport costs through sharing costs; obtain feed and seed on credit and chemicals in the case of a disease outbreak; and benefit from a stronger negotiating position with processors and brokers due to larger volumes and continuous supply (TH 26, 2011; TH 44, 2011; TH 45, 2011; TH 48, 2011). Medium-scale farmers make up the largest proportion of shrimp association members. This is because large farmers can make direct contact with processors, while small-scale farmers may struggle to implement requirements put in place by the association to enable a contract with a processor (TH 10, 2011). For small-scale farmers, alignment with a farmer association can provide higher returns though lower production costs and higher profits. Associations are also very important in tilapia production. Associations tend to form among farmers growing tilapia in the same area of the river, as they experience similar environmental problems such as poor water quality (TH 75, 2011). However, key informants noted that processors are still sceptical about the value of contracting with cooperatives due to a lack of consistent and reliable supply (TH 5, 2011). For this reason, many processors prefer to contract with large farms instead.

The analysis in this section has shown how value chain agents attempt to strengthen linkages in value chains through the use of contracts. In Thailand, this has been more successful at both the processor and farm levels, and both vertically and horizontally, than in Bangladesh. This is due to greater investment by processors at other value chains nodes, such as in improving quality. Improved value chain coordination is therefore limited by

the power of the strongest value chain agent. Where this agent is weak, as is the case in Bangladesh, there are limited opportunities for increased coordination.

7.3.2 Between Asia and the EU: Proactive governance

As section 2.1.5 first raised, some buyers work directly to assist producers in lower-income countries, aware that the requirements of final product markets in high-income markets may require competencies that are outside the reach of these agents. These competencies may be technical, financial or related to the ability to interpret market information. During interviews, examples were found where suppliers had been deliberately assisted to enable them to develop the capacities to respond to market information and create greater value. Three methods were revealed in the selected seafood supply chains.

7.3.2.1 Indirect assistance

Indirect assistance is a semi-hands-off approach, where the buyer or lead firm continues purchasing product with the agreement that the supplier undertakes upgrading (usually product or process upgrading) using financing provided by the seafood buyer. "No longer can partners simply walk away", noted one informant, "and delisting is really a last resort. Instead, our aim is for the buyer and supplier to find solutions together and to each own the product" (DEU 4, 2011). By guaranteeing a market for the product, the supplier can plan investments and the buyer is more confident of continuous supply.

7.3.2.2 Direct assistance

The benefits of direct assistance have been expounded in research undertaken by Oxfam (Oxfam International 2009a; Oxfam International 2009b; Wilshaw 2010; Bright and Seville 2010). Oxfam highlights the business case for development, arguing that investing in value chains improves financial returns for EU value chain agents through increased competitiveness as well as increased branding, reputational and CSR opportunities. It also brings greater financial returns to value chain agents in developing countries due to value creation. One retailer called direct assistance a form of, "development counselling" (DEU 5, 2011). In examples given by EU value chain agents, direct assistance occurs when buyers visit the supplier country and production site, transferring knowledge on best practices within the chain as well as training workshops on general development issues, such as cleanliness. One processor informant noted, "My role is not as teacher, but I can share the reasons why expectations from my factory regarding food safety and quality are so high" (DEU 4, 2011). Although the informant realised that not everything about production in a third country can be changed, by partnering with the supplier and its local community on generic development issues (such as hygiene), they believe, "We obtain a better quality product and give something back to the local community" (DEU 4, 2011). In response, buyers expected understanding and changed behaviour over time from their suppliers.

7.3.3.3 Direct investment

The third way that lead firms and seafood buyers mentioned they assist with direct upgrading in their chains is through investment in specific product or process projects. This differs from direct assistance as it requires time set aside for the project, management and financial investments as well as multiple stakeholder engagement, usually involving value chain agents such as processors, importers and retailers (interestingly, no examples were provided by foodservice companies) who provide access to the final market as well as financing investments, NGOs who may also contribute to financing and provide the processes necessary to assist with upgrading to a particular standard, and the inclusion of local farmers and processors. Monetary returns, at least, may not be guaranteed to those financing the project (although reputational returns will be considered shortly). One example of such an initiative is organic production in Bangladesh (originally raised in section 5.3.1.2). An EU importer, (BD 81, 2010) an EU-based NGO (DEU 9, 2011) and the development branch of an EU government substantially financed the project. The project introduced tighter value chain coordination by eliminating middlemen in the supply chain, which reduced the use of illegal PL, falsification of weights and the soaking of shrimp, all of which contributed to poor quality. Introducing a digital database led to fewer losses and quality control issues such as misplaced or lost paperwork, while direct links through the importer facilitated EU market access. Nevertheless, the manual input of data is time consuming, the Internal Control System (ICS) is financed externally and innovative methods of traceability using coloured baskets for different farms had to be established. The project demonstrates that there is a

market for extensive production, if key aspects of product quality and safety are guaranteed and the chain is properly organised and marketed. In being awarded an organic certification, the project demonstrates that an organic standard is achievable in Bangladesh. However, the investment required coupled with a weak institutional framework undermine the possibility for more extensive and expanded upgrading by participants currently.

An integrative analysis of participants and beneficiaries of alternative strategies of upgrading introduced in this chapter is presented in Table 7.2. According to the identities of the companies involved in proactive governance, enterprises whose brand names are closely linked to their CSR policies are most likely to undertake direct investment. These companies operate in high-end markets where margins are higher throughout the chain, enabling the sort of financing that is required for direct investment. However, as mentioned, financial returns on investment are not guaranteed, even over a number of years. Clearly, this type of involvement, even where other less tangible but no less valuable returns such as reputation, trust and branding are built, relies on being part of a highly specialised marketing strategy by select firms.

Table 7.2 Number of participants per type of proactive governance and EU lead firm

EU Participant	Beneficiaries	Indirect assistance	Direct assistance	Direct investment
Importer	Processor, Farmers		1	2
Processor	Processor, Farmers	2	2	1
Retailer	Farmers	1	1	1
Foodservice	Farmers	1		
NGOs	Processor, Farmers			1

Source: Author, based on key informant interviews

As 7.3.1 concluded, improved value chain coordination is only as successful as its strongest agent. As section 7.3.2 has shown, in cases of proactive governance where the strong agent is an EU market actor, direct investment bypasses failings in the institutional framework, governance and coordination mechanisms in the value chain and even supplier (in)competencies. In seeking to gain their own competitive advantages, EU value chain agents bring solutions to restricted information and limited competencies in value chains.

Overall, chapter 7 has shown that access to information is not the only condition that determines the extent of value created. The competencies of suppliers are also critical. In attempting to meet consumer demands, lead firms in Asia may invest in increased value chain coordination, improving supplier capabilities and their responses to market information. This occurs to a limited extent by processors within Thailand and virtually not at all in Bangladesh due to a lack of private sector involvement in the value chain to bring about improvements, coupled with a weak institutional framework. More successful value chain coordination that has raised supplier competencies has taken place with the involvement of EU value chain actors, demonstrating that a lack of supplier capacities can be overcome.

Chapter 8

Knowledge is Power?

"Every business today competes in two worlds: a physical world of resources and a virtual world of information" (Pereira 2001). In value chains, how the physical and virtual world are organised can lead to the maximising of competitive advantages for businesses. The aim of this thesis has been to examine the market orientation of two seafood supply chains between Southeast Asia and the EU in order to establish whether and to what extent knowledge is indeed power. Knowledge about end markets and subsequent choices about the organisation of value chains lead to diverse development trajectories for seafood suppliers. This chapter concludes the thesis by presenting the unique findings of the research, how these advance existing understandings of global seafood value chains, the implications of these findings for both GVCs and future policy, and areas for further research.

8.1 Knowledge and power

A critical examination in Chapters 5, 6 and 7 of the three key areas of market orientation was undertaken using primary data from interviews. These were: the generation of market information in value chains, its dissemination, and the ability of suppliers to respond to this information. An innovative analysis extending understanding of global value chains using the market orientation approach revealed that there are three determinants of the market orientation of seafood value chains: i) the institutional framework in the

exporting country, and particularly domestic regulation; ii) the involvement and investment in the value chain, particularly processors; and, iii) demands made by seafood buyers in importing countries.

8.1.1 The institutional framework in the exporting country

The institutional framework plays a critical role in enabling access and the dissemination of information to value chain agents, as well as shaping responses. Through the research, the most important aspects of the regulatory framework that affect chain responses were identified, such as the regulatory scope governing the quality of inputs and outputs as well as documentation and testing. Standardised and strict regulation, in line with strengthened governance in resource allocation and environmental integrity, stringent food safety and quality standards, can lead to value creation. Enforcing existing laws is also critical but may be compromised due to the number of Ministries involved in aspects of aquaculture in some countries (Table A3.1), but also a lack of political will and unintended consequences of government incentives. Drawing from the research, export tax breaks and subsidies to build processing plants have led to investment in factory infrastructure in Bangladesh, but during the course of the interviews it was found that there was little impact on the quality or quantity of production (section 5.3.1.1). Inefficiencies in resource use may explain the apparent undermining of product quality and detraction from improvements in the chain. Extending this observation suggests the need for further evaluation to explore the existence of alleged corruption in Bangladesh.

In contrast, the research in Thailand identified investment by the government in public infrastructure, such as transport and electricity, as well as support for sanitary measures, public service provision, internet-based information services and market facilitation, that assists the industry with progressing towards accessing market information and responding to it with value creation. By revealing how the strength of the domestic institutional framework and the ability of value chain agents to create value are directly correlated, the research identified how a strong domestic regulatory framework is required in order to address the concerns of importing countries and strengthen the viability and (in the best cases) the sustainability of the seafood export industry.

Where the regulatory framework is weak or inadequate, food safety failures related to residues (Appendix 2), antibiotics and fecal coliforms (section 7.2.1.2) may result. Ensuing import bans (section 7.2.1.1), alongside ongoing non-compliance, have resulted in a poor reputation for aquaculture products from Bangladesh. Although this has been detrimental to shrimp and prawn exports from Bangladesh in particular, there are wider implications for seafood from Southeast Asia. Clearly there is a risk that an unfavourable seafood reputation from one Asian country could tarnish the reputation of seafood from other Asian countries. Reputation is easy to lose and much harder to reclaim and higher standards are more likely to be required in the future as verification of compliance. Even more critically, consumer confidence may take time to be re-established, and even then may only be reclaimed at a reduced price level. Ironically, the nature of extensive production in Bangladesh generally leads to a high quality product at the point

of harvest, but sub-standard, post-harvest handling practices break the temperature-controlled-chains and undermine quality.

For some countries, targeted assistance from international organisations such as NGOs and donors will be crucial in developing the technical capacities and investment in the value chain that lead to an improved reputation. Such projects in Bangladesh have proven essential in enhancing indigenous skills due to limited capabilities within the domestic institutional framework. However, some concern exists that such private assistance creates greater dependence on foreign aid and the transfer of activities from the public to the private governance sphere. This could potentially undermine long-term change and improvement in the sector as a whole due to a lack of resources to maintain projects once funding ends (section 5.3.1.3) and points to the need for enhanced domestic government competencies.

8.1.2 The domestic industry in the exporting country

Again drawing from the case studies, market orientation is evident in both the Bangladesh and Thai value chains examined, but to different extents. This correlates to the degree of investment by the industry in the value chain and can be viewed as a linear progression. First steps relate to compliance with international standards of food safety and require investment in inputs, post-harvest practices, chain of custody traceability and processing factories. Second, quality standards are a signal of yet greater investment in the chain due to the more advanced practices required at each of these stages. Thereafter, investment by the industry can lead to increased innovation in

terms of product portfolios, high value-added products and NPD. In particular, the extent of traceability in the value chain can be used as a critical indicator of industry involvement. This is because traceability is a key value sought by the seafood industry in the EU. Without traceability, access to the EU market is limited, let alone the loss of potential added value secured through the provision of additional information to buyers and consumers.

Full chain traceability and other similar product attributes have additional costs related to production and transfer of product between value chain nodes. Where these costs are diverted to producers, it may no longer be possible for them to participate in export value chains and producers therefore cannot gain from value creation associated with traceability. Costs associated with differentiated product attributes are particularly problematic because in seafood supply from countries where a large number of small-scale farmers and intermediaries exist alongside a lack of documentation, the number of transfer points of information and product contact is increased. Furthermore, involvement in multiple schemes, as is often required by seafood buyers, may raise costs to such an extent that it leads to the exclusion of suppliers from the value chain (section 7.2.2.2).

A solution would be to reflect the costs of increased traceability in the sales price, thereby passing on the costs of desired product attributes to the consumers who value them. However, as section 5.2 highlighted, low price is an important consumer value and the interviews found that EU value chain agents are reluctant to raise prices for consumers. If consumers are not willing to pay for certain product attributes, it raises the question of the value attached to the particular attribute and whether it should be offered at all. This

could be resolved through spreading costs among producers, intermediaries and consumers. Alternatively, as evident from the growth of the Fairtrade market in general, there are some consumers willing to ensure producers obtain a higher price. As there were yet no Fairtrade initiatives in the value chains studied[48], three alternative solutions are being employed.

First, processors may pay initial and ongoing costs of certification in exchange for obtaining the farmer's production (section 7.2.2.2). A compliance failure results in the farmer reimbursing the processor. Second, local cooperatives that supervise production and maintain joint records have been established; the cooperative as a whole is audited rather than each individual producer, thereby reducing associated costs (section 7.3.1.2). One disadvantage of this system is that a compliance failure by one farm means that all farmers in the cooperative also fail the audit. However, working together in this way does encourage group accountability and cooperation so that it is less likely that a farmer fails the audit. Managers of these cooperatives could be trained with inputs from governments and auditing companies. Finally, reducing costs of compliance, auditing and certification may increase incentives for consolidation in value chains: vertical integration or stronger and more secure contracts between value chain nodes would also increase traceability (section 7.3.1.2).

Private sector investment has been shown through the research to be an important element of market orientation and the reason why processors, genuinely interested in traceability and quality and who invest in such areas, contribute to transformation in production nodes, as evidenced in Thailand.

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[48] A Fairtrade shrimp standard was under development at the time of the interviews.

Evidently there is scope for future research to be undertaken in this area. Their feasibility within different contexts and whether other methods have proven successful warrant fuller exploration. Importantly, outcomes from such research would assist with establishing consumer willingness to pay for certain product attributes and the allocation of costs associated with improvements to the value chain that would deliver these attributes. At the same time, targeting improved traceability should be a policy priority of domestic and international governments.

8.1.3 Seafood buyers in importing countries

Within highly differentiated markets, chains with greater value addition associated with their final products place greater emphasis on the generation, dissemination and response to market information. Consequently, the greater the difference between market values and existing product attributes, the greater the market orientation required in the chain in order to close this gap. In the EU market, there is increasing demand from buyers for more sophisticated products, often with higher levels of value addition that promote product differentiation and competitive advantages. However, there are two key problems with relying on buyer demands as incentives for improved market orientation and value creation in chains. First, the EU market is host to an extensive global product portfolio due to diversity in geographic markets, market segments and a variety of standards such as food safety, product quality and sustainability (section 5.2). Supplying highly differentiated end markets and their niche segments means that not every buyer values the same product equally.

Markets for low value products may be equally or more attractive than other market segments, due to a need for higher volumes, for example. Bangladesh shrimp and prawns serve end markets where consumers typically value low price, rather than other product attributes such as certification. This raises the issue of active and passive aspects of market orientation. Active market orientation is the outcome of a marketing strategy to meet particular consumer values: low price in the case of Bangladesh shrimp and prawns. Passive market orientation, on the other hand, occurs when the market orientation of a chain coincidentally matches product attributes to consumer values. Therefore, while it looks as if Bangladesh shrimp and prawn chains benefit from high market orientation, in reality, orientation is passive (due to weaknesses in access to information and response capabilities) and suggests a lack of a deliberate strategy by suppliers to target low-end market segments in the EU. This leaves the shrimp and prawn chains vulnerable to shifts in consumer values that suppliers might not be able to respond to. Questions might also be raised about how to measure the extent of active or passive market orientation of chains. Further research in this area would help identify and measure different aspects of market orientation in value chains. Intervention strategies by policy makers, NGOs and development organisations, as well as trade associations, could then be developed in order to support and promote market orientation that would strengthen the power of suppliers.

Second, the high seafood import standards in the EU market require extra effort by value chain agents that may slow or limit value creation in the short-term, impacting on development trajectories. Further research on

seafood value chains from other developing countries or other products would establish whether these problems are inherent in all value chains or restricted to seafood. In the meantime, demands in the EU market may be so high that Asian suppliers seek alternative markets, resulting in a shift of seafood exports from EU markets to emerging Asian and other markets such as the Middle East, Russia, Latin America and Africa. Emerging economies such as China, Brazil and India have very large and growing markets, which may induce a shift away from certain types of value addition and towards new trends in seafood supply. This tendency may be accelerated because of further incentives; for example, these markets may (currently) have lower product standards.

The presence of a non-third party Thai organic standard shows that premiums may be gained in local markets without some of the costs associated with traceability and verification that are mandatory for the EU market. Importantly for value chains, new markets with lower standards do not provide an incentive to invest in market orientation and upgrading that would result in value creation (although the chain may not be any less profitable). At the same time, observations in supermarkets in Thailand indicated changes in values that demonstrate the international complexity of modern seafood trade. For example, the introduction of 'green'[49] packaging in some Thai supermarkets and ready-to-eat convenience products show that developing country values may follow a similar trajectory to those in the EU - and elsewhere internationally - as their economies develop. In addition, traditional presentations of seafood (such as live fish) are still important. Asian

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[49] Such as a reduction in the use of certain types of packaging or a change to environmentally-friendly plastic packaging that is recyclable, biodegradable or compostable.

producers may then be strategically placed to benefit from new market opportunities, and in particular may gain relatively better access to market information.

Overall, varying levels of reliance on market information may transform seafood value chains in the future in ways that are not immediately evident. These developments hold serious implications for both the industry and policy makers within the EU. The EU is already highly dependent on seafood imports (see chapter 1) and future seafood security remains an important challenge. Although future demand will be determined by a complex interaction of global factors such as demographic, climate and economic changes (FAO 2012a), the opening of new markets for Asian supply will require policy changes at the EU level. These are likely to include greater investments in domestic aquaculture programmes in order to increase research in, and production of, traditional species favoured by the EU market. Also, policy support for the marketing of alternative species leading to expanded product portfolios within the EU seafood market might relieve pressure on traditional stocks and enable demand to be spread over a broader spectrum of seafood. Calls for support for EU value chain agents struggling to adapt to new trade flows that leave them marginalised may also contribute to the future political landscape. Finally, the increasing integration of markets and associated chains will bring its own and varied challenges such as the greater complexity of required market information as a result of the spread of new pathogens and diseases. Responding to such challenges will incur additional costs, not only in terms of information acquisition but also for containing such risks through increased traceability and food safety

legislation. At the same time, increased international cooperation will be required to ensure that private and public standards are not barriers to market access. The key to meeting the challenges of globalisation, without compromising the advantages that international seafood trade gives rise to, lies in developing and implementing coherent governance frameworks around these issues.

8.2 Implications of the research

Overall, the research revealed that successful integration of developing country producers into global markets is partly dependent on governance and industry development in the exporting country, and importantly, on the willingness of developed country market agents in importing countries to share knowledge and power. The generally low market orientation of the seafood value chains examined (although some chain strands are higher than others) highlights one of the problems of the market orientation approach, in that it assumes that value chain agents wish to share information in order to maximise the competitive advantage of the chain. Critically, the research has led to the conclusion that the possession of market information is one way for value chain agents, particularly those downstream, to guard knowledge and power for themselves.

EU buyers are not necessarily looking for more equal partnerships with their suppliers. Instead, EU value chain agents may be undermining overall chain competitiveness, and perhaps also restricting increased returns for Asian producers. Although the research also showed the benefits of collaboration between EU value chain agents (section 6.3), a similar mutual

interdependence is not found in relationships between EU agents and suppliers from Bangladesh and Thailand. Instead, the research highlighted how governance mechanisms in the chains and particularly coordinating relationships may be used to guard product innovation, value addition and the benefits of certification in the hands of EU value chain agents. This highlights how powerful increased knowledge can be. Expanding the research to include other chains and countries would contribute to a broader analysis that establishes whether low market orientation is a feature of seafood chains only, agro-food chains in particular or chains from developing countries in general.

Accessing market information by value chain agents can be difficult and costly (Appendix 1). Although EU value chain agents also experience these costs, developing country suppliers may be particularly disadvantaged. This may result from all or some combination of their lack of knowledge of how or where to access market information, financial barriers to entry, a lack of interpretative ability and background contextual market intelligence, and generally low skills that undermine responses to market information. Further research focusing on overcoming such barriers and blockages within seafood value chains could provide specific solutions. One solution raised during interviews was the European Market Observatory for fisheries and aquaculture products (EUMOFA), proposed by the European Commission[50]. This initiative focuses on price-setting in the EU seafood market and how value addition is transmitted in seafood marketing chains. Such schemes could be extended and adapted to provide a platform of information that would

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[50] http://ec.europa.eu/fisheries/cfp/market/market_observatory/index_en.htm

facilitate developing country access to the EU seafood market. For this to be successful, information needs to be broader than a narrow focus on prices in order to increase EU market understanding for Asian value chain agents. As section 3.1 identified, existing secondary data sources are not sufficiently disaggregated to be meaningful, so that final markets, essential to understanding consumer values, cannot be identified. Greater assistance in interpreting data and adapting value chains in light of market information is necessary from a variety of institutions that include NGOs, trade associations and governments, particularly where few incentives to alter the extent of current information dissemination within the value chains exist.

Forging direct links between suppliers in Asia and buyers in the EU is another method of encouraging EU value chain agents to be more heavily invested in the conditions of suppliers (section 7.3.2). The research showed that such investment may lead to shortened supply chains (thereby reducing the number of nodes through which information travels, improving accuracy), transfers financial and technological investment directly to producers, and increases overall chain competitiveness through value maximisation at each node. Such undertakings require investment, energy and conviction on behalf of the participating EU value chain agents - and the potential burden is reflected in there being only one example identified during the course of the research. The comparative scarcity of such schemes points to the large investments required and uncertain returns, but nonetheless might still provide an example of what can be achieved through high levels of support and investment by EU value chain agents.

The beneficiaries of proactive governance in the example were small-scale suppliers. This is perhaps because the costs of access and response to market information are relatively higher for small-scale suppliers than large suppliers. Rising levels of codification, extensive levels of traceability required along the length of the chain, and increasingly stringent mandatory and voluntary standards are likely to be easier for large-scale producers to absorb. Long market chains and complicated marketing processes increase uncertainty and risk, more so for small-scale farmers. A further reason may be that small-scale suppliers do not pose a threat to the overall power held in the chain by EU value chain agents. This means that EU value chain agents may invest proactively so long as they do not feel threatened by the recipients of the benefits. There was insufficient opportunity in the research gathering stage to focus more intently on this area. However, obtaining a more accurate overview of the extent of assistance in chains would identify key criteria for developing country participation in such projects, and determinants of success that guarantee more stable business relationships.

Further research is required on the number of projects, investments involved, beneficiaries and returns, in order that similar linkages potentially be developed in other value chains from developing countries. Similar links might increase coordination between weak and strong suppliers and contribute to private sector development assistance. The role of EU importers for such developments is likely to be critical. Importers are aware of market demands transmitted through the chain from retailers and foodservice agents, but are also aware of supplier competencies and the current abilities of producers to respond to such demands. Importers are therefore uniquely placed to transfer

relevant knowledge and technology to specific nodes. Although importers may not view such activities as in their business interests, the involvement of importers in ongoing proactive governance projects testifies to the benefits accrued through this type of investment. These could be better-supported and expanded through NGO and national government development cooperation.

The implications for broader seafood trade is that strengthened linkages may be sought in value chains, but that these are likely to be between very poor suppliers who have few opportunities to otherwise engage directly with buyers, while more competent suppliers and large processors may not need to benefit from these types of relationships. In fact, it may be medium-sized enterprises that find themselves too big for such partnerships with EU value chain agents, but too small to benefit from the economies of scale that are advantageous to large suppliers. This may result in greater incentives for medium-sized enterprises to shift supply to other Southeast Asian markets, or to where competitive advantages can be gained. Alternatively, associations of medium-sized enterprises or links between such enterprises in Asia and the EU could provide the necessary increased support through targeted assistance. Notwithstanding the limitations, large and medium-sized value chain agents in developing countries can obtain competitive advantages *relative* to smaller value chain agents within the country, or even compared to value chains from other countries. For example, large and medium-sized processors may have the resources to have more information relative to smaller players in value chains, and therefore they gain competitive advantages. Such a case was found in Thailand, where the largest processor has the skills, capital and capabilities to have established

market offices in the EU (section 5.3.2.3). Further research on firm size should be able to shed more light on what is potentially a complex matter. For instance, more important factors of competitive advantage may be the possession of a brand or status as a preferred supplier, rather than the size of the firm itself.

8.3 Conclusion

The principal finding of the research is that although increased knowledge is necessary, it is not a sufficient condition for increased value creation. Access to market information is one key to unlocking the potential of developing countries to create greater value in seafood supply chains, but the research also found that other important investments are required. These are: strengthening domestic regulatory frameworks, the sharing of market information between buyers and suppliers (with the aid of NGOs, inter-governmental organisations, trade associations and market information providers such as INFOFISH[51]), and encouraging investment by the industry in their own value chains.

A better understanding of seafood markets and an improved analysis of aquaculture value chains from Asian countries to the EU market now has the potential to lead to public and private responses that focus on the competitive advantage of the whole chain as a means to more sustainable development. The findings indicate that greater attention needs to be given to the role of the institutional framework, internal governance and relationships in value chains when examining ways for developing country suppliers to create

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[51] http://www.infofish.org/

greater value. Only when knowledge is shared and suppliers gain power, will

the market orientation of seafood value chains be improved, if not optimised.

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Appendix 1

Review of Literature on EU seafood supply chains

In order to gain a deeper understanding of consumer values attached to final products, section 3.1 of the thesis uses international trade data to map seafood flows to end markets, highlighting data limitations created by aggregated data. Appendix 1 is a supplement to section 3.1. It reviews European, national and industry-level literature on European seafood supply chains.

A1.1 European Seafood supply chains

Seafood in the EU is the result of either domestic production (aquaculture, or landings from a European or third-country fleet in a Member State), or via importation (usually by sea or air) from a third country. The majority of imports of the species under consideration from Asia are frozen and imported by sea. Each European Member State with an interest in fisheries or aquaculture collects data that have to be submitted to the EU through a standardised and harmonised process. These are generally published by national statistics offices. However, the amount of analysis generated by governments and released as analytical publications varies between the countries. This is because not all countries collect data to the same degree and not all Member States define value chain agents in the same way. Consequently, secondary data is more abundant for certain chains than others. For example, although national customs authorities are entrusted

with the registration of import and export flows and supply COMEXT[52] with harmonised data, there are gaps between national customs data and COMEXT. Although these are marginal at the aggregate level, they are more significant at the detailed product level, hampering in-depth market analysis and the identification of end-markets (Döring and Guillen 2010). In addition, much of the information suffers from similar issues of aggregation as mentioned in section 3.1 of chapter 3.

National statistical production and trade data as well as information pertaining to seafood value chains is also available through industry associations, trade reports and associated trade literature. Much of this literature relies on official government data, and the ad-hoc surveys and reviews that build on this data suffer from its inherent problems. The basis on which data is collected on seafood supply chains after the point of first sale varies from country to country. Where data exists, it tends to be categorized in very broad terms, particularly for the food sector. For example, Statistics Belgium[53] provides import data up to the method of preservation but not by any further disaggregation, while Statbank Denmark's[54] statistics on fisheries can only be found under 'Food, beverages and tobacco'. Insee[55] in France also maintains high levels of aggregation. Furthermore, domestic political changes affect the collection of data. For example, publication of statistics at a national level for Spain has been halted due to the strengthening of political autonomy of Spanish regions (Irwin and Thomas 2010).

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[52] The EC's generalised system for straoge, extaction, aggregation and dissemination of statistical data. COMEXT is used by EUROSTAT to manage Foreign Trade Statistics.
[53] http://statbel.fgov.be/en/statistics/figures/
[54] http://www.statbank.dk/statbank5a/default.asp?w=1280
[55] http://www.insee.fr/fr/themes/tableau.asp?reg_id=0&ref_id=NATSOS12301

Already then, it is clear that there are constraints to data availability and access that would usefully enable supply chains across the Member States to be consistently mapped. The following sections therefore consider available data on individual supply chain nodes in order to establish whether it is possible to follow seafood supply chains in the EU from the available literature and thereby identify consumer values associated with end markets. It will also help establish the ease of accessing information on the EU seafood market.

A1.1.1 The wholesale and distribution sectors

In general, the wholesale sector is particularly difficult to obtain accurate data on, primarily stemming from the multiplicity and duplication of functions. Value chain configurations at this level can often be complex, difficult to unravel and with overlapping channels and buyers. Certain characteristics of fish, notably its high perishability, uncertainty of supply and product heterogeneity, mean that activities traditionally undertaken by wholesalers may be carried out by others in the distribution channel. For example, bulk-breaking and assortment building can be carried out in auctions, port markets and port wholesalers, or wholesaling may be incorporated within the functional activities of processors. In addition, the small size of some wholesalers precludes coverage within official data sources (European Commission 2012a). As a result, current secondary data on the wholesale sector varies in quantity and quality from market to market. Where data exists, it tends to be characterised in very broad terms. In some instances there are no solutions to this other than to make broad aggregations

where necessary. Selected free-of-cost market price information is available through the websites of wholesale markets, particularly large and important markets such as the French central wholesale market, Rungis[56], and its Spanish equivalent, MERCASA[57], which has further information on fish product consumption by sector and presentation to 2008, but only in Spanish. The availability of information in English may be an important consideration for value chain agents wishing to access national statistical information, raising their information costs.

Different types of wholesalers supply different types of customers. For example, some wholesalers may supply in-house or contract caterers, while 'cash and carry' provide a wholesale function but without delivery. Normally, contract distributors offer only a delivery service function, delivering on behalf of the manufacturer or foodservice customer. Other wholesalers may provide transport and storage facilities and a range of support services. In retail channels it is more common for products to go direct to a retailer's regional distribution centre or direct to a store from a wholesaler. Direct delivery is mainly associated with high volume products (European Commission 2012a). Vertical channel issues such as these and their management often form the basis of competitive advantage for companies, and therefore information on this node is often difficult to obtain.

Although it is recognised that a distribution channel should be viewed as a single vertical entity, traditionally it has been seen as a series of discrete stages and data on the distribution sector in the EU is generally overlooked.

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[56] http://www.snm.franceagrimer.fr/message/1712.htm; http://www.snm.franceagrimer.fr/cgi-bin/cgiaccueil; http://www.rungisinternational.com/fr/rouge/pres_serv/contact.asp; http://www.rungismarket.com/
[57] http://www.mercasa.es/

This raises concerns about the ability to follow seafood supply chains in the EU and identify end markets for products.

A1.1.2 The processing sector

It is difficult to follow seafood through the fish-processing sector across the EU due to its heterogeneity linked to the size of companies (from family business to international companies with large processing plants), the products (depending on the species used as raw material, and processes), and the origin of the raw material (landings, imports or aquaculture). Products, either exported or imported, will often be further transformed once they have passed through the data collection point, which hinders attempts to make inferences about the final market.

Every two years, a report on the evaluation of data collected at the European level on the fish processing sector is published by the Joint Working Group on Economic Affairs (SGECA) of the Scientific, Technical and Economic Committee for Fisheries (STECF). The aim of the report is to strengthen socio-economic analysis for each Member State on aspects such as concentration, cost structures, competitiveness, vulnerabilities and dependency on domestic production. In the course of 2011, a new call for 2009 data was launched with a view to updating the data, which will enable a broadening of the scope of analysis (Döring and Guillen 2010). Discrepancies between this data and EUROSTAT data exist due to over-coverage (e.g. dormant companies were also included) and under-coverage (where only companies with a certain number of employees were considered) (Girard 2002). Small companies in the fishing and retail sectors are important and

data on a large proportion of the value chain could be lost in this way (Döring and Guillen 2010). The criteria defining a fish processor also vary between Member States and between surveys within Member States, making comparison difficult (Nautilus Consultants (UK & Ireland) et al. 2003).

Prodcom[58] provides European statistics on manufactured products. Products are identified by an 8-digit code, which corresponds to the Combined Nomenclature (HS) codes and therefore suffers from the same problems of aggregation. For example, *Prodcom* categories are 'fish, other than whole fish, fresh or chilled', which correspond to two HS categories (030270 and 030410); 'fish, other than whole fish, frozen', which correspond to 030420 and 030490 HS categories; 'dried, salted or smoked fish', which correspond to the 0305 HS category; 'preserved fish' which is equivalent to HS 1604; and 'preserved crustaceans, molluscs and other invertebrates', corresponding to HS 1605. Furthermore, it is evident that Member States have recorded trade relating to these categories in different ways. A study of the data conducted by consultants calculated an average data error of around 10% (Knezevic, Renko, and Knego 2011). The study also found major anomalies between trade data in manufactured products provided by EUROSTAT and Member State Authorities. These are inadvertently masked by the different categorisations chosen by Member State Authorities and the industry (Nautilus Consultants (UK & Ireland) et al. 2003).

The EC's trade database, Eurostat, provides 'Farm to Fork' statistics[59]. The data is helpfully presented in a pocketbook[60]. Again, most of these data

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[58] http://epp.eurostat.ec.europa.eu/portal/page/portal/prodcom/introduction
[59] http://epp.eurostat.ec.europa.eu/portal/page/portal/food/data/database
[60] http://www.eds-destatis.de/downloads/publ/KS-32-11-743-EN-N.pdf

are aggregated to the EU level, but links within the document to the applicable Eurostat dataset enable further exploration of the number of units in the EU involved in the production of fish and fish products until 2008, the number of people employed in these units and total turnover. This data can also be accessed per company.

Some countries have dedicated industry websites, which provide information on the processing node. The Fish Information Centre (FIZ)[61], a service facility of the German fish industry, holds information on the processing and wholesale sector. Given the importance of this sector in Germany, there is also a Federation of German Wholesale and International Trade website[62]. In Poland, the website of the Polish Association of Fish Processors[63] is a dedicated website but only has limited information in English. The *Office National Interprofessionel des Produits de la Mer et de l'aquaculture* (OFIMER) provides substantial information on the processing sector in France, as does the National Institute of Statistics and Economic Studies (INSEE)[64], which has up to date information on the value of turnover of the French fish processing sector in France (to January 2012). The Danish Food Processing Group[65] is part of the Danish Export Association[66] and has information on firms specialising in fish processing equipment, while the Seafish Industry Authority in the UK (Seafish) conducts data collection on behalf of the UK government in the form of a census survey for all UK processors followed by a financial sample survey. While each of these

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[61] http://www.fischinfo.de/
[62] http://www.bga-online.de/index.php
[63] http://www.pspr.pl/przetworstwo_ryb/?lang=en
[64] http://www.insee.fr/en/default.asp
[65] http://www.danishexporters.dk/scripts/danishexporters/EO_foodProcessing.asp
[66] http://www.dk-export.dk/uk-1

organisations provides data on changing procurement, size, turnover and number of employees involved in processing, information on the type of processing undertaken and supply chains sold to is missing. This could be because the sector is experiencing very high competition from extra-EU imported products as well as intra-EU trade (Döring & Guillen 2010). Therefore, such information could be deliberately concealed in order to ensure competitive advantages.

A1.1.3 The retail sector

Data availability on different aspects of supply chains is dependent to some extent on national supply chain norms, ranging from the highly-centralised approach of the Anglo-Saxon and Benelux retailers, to decentralised approaches preferred by France and Mediterranean countries[67]. The approach taken by a Member State and industry towards data collection and analysis reflects these structures. Some governments provide information on retail formats, consumer profiling and consumer awareness surveys, such as the Spanish Ministry of Agriculture, Fisheries and Food (MAPA)[68] and the Danish Directorate of Fisheries[69]. However, information on downstream nodes of the value chain is often more easily available in industry reports such as those produced by the Global Agriculture Information Network (GAIN). However, in these reports, data on the 'Benelux' (Belgium, Netherlands, Luxembourg) countries are often grouped together, making it difficult to establish industry trends within each of the countries. Some industry reviews

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[67] www.euromonitor.com.
[68] http://www.marm.es/es/
[69] http://www.fd.fvm.dk/external_trade_statistics.aspx?ID=24930

are also only available at a cost, or in the national language. For example, the *Nederlands Visbureau* has information and statistics on imports and exports, consumer behaviour and retail chains, but this service is only available in Dutch[70]. Other sources of information include market research outlets[71] and *Euromonitor*[72] (which entail payments).

The Trade press such as *The Grocer*[73] and Eurofish Magazine (GAIN 2010) also provide information on the European food and drink retailing sector as well as prices. Dedicated industry websites may often be useful additional sources of information[74]. Market reports and consumer research is also available through the Confederation of German Retail[75] website and the Federal Ministry of Food, Agriculture and Consumer Protection[76]. The Fisch-Informationszentrum[77] in Germany provides a review of fish consumption and some information on seafood sales and distribution by channel, although it is not particularly extensive. More recent information in Italy is available at the Instituto de Servizi per il Mercato Agricolo Alimentare[78], but it is only in Italian. *Globefish* provides price reports by product form and grading. Data on the country from which the prices originate, the price reference and the origin of the original raw material are available at a cost of €100[79].

Secondary data relating to non-grocery retail formats such as specialist fishmongers is often even more limited. Such outlets may be a subcategory

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[70] http://www.visbureau.nl/navigatie_bovenaan/home/
[71] www.marketresearch.com
[72] www.euromonitor.com.
[73] http://www.thegrocer.co.uk/
[74] www.igd.com
[75] http://www.einzelhandel.de/pb/site/hde/node/1243/Lde/index.html
[76] http://www.bmelv.de/EN/Homepage/homepage_node.html
[77] www.fischinfo.de
[78] http://www.ismea.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/1
[79] http://www.globefish.org/price-reports.html

within broad food, drink and tobacco groupings in national statistical sources, which concentrate on the grocery sector and not single unit independent retailers. Commodity data can be obtained on basic indicators such as the number of businesses and turnover and may be disaggregated further by size, but tracing the flows of a particular species or category of fish or group of fish products through detailed retail channels is almost impossible. Furthermore, the availability of commercially sensitive data on product lines, pricing, profit margins and sourcing is much more restricted and highly selective where it does exist, posing time and resource costs for potential exporters from Bangladesh and Thailand. For example, *Statistics Denmark*[80] hosts information on market channels that includes grocers, all-night shops, supermarkets and discount stores, but not specialist retailers. In actual fact, fishmongers are an important part of the European shopping tradition, particularly in countries like France. It is therefore unsurprising that countries with more comprehensive data on supply chains that include data on segmentation of seafood sales by distribution circuit and volume as well as foodservice channels include France[81].

A1.1.4 The foodservice sector

Foodservice is the term commonly used to describe the provision of meals out of the home, traditionally known as 'catering'. Developments in the sector have led to the use of the terms HORECA (Hotels, Restaurants, Catering) and 'cost sector'. The cost sector generally refers to public procurement (such as for schools, hospitals and prisons). In practice, these

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[80] http://www.Statbank.dk/DETA2007
[81] www.ofimer.fr

lines are blurring as there is a growing trend for retail businesses to adapt their offers to meet the needs of this market and food retailers have responded by providing their own forms of Home Meal Replacements (HMR). Also, major multiple retailers are developing stores resembling cafés and supplying food products for consumption in the home such as pizzas, hot cooked meals and branded coffee and confectionary. A separation between the cost and profit sector is also blurred through the provision of food to the public sector, which is increasingly being served by contract commercial catering. Such contract caterers may be referred to as Foodservice Management Companies, such as Sodexho, who provide other services in addition to catering such as cleaning, security, maintenance and gardening (Fulponi 2007).

Available data on the foodservice sector is marginal at best. Some basic information on how the foodservice sector is supplied through the use of regional wholesalers[82], the number of outlets and consumer spending relative to retail spending exists[83]. Overviews of the sector in the EU are available from *Datamonitor* with projections to 2014, but at a cost of USD 495[84]. Charging for such information could pose entry barriers from the perspective of Asian exporters wishing to access such information.

Overall, the literature on available data highlights the complexities of following seafood supply chains in the EU. Data is disaggregated, not always easily available and highly varied at different nodes. It is therefore virtually impossible to use secondary data sources to identify end markets. This not

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[82] Brunsø 2007
[83] Irish Food Board 2008
[84] http://www.datamonitor.com/store/Product/toc.aspx?productId=DBCM9133.

only has an impact on the generation of market information in chains, but also on data collection for fieldwork in order to fill these gaps.

Appendix 2

The Institutional Framework for Farmed Seafood Trade

Appendix 2 presents important agents and institutions in seafood value chains. This Appendix first reviews the international institutional framework shaping international seafood trade, before reviewing the literature available on the Bangladesh and Thai domestic institutional frameworks.

A2.1 The International Institutional Framework

At the global level, the WTO is the most important trade regulating body, particularly for the setting of trade tariffs. Trade tariffs vary significantly depending on the type of product. Value-added processed fishery products from developing countries are subject to higher tariff rates than unprocessed seafood. For example, more than half of Thai exports receive preferential treatment, either through Most Favoured Nation (MFN) Agreements or partial or full tariff elimination as part of the EU's Generalised Scheme of Preferences (GSP). The GSP is an exemption of trade rules allowing WTO member countries to lower tariffs for less developed countries in order to create a level playing field for their exports. The philosophy is to take away advantages from countries that are very competitive in particular exports so that the benefits are steered to those developing countries that still need preferential access to the EU market (Delegation of the EU to Thailand 2011). As a result, tariffs for seafood exports from Thailand fell to 4.2% for

unprocessed products, while tariff rates for processed products dropped from 20% to 7%. Thailand is the second largest GSP beneficiary among the EU's trade partners, behind India (Delegation of the EU to Thailand 2011). Free Trade Agreements (FTA) between ASEAN countries and the EU were begun in 2007 but paused in 2009 as insufficient progress was made. Thailand has expressed interest in engaging in a bilateral FTA negotiation with the EU, which would then take precedence over GSP arrangements (Delegation of the EU to Thailand 2011).

Bangladesh benefits from the most preferential trade arrangement granted unilaterally by the EU to Least Developed Countries (LDCs), known as the Everything But Arms (EBA) initiative. This gives duty-free and quota-free access for all products from Bangladesh for an indefinite period of time (Delegation of the European Union to Bangladesh 2012). This is potentially one of the reasons why the EU has become the most important seafood market for shrimp and prawn from Bangladesh.

At the global level there are also non-tariff measures that have an impact on trade flows. The most important are the Sanitary and Phytosanitary (SPS) Agreement and the Technical Barriers to Trade (TBT) Agreement. The SPS Agreement allows countries to take measures to protect human, animal or plant life or health as long as these do not discriminate between countries and are not a disguised trade restriction. The TBT Agreement aims to ensure that product specifications and testing procedures do not create unnecessary obstacles to trade. Both Agreements promote the use of international standards to increase coherence and reduce export hurdles. These standards reflect market concerns for food safety and quality. There are also specific

measures in international trade regulations on safeguards and anti-dumping measures to provide Members with recourse when their domestic industries are threatened by cheap imports from other Member States. While developed countries are the primary importers of fishery products, they are also the countries that impose most anti-dumping measures and safeguards, which attract considerable criticism from developing countries (ICTSD 2008). Anti-dumping measures are highly contentious and several tensions have led to the use of the WTO's Dispute Settlement Mechanism. The WTO also attempts to control potentially negative by-products of customs rules through an Agreement on Customs Valuations, limits excessive requirements for import documentation through its Import Licensing Agreement, and defines rules of origin in order to assist traceability, assess compliance and other purposes.

An important function of the WTO is to set guidelines for the acceptable use of standards. The Codex Alimentarius has become the global reference point for those involved in international food trade. It both formulates and harmonises food standards and ensures their global implementation. Hazard Analysis and Critical Control Points (HACCP) is the method chosen by Codex Alimentarius for ensuring the safety of a wide variety of foods provided on a commercial scale, including seafood. It establishes target and acceptable hazard levels through the food handling process and is the minimum standard for export in both Bangladesh and Thai seafood production.

Regional trade agreements have proliferated over the past several decades and now play a key role in the management and expansion of trade liberalisation for food. The EU hosts one of the largest regional trade

agreements in the world. Imports of fish and fishery products into the EU are authorised by the EC, based on the recognition by the EC of the CA of the non-EU country and their system of official certification. To be eligible to export to the EU, the country must be on a positive list of eligible countries and the CA (usually the government) has responsibility for official control throughout the production chains. The legislation within the exporting country must also be harmonised with that of the EU[85]. This requires compliance with the EU hygiene package including general hygiene requirements and HACCP[86], foods of animal origin[87], official controls to verify compliance with food and feed law[88], animal health and welfare, potable water[89], food additives[90], labeling and consumer information[91], EU food law[92], and transitional arrangements[93]. Certain specific requirements must be met with respect to products of aquaculture origin such as a control plan for heavy metals, contaminants, residues from pesticides and veterinary drugs. Consignments can only be exported from approved establishments in listed countries and the national CA must perform official controls that comply with EU regulations 882/2004; 854/2004 including organoleptic examinations (Regulation 2406/96); freshness indicators (Regulation 2074/2005); microbiological criteria (Regulation 2073/2005); residues of veterinary drugs (Directive 96/23, Decision 2002/657) and contaminants (Regulation 1881/2006 on maximum levels, Regulation 333/2007 on heavy metals,

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[85] In accordance with Article 11(4)(a)(i) of Regulation (EC) No 854/2004
[86] Regulation 852/3004 (subsequent amendments include EC No 2010/2008, EC No 219/2009)
[87] Regulation 853/2004 and subsequent amendments
[88] Regulation 882/2004 and subsequent amendments including animal health and welfare
[89] Directive 98/83
[90] Directives 89/107 and 95/2
[91] Directive 2000/13, Regulations 104/2000, 2065/2001
[92] Regulation 178/2002
[93] Regulation 2076/2005 modified by Regulation 479/2007

1883/2006 on dioxins and PCBs). Consignments are then subject to a systematic documentary, identity and physical check at the Border Inspection Post (BIP) in the EU, depending on the risk profile of the product and on results of previous checks. In general, the EU market's monitoring process is more rigid than other markets, putting more emphasis on composition and residue.

Import rules for seafood products are harmonised across all EU Member States. Import rules for fishery products and shellfish seek to guarantee that all imports fulfill the same high standards as products from EU Member States with respect to hygiene and consumer safety. Imports must come from a positive list of eligible countries. The CA must be able to ensure credible inspection and controls throughout the production chain for hygiene, public health and also animal health for aquaculture products. Exports must come from approved establishments and the CA provides the necessary guarantees to carry out regular inspections and take corrective action if necessary, subject to a border check (European Commission 2007b). The EC also provides rules on various other marketing and trading standards including common marketing standards, which are essential for a single internal market based on uniform commercial characteristics, and regulations controlling the use of all animal products that are not intended for human consumption. New legislation at the end of 2011 on providing information to consumers changed existing requirements on food labelling considerably. The example provided in Figure A2.1, obtained from a German packaging company, shows the information that is now available on packs. There is a three-year transition period for new labelling requirements (apart from nutrition

requirements, which will come into force on 1 January 2014). Date of first freezing will be mandatory for all unprocessed fish products and water additions above 5% must be declared as an ingredient.

Figure A2.1 An example of labeling requirements on packaging, Germany

Alongside regulations for international trade, there are also alternative, voluntary and market-based approaches that reflect consumer preferences in consuming countries. Over the past decade there has been a proliferation of private, national and supranational schemes designed to provide seafood buyers and consumers with more and better information on production processes. They may be guaranteed by internal controls or certified by an

independent organisation and marketed using a label. Voluntary standards cover areas such as good management practices, food safety, food quality, the environment, social responsibility, fair trade and animal welfare. Standards may be implemented by national governments or international/regional governing bodies, or by the private sector and NGOs.

Public voluntary standards may assist with the sustainability of the fisheries and aquaculture sectors, such as the FAO Code of Conduct for Responsible Fisheries and FAO Guidelines for the labelling of aquaculture, providing guidance on the development, organisation and implementation of credible aquaculture certification schemes. The World Organisation of Animal Health (OIE) publishes health standards applicable to animals and animal products; interactions between culture and capture fisheries are regulated in part through the United Nations Convention on the Law of the SEA (UNCLOS); biological diversity and the trans-boundary movements of aquatic organisms are safeguarded by the Convention on Biological Diversity (CBD), while the International Standards Organisation (ISO) has provided international standardisation in the area of quality and environmental management processes. Standards for fisheries and aquaculture, with a particular focus on traceability, are still under development. In 1999 the FAO in partnership with NACA, the World Bank and WWF formed a Consortium on Shrimp Farming and the Environment in order to identify issues around shrimp farming and to advise on better management of the sector. The United Nations Environment Programme (UNEP) joined the consortium in 2003 and this led to the development of the International Principles for Responsible

Shrimp Farming, which address technical, environmental and socio-economic sustainability issues in the shrimp-farming sector.

Private voluntary standards and their accompanying certification schemes have evolved considerably over the past decade, accompanied by a growth in the number of institutions and agents setting standards and assessing conformity, standard-setting bodies, auditors, certification and accreditation agencies. Private standards assist with production differentiation through branding and labelling. However, involvement is controversial as positive impacts are not guaranteed and sometimes not assessed (Ponte et al. 2011). Examples applicable to the aquaculture sector include the Soil Association (UK), which certifies shrimp producers abroad, Agriculture Biologique (AB, France), a state-owned logo for organic products; BioSuisse (Switzerland), covering the farming, processing and marketing of organic products; KRAV (Sweden), organic aquaculture production; GlobalGAP (Retail), voluntary standards for producers and processors; and the Global Food Safety Initiative (retail, manufacturing, food service, service providers). NGOs have also introduced their own schemes, such as: the Organic Guarantee System by the International Federation of Organic Agriculture Movements (IFOAM); Naturland, a German NGO that certifies organic aquaculture to its standards; the Ethical Trading Initiative (ETI) that promotes ethical consumerism; Fairtrade Labelling Organisations International (FLO); the RSPCA's Freedom Food farm assurance and farm labelling scheme for welfare standards; the Seafood Watch system, where farmed fish are marked according to a traffic light system that highlights their desirability; and WWF's Aquaculture Stewardship Council certification.

Retailers and brand manufacturers generally also have their own voluntary standards that are key elements of their internal quality and sustainability schemes. These may build on NGO 'red-lists' that record banned species, or traffic light systems (highlighting acceptable species under a green light, species that should be eaten in moderation under an amber light, and species that should be avoided under red), or may be justified as part of the company's policy on sustainability, such as Carrefour's Quality Line or Findus Group's *Fish For Life* programme. There is no law that requires suppliers to meet these voluntary standards. However, codes and practices are increasingly equated with performance and quality. As a result, costs are raised for developing country producers due to more demanding standards, an increasing number of aspects covered by them, more sophisticated management and traceability systems, a multiplication of standards that cover similar ground and a lack of international standardisation.

Finally, private and international voluntary standards evident in processing companies in Asia include HAL-Q (permissible under Islamic law), Good Management Practices (GMP, general principles to be observed during manufacturing), British Retail Consortium (BRC, to administer the food supply chain), International Food Standard (IFS, a European standard for retail food products), Safe Quality Food (SQF, an international standard for food safety management systems), GlobalGAP for integrated farm assurance standards, and Best Aquaculture Practices (BAP, integrated farm-raised seafood standard). The choice of scheme will depend on the local buyer and exporter.

A2.2. The Domestic Institutional Framework

A2.2.1 Bangladesh

The rules that constitute the domestic regulatory framework are of critical importance to Bangladesh due to its high reliance on exported shrimp for GDP earnings. Declining foreign aid also means that Bangladesh will likely rely increasingly on trade for the generation of foreign exchange in the future (Khatun 2004).

Freshwater prawn farming has developed as an indigenous technology in Bangladesh with no planning and little support or assistance from any outside sources, including the government. The Department of Fisheries in Bangladesh and NGOs were slow to respond to the opportunities of the sector. However, donor-funded projects have provided technical assistance to small-scale farmers (USAID Bangladesh 2006). In contrast, shrimp culture in Bangladesh initially developed with the assistance of international institutions. The World Bank first lent its support as early as 1985 when it extended a loan to the Government of Bangladesh with the aim of intensifying existing shrimp production and introducing some environmental projects (USAID Bangladesh 2006). Since then, the Food and Agriculture Organisation of the United Nations (FAO) has played a large role in providing technical assistance, the transfer of low-cost technologies for adding value, matching buyers and sellers to facilitate market diversification, and the development of product standards, regulations and fish inspection schemes in response to externalities in shrimp production (Cato and Subasinge 2003). The government has provided support in the form of tax breaks and other financial incentives that have served as subsidies to the sector (EJF 2004). Provisions

such as zero-tariff access to imports, fiscal incentives for direct and deemed exports, preferential loan rates, income tax rebates, a nine-year tax holiday, subsidised credit, leasing of land on favourable terms and institutional support for setting up downstream factories and no licensing or registration fees for shrimp farmers, fry collectors or small traders have all provided huge stimuli for private investments in shrimp culture (EJF 2004).

The domestic institutional framework for shrimp and prawn culture within Bangladesh itself is extensive due to the large number of ministries, institutions and directorates involved. Table A2.1 presents a summary of the breadth of involvement. According to Khatun (Khatun 2004), the current regulatory framework for shrimp production is weak and biased towards the educated elites, meaning the capacity of the Department of Fisheries to oversee and coordinate shrimp sector development is limited. Certainly, the number of public administration organisations, private bodies and association standards regulating shrimp culture may increase organisational problems.

Table A2.1 Responsible Ministries for Aquaculture in Bangladesh

Ministry/Institutions	Activities
Ministry of Fisheries and Livestock	
Directorate of Fisheries	Administration, Management, Development, Extension and Training
Bangladesh Fisheries Development Corporation	Training, Production and Development
Fisheries Research Institute	Research and Training
Ministry of Local Government, Rural Development and Cooperative	
Rural Development Board	Fisheries component of integrated rural development
Directorate of Cooperatives	Registration and Supervision of fisheries cooperatives
Bangladesh Jatioy Matshyajibi Samabaya	Development of fisheries cooperative, Operation of ice plant and import of gear
Bangladesh Samabaya Bank Ltd.	Financing fisheries cooperatives
Upazilla Administration	Management of water bodies less than 20 ha.
Ministry of Land	
Land Administration and Land Reform Division	Leasing of public water bodies
Ministry of Irrigation, Water Management and Flood Control	
Bangladesh Water Development Board	Leasing of reservoir and irrigation canals
Ministry of Commerce	
Department of Commerce	Leasing of fish processing plant
Export Promotion Bureau	Export promotion of shrimp, fish and fish products
Ministry of Planning	
Fisheries Section	Planning and overall coordination of all development activities related to fisheries

Source: (Khatun 2004)

The Bangladesh government has introduced regulatory requirements for processing firms, including an Initial Environmental Examination (IEE) before they can begin operations. Processors are also required to submit an effluent treatment plan and environmental management plan to the Department of Environment in order to obtain an Environmental Clearance Certificate (ECC). In order to export shrimp a quality control license is

required (Khatun 2004) and a health certificate must accompany imports to the EU (Nazmul Alam and Pokrant 2009).

In the past, Bangladesh shrimp exports have suffered heavy financial losses due to detention and rejection on the basis of poor sanitary conditions. In 1996 the FAO assisted the preparation of a fish safety and quality control programme for Bangladesh shrimp and fish plants based on HACCP. The programme provided training in HACCP procedures to both the public and private sectors and informed the government about import requirements. A parallel Common Fund for Commodities/FAO project by the Intergovernmental Organisation for Marketing Information and Technical Advisory Services for Fishery Products in the Asia Pacific Region (INFOFISH) focused on the export promotion of value-added products and sustainable development, including industry training and the development of export opportunities (Cato and Subasinge 2003). Nevertheless, it was not enough to prevent a ban imposed by the EU on Bangladesh shrimp imports in 1997. The largest problem was raw material contamination. Since then, the Bangladesh government has supported upgrades to comply with HACCP quality standards and regulations (Nazmul Alam and Pokrant 2009) as well as numerous other third-party standards and certification schemes (Table A2.2). However, nearly 100 consignments sent to the EU were put under a Rapid Alert notice over a period of four years and the EU returned 60 shipments of frozen shrimp between 2005 and June 2009. Consequently, the EC introduced a mandatory analytical test of 100% of seafood exports from Bangladesh destined for import to the EU. However, in 2009 there was a significant increase in the number of Rapid Alerts (RASFFs) (54) relating to prawn and in June of that

year, Bangladesh voluntarily suspended the export of fresh water prawn to the EU market for six months. To meet EU import requirements, the government strengthened its role in food safety, quality and hygiene regulations throughout the shrimp supply chain and incorporated the HACCP approach into its own regulatory framework. The Department of Fisheries laboratories were also upgraded with qualified and experienced manpower and new equipment. Laboratory capacity was strengthened, incentives were provided to upgrade processing factories (USD 75 000 to each processing plant) and an interest free loan was provided towards the cost of upgrading and implementing quality management systems. Processors also upgraded and renovated facilities, technology and equipment and implemented Good Manufacturing Practice (GMP), Standard Sanitation Operating Practice (SSOP), Standard Operating Practice (SOP) and HACCP. Duty-free imports for machinery assisted firms in introducing higher-value products. The Department of Fisheries also organised training courses for processing plant personnel regarding HACCP, hygiene and sanitation, standards and quality control aspects (Nazmul Alam and Pokrant 2009). Despite these efforts, from 2010 onwards the EC made it mandatory for the Member States of the EU to undertake specific analytical tests on at least 20% of seafood consignments from Bangladesh. It is likely that total traceability systems will be required to identify the sources of contaminants, incurring costs along the length of the value chain.

Table A2.2 Third-party standards and certification schemes in the Bangladesh Value Chain

Value Chain	Available Audits
Feed Manufacturing	FAMI-QS, GMP+, EFISC, GlobalG.A.P.
Farming	GlobalG.A.P. Organic farming, Integrated farming, SQF 1000, Responsible aquaculture
Manufacturing	ISO/TS 22002-1, FSSC 22000, BRC Food & Packaging, IFS, EN 15 593, Suppliers' audit, performance evaluation, SQF 2000
Logistics and Trade	BRC Storage & Distribution, IFS Logistics/Broker, FMP+, Service Certification, Pre-Shipment Inspection
Retail	BRC Storage & Distribution, IFS Logistics, Service certification, Supply Chain Inspection, Suppliers' audit, Hygiene inspection/audit
Food Service	Hygiene inspection/audit, Service certification, Supply chain certification, performance evaluation
All sectors	ISO 22000, HACCP, ISO 9001, ISO 14001, OHSAS 18001, SA 8000, Product certification and inspection, Chain of Custody certification, ISO 22005, International Trade Inspection

Source: (FRA 1, 2011)

Freshwater prawn farming in Bangladesh has not been associated with the negative environmental consequences for which marine shrimp production has received so much criticism. However, concerns do remain about the long-term environmental sustainability of pond construction, wild post-larvae collection and over-harvesting of snails for use as prawn feed. In addition, the disposal of large quantities of prawn shells has blocked canals (Ahmed, Demaine, and Muir 2008).

Finally, the role of shrimp as an export earner coupled with its highly publicised food safety failings and environmental impacts have resulted in an extensive role for NGOs in the institutional context in Bangladesh. A network of diverse international environmental groups contribute towards the latter, such as the Aquaculture Certification Council (ACC), the Environmental

Justice Foundation (EJF), the Global Aquaculture Alliance (GAA) and WWF, in addition to local NGOs such as the Coastal Development Partnership (CDP), the Centre for Policy Dialogue (CPD), the Bangladesh Shrimp and Fish Foundation (BSFF) and the Bangladesh Shrimp Farmers Association (BSFA).

A2.2.2 Thailand

Research centres, overseas development agencies, government departments, the industry and NGOs have contributed to the institutional context surrounding aquaculture in Thailand. Official encouragement to expand shrimp aquaculture dates from 1972 when the Thai government began to offer financial assistance for production and the Department of Fisheries adopted a policy of promoting coastal aquaculture by encouraging farmers to upgrade their farming methods (Goss, Burch, and Rickson 2000). Alongside this, support from Asian Development Bank funding and a joint venture between the CP Group and the Japanese company Mitsubishi employing Taiwanese technicians all supported the sector and the introduction of shrimp technology (Goss, Burch, and Rickson 2000). As mentioned in chapter 3, the CP Group dominates the industry and shapes many of the organisational aspects of production.

The Department of Fisheries (DOF) has pioneered and disseminated a number of techniques that have been widely adopted, introduced new strains and species of fish and provided support, training and extension to aquaculture producers. DOF continues to play an important and ongoing role in aquaculture production in Thailand. The government also sets insurance

prices by considering the costs of production, transport, export prices, risk factors from exchange rates, fuel costs and farmers' profits.

DOF implemented a voluntary HACCP fish inspection programme in 1991 in order to improve food safety, which became mandatory 5 years later. Today, all processors under DOF approval implement about 90% of HACCP procedures (Yamprayoon and Sukhumparnich 2010). DOF has provided procedure and policy manuals and also monitors finished products from approved processors to check product quality, safety and compliance with DOF criteria. Health certificates required by most importing countries are issued by DOF to approved processors based on plant performance and product compliance history (Yamprayoon and Sukhumparnich 2010).

The importance of shrimp to Thailand's economy has been overshadowed by persistent and growing awareness of social and environmental impacts associated with shrimp farming. Shrimp farming is a highly controversial activity at local, national and global levels, and there is growing uncertainty over its long-term sustainability. Controversy over shrimp farming development is particularly acute in Thailand: both inland and coastal aquaculture attracted severe criticism for their environmental impact, ranging from water quality to seepage, degrading paddy fields, nitrogen and phosphorous pollutants, and the presence of antibiotics, among others. Farm failures began to increase during the 1990s as declining yields and disease outbreaks emerged. Up to 80% of operations in some areas were abandoned within a few years (Belton and Little 2008). According to the National Economic and Social Development Board, 640 000 acres of the country's 960 000 acres of mangrove forests have been destroyed by waste water from

shrimp farms and about 24% of shrimp farms are abandoned after a period of 2-4 years.

Various standard and certification schemes have been introduced to the shrimp industry in an attempt to rectify some of these challenges and have brought about a transformation in shrimp trade in general. Standards vary in intent and may include food safety, food quality control, environmental management, social responsibility and animal welfare. It is now compulsory that all seafood processors and exporters implement the Thai Code of Conduct (CoC) and GAP (Good Aquaculture Practices). Both programs stress good sanitary practices and a safe consumer product, free of chemicals and antibiotic residues. GAP certification is valid for two years. When a plant processes or buys the CoC shrimp from a CoC distributor and CoC farm, the plant operator can apply labels to indicate a CoC shrimp product. The CoC certificates issued to operators and the CoC label are valid for 1 year. During the year, DOF performs random audits twice and the operator can apply for a new certificate after the existing one has expired. For the farm certificate there are 3 levels of validity: 6 months, 1 year and 2 years, depending on the categorisation as fair, good and very good. CoC is considered more difficult to achieve as it involves environmental issues and social responsibilities. Currently, 16 500 Thai farms are GAP (Good Aquaculture Practice) certified and 320 are CoC certified. The number of registered farms in 2010 was 33,500 (Information and Communication Technology Center 2011).

Certification processes start from hatcheries and cover grow-out farms, chemical control, feed factory and feed quality control, monitoring of drug residues and water qualities around the cultivation area. Downstream

processes eligible for certification include standards on sanitation, post-harvest handling, transportation, standards for cold storage and packing. In the shrimp value chain, GAP certification is applicable to the hatchery and nursery, farming, collector/pre-processor and processor nodes. Movement documents and fry movement documents link different stages of the chain where the product changes hands in order to ensure traceability (Uddin 2008).

There are a number of concerns surrounding the content and methods of certification. The financial requirements of certification are a cause for concern for shrimp producers, in particular for small-scale farmers whose technical and financial capabilities may not be sufficient to meet certification requirements. In order to sustain their business and prolong livelihoods, shrimp stakeholders in Thailand, especially processors and farmers, are now under pressure to adapt their production systems and pond management practices to comply with different certification requirements. A major concern is that while farmers and processors invest in upgrading facilities, there are no clear mechanisms to influence price-setting policies of certified shrimp for those who must carry the burden of higher production costs. Nor is there a system to fairly distribute benefits to different stakeholders throughout the shrimp supply chains. In many cases, even the development of certification criteria involves little or no participation from stakeholders, particularly at the farm level (Leepaisomboon et al. 2009). Furthermore, this may prove to be the tip of the iceberg with regards to certification. Shrimp exporters and processors who run cold storage facilities now have to inform the TFFA about where they want to buy shrimp in order to conform to the requirements for carbon footprint labels from the EU. Carbon miles may prove to be part of the

'next phase' of standards and certification, providing further burdens for value chain agents.

Despite the extent of environmental certification for shrimp, there are no certification programmes developed specifically either for prawn farming or freshwater aquaculture. The Good Aquaculture Practice (GAP) certification is most commonly applied to prawn operations nationwide and is issued at the farm level for two years.

Overall, the institutional framework for international farmed seafood trade is complex at both the international and domestic levels, exerting substantial demands on export value chains.

Appendix 3

Supplementary Information on Seafood Value Chains in Bangladesh and Thailand

The purpose of this Appendix is to review the literature on shrimp and prawn production in Bangladesh and shrimp and tilapia production in Thailand. This supplementary information assists with contextualising the analysis.

A3.1 Bangladesh

Bangladesh enjoys an advantageous natural setting for prawn and shrimp culture. Two regions in particular (Chittagong-Cox's Bazar and Khulna-Shatkira-Bagerhat) account for approximately 95% of the total area dedicated to shrimp farming (USAID Bangladesh 2006). Freshwater prawn cultivation first developed in the mid-1980s in rice fields and low-lying agricultural land. Early innovators tended to be large and medium-sized farmers although prawn farms are typically smaller than farms in the brackish water shrimp sector (0.28 hectares (ha) on average compared to 4.0 ha for shrimp (Ahmed, Demaine, and Muir 2008) although estimates vary. The variation in farm size is also considerable, ranging from small subsistence farms of 0.02 ha to farms with more than 90 ha of ponds (Gordon et al. 2008). Growing markets have resulted in the rapid expansion of shrimp cultivation and export over the last two decades. Between 1983 and 2003 the volume of shrimp and prawn cultivation increased more than 14 times while over the same period the area

of ponds dedicated to shrimp and prawn production more than tripled (USAID Bangladesh 2006). There were approximately 150,000 farms producing shrimp and prawn in Bangladesh in 2005, occupying 203,071 ha (USAID Bangladesh, 2006).

There are two main types of prawn farming systems in Bangladesh: ponds and gher (polyculture) (Table A3.1). Around 71% of farmers are involved in gher systems. The combination of prawn, fish and rice cultivation in gher systems give particularly good returns: annual gross revenues from prawn production average 69% of total revenue while fish and rice contribute 14% and 17% respectively (Ahmed, Demaine, and Muir 2008). Although farming is still traditional and extensive by nature, around 20% of farmers practice improved methods where prawns are cultivated semi-intensively (Ahmed, Demaine, and Muir 2008).

Table A3.1 Overview of shrimp and prawn production in Bangladesh

Production aspect	Black Tiger Shrimp (Panaeus monodon)	Freshwater Prawn / Giant River Prawn (Macrobrachium rosenbergii, also M. Dacqueti)
Local Name	Golda	Bagda
Water System	Brackish water	Freshwater
Production area	Mainly Chittagong-Cox's Bazar and Khulna-Satkhira- Bagerhat	Mainly southwest Bangladesh, Mymensingh, Jessore
Production system	Mainly with whitefish, although some farmers may also stock bagda with golda during the monsoon season when salinity is lower	Mainly gher system: polyculture of fish in the rainy season, rice in the dry season, and vegetables and fruits grown on the dykes year-round. In most areas of Bagerhat, farmers grow bagda from March until July/August
Culture practices	Often with whitefish	Prawn monoculture (in practice this is limited as most prawn is grown with finfish); Prawn polyculture with fish and sometimes shrimp; Prawn in paddy fields along with and after rice harvesting; Integrated farming with vegetables, prawns and fish
Seed	Hatchery PL from Cox's Bazar (brood stock come from the deep sea); possibility to have screened PL	Wild PL (majority), hatchery PL and some hatchery PL from India, Locally traded
Feed	Few feed inputs	Snail meal and homemade mix; commercial feed

Source: Key Informant Interviews

Around 20% of farms are managed by tenant farmers (USAID Bangladesh 2006). For shrimp farmers, seed and labour together represent on average almost 90% of total expenditure (Gordon et al. 2008). 74% of the annual costs of prawn production are attributed to variable costs such as seed, feed, fertilizer and labour, while the rest are fixed costs (depreciation, land use and interest on operating capital etc.) (Ahmed, Demaine, and Muir 2008). Around 600,000 workers are employed on shrimp and prawn farms

and many of these workers are unremunerated family members while others are hired for temporary or seasonal work (USAID Bangladesh 2006). The costs involved are mostly beyond the capacities of small-scale farmers and finance comes mainly from a broad mix of personal and informal sources: some farmers primarily fund operations by disposing of household assets such as cattle while others are heavily indebted to traders and middlemen. Access to credit is considered to be one of the important factors influencing prawn production (Ahmed, Demaine, and Muir 2008). Most shrimp farmers cannot buy shrimp larvae with their own money so they borrow it from middlemen. Faria offer conditional loans to the farmers as well as other equipment and buy shrimp from them at a price they determine (USAID Bangladesh 2006). Faria fix the price based on grades of shrimp produced and the number per unit of weight. However, as there are few accurate measuring devices to assess size and weight, significant power rests with the faria (USAID Bangladesh 2006). Consequently, these middlemen play a pivotal role in injecting credit into the chain and exerting control over sale prices and margins (Islam 2008). At the same time, middlemen may have to resort to loans themselves in lean times (USAID Bangladesh 2006).

Adequate supply of PL is one of the major constraints for the expansion of freshwater prawn farming in Bangladesh. Catches of wild PL have declined in recent years due to overfishing, the use of destructive gear, environmental degradation and pollution. Disease is also a common and important problem (Ahmed, Demaine, and Muir 2008). Around 1 billion shrimp and prawn fry may be collected each year from natural sources (DOF Bangladesh, 2010). Farmers can also collect shrimp PL from hatcheries, but

these are generally considered to be weaker than wild fry and are therefore sold more cheaply (Khatun 2004). Estimates of the percentage of wild fry purchased by farmers vary from about 50% (USAID Bangladesh 2006) to 98% (DOF, Thailand 2007). Almost 426,000 individuals were involved in fry catching during the 2005 peak season (USAID Bangladesh 2006). Fry workers are generally poor as they are dependent on a largely open-access resource and most are landless with few assets and with low levels of education.

Until recently, farmers had two options to sell their shrimp and prawn: either through faria (middlemen) to depots (collection centers), or directly to depots themselves (to a lesser extent). In 2000, a new value chain node was added, the so-called 'chatal'. Chatals are hubs of auctioneers (aruts) facilitating the sale of shrimp and prawn to depots. Some primary processing, such as washing and deheading, may also occur in certain chatals. Depots supply prawn and shrimp to the processing plants through aratdar. Aratdar are licensed buyers with fixed premises who buy shrimp and prawn from both faria and farmers and provide short-term storage facilities that involve grading and sorting the shrimp before sale to processors.

Alongside rapid growth in production has been the expansion of processing plants; from 13 in the mid-1970s, 54 in the mid-1980s to around 130 today – although only 65 are in operation and of these 57 are approved for EU export (USAID Bangladesh 2006). Processing plants are estimated to be operating at 20-30% of full capacity due to a discontinuous supply of shrimp and prawn, the presence of export subsidies and the use of processing facilities for money laundering. This also explains why despite

rising market demand, the price of Bangladesh shrimp and prawn has been declining (Ahmed et al., 2008).

When a consignment is ready, chemical and antibiotic analysis takes place in Bangladesh by appointed quality inspectors for processors (FIQC, Fish Inspection and Quality Control service) and exporters, buyer-designated quality assurers and EU-delegated Government bodies (USAID Bangladesh 2006). Processing plants transport the shrimp and prawns to ports using refrigerated vehicles and shipping agents load the product onto ships bound for international markets. Shrimp is exported either as individually quick-frozen (IQF) or block frozen, and prawn mostly as IQF (Ahmed, Demaine, and Muir 2008).

A3.2 Thailand

Thai shrimp farming started in the early 1980s, mostly as extensive systems of polyculture production. By 1987 shrimp culture had taken off in Thailand and spread quickly along the coast. Thai rice farmers began converting their coastal fields and often mangroves to shrimp ponds. The inland culture of black tiger shrimp in coastal provinces began to expand rapidly; from 13,007 t in 1984 to 265,524 t in 1994, by utilising large areas of coastal land (FAO 2009b). The advent of low-salinity shrimp farming resulted in the establishment of marine shrimp farms in predominantly wet rice-growing areas much further from the coast, which relied on salt water drawn from the sea. However, salinisation and competition for land with agricultural users led the Thai government to eventually ban inland shrimp farming in designated freshwater areas (Miller 2005).

Farms may have nurseries attached where the postlarval shrimp are grown into juveniles on a high-protein diet. Nurseries are favoured by many farms, as it makes for better food utilisation, improves size uniformity and is a controlled environment, therefore leading to increased harvests. Semi-intensive and intensive systems of shrimp culture were made possible by the emergence of large-scale private shrimp hatcheries. Unlike extensive farms, semi-intensive farms do not rely on tides for water exchange but use pumps and a planned pond layout. Industrially-prepared shrimp feeds are added and aeration may be required to prevent oxygen depletion. Intensive farms use smaller ponds and have higher stocking densities. These ponds have to be actively managed using aeration, high rates of water exchange, specially designed diets and highly trained professionals.

Shrimp production decreased between 1994 and 1995 but rose again from 1998 after a shift from black tiger to white shrimp. Black tiger shrimp was found to be susceptible to disease, subject to 'slow growth' syndrome and there was a lack of good-quality brood stock. Today, vannamei production dominates shrimp farming in Thailand. Strict licensing arrangements by DOF ensure that only SPF (Specific Pathogen Free) vannamei shrimp PL may be legally bought and sold. SPF broodshrimp are sourced from Hawaii for this purpose. Monodon broodstock, on the other hand, are sourced from the seas around Thailand and undergo significant testing to release only healthy shrimp into production in order to keep disease to a minimum. Vannamei fry are perceived to be less fragile than monodon fry during transportation and are easier to feed, breed and market. Profits are also higher as vannamei stocking densities are higher.

Unlike integrated freshwater aquaculture, shrimp farming has become dependent on commercially manufactured feeds and is capital and management intensive. There are 42 large-scale modern feed mills in Thailand although production is dominated by 10 companies who also control feed manufacture and post-harvest marketing operations. The CP Group is the largest with 65% of the shrimp feed market (making it the largest shrimp feed producer in the world) (Goss, Burch, and Rickson 2000). CP is a Thai-owned conglomerate with a total turnover in 2005 of USD 4 billion and with 100,000 employees in 20 countries (Belton and Little 2008).

Initial processing of shrimp consists of deheading, peeling and deveining. Secondary plants convert prepared shrimp into more marketable products through cooking, packaging and other preparations (Solidarity Center 2008). Due to the extent of product innovation required in order to remain competitive, there is a large investment in R&D in shrimp processing plants. Larger processors operate multiple production lines such as crumbed, raw, frozen, value added and fresh. Processors have very strict requirements regarding cold chain-of-custody arrangements in order to guarantee quality and freshness of shrimp.

Farmed tilapia in Thailand is mainly for domestic consumption (Pupphavesa and Tokrisna 2007), but in recent years there has been a growing acceptance and consumption of both black and red tilapia in non-traditional markets such as the EU. Tilapia can be grown in ponds, cages in rivers or cages in ponds (Table A3.2). Tilapia are mainly reared semi-intensively in hapa cages secured in ponds while shrimp and sometimes prawn (which are not fed directly) may also be grown at the same time

(extensive rearing). In populations of tilapia, males grow faster and are more uniform in size than females. For this reason, the farming of monosex populations of tilapia is achieved by manual sexing, direct hormonal sex reversal, hybridisation or genetic manipulations (Gupta and Acosta 2004). The introduction of new strains and the development of techniques to manage unwanted reproduction have spurred production, and tilapia farming is likely to grow as an important source of animal protein, foreign exchange and employment opportunities in the future.

Table A3.2 Overview of shrimp and prawn production in Thailand

Production aspect	Shrimp	Tilapia
Majority Species	P. vannamei (white shrimp).	O. niloticus (black tilapia).
Minor Species	P. monodon (black tiger shrimp).	O. mossambica (red tilapia).
Location	Brackish water.	Freshwater/Brackish water.
Culture Practices	Some polyculture with tilapia.	Cages in rivers, Cages in ponds, Ponds, Polyculture with shrimp.
Seed	Mostly imported SPF (vannamei); domestic monodon production.	Domestic production.
Feed	Commercial feed.	Mix of commercial and homemade feed.
Markets	Primarily exported to the US followed by the EU.	Primarily sold domestically; US followed by the EU are the most important export markets.

Source: Key informant interviews

Red tilapia hybrids are the preferred choice of many commercial farmers in Thailand due to its reddish colour, which is favoured by consumers and resembles premium species such as sea bream and red snapper. Red tilapia hybrids are most commonly used in intensive aquaculture operations but may also have potential under low-input farming (Gupta and Acosta 2004). The increasing value of the Thai Baht in combination with growth in

domestic consumption of tilapia and reductions in supply over the past two years, have led to rising prices of tilapia in general. Until recently, large-scale farms produced mainly for export. Recently, the domestic market has proved more lucrative and large-scale farms have started selling live produce to the domestic market. Around 10,964 t of tilapia was exported between January and December 2010; 33.3% to the EU (TFFA 2011).