



# Governance of Global Value Chains in Response to Food Safety and Certification Standards: The Case of Shrimp from Vietnam

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**Summary.**— We use global value chain (GVC) theory to understand governance of Vietnam's shrimp farming industry. We describe this GVC as buyer-driven with important food safety standards imposed by governments of importing countries and new certification systems promoted by nongovernmental organizations (NGOs). Governance relations are clear between governments in importing countries and Vietnam, and between importers and NGOs. Governance relations become more fragmented further down the chain where large numbers of small-scale producers and traders operate. This fragmentation may adversely affect access to the most lucrative markets and have the unanticipated effect of marginalizing small-scale farmers and traders.  
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**Key words** — Vietnam, global value chains, shrimp, aquaculture, international trade, small-scale producers, small-scale traders

## 1. INTRODUCTION

International trade in seafood was valued at \$102 billion in 2008 with most exports flowing from the South to countries of the North (Food and Agriculture Organization [FAO], 2010b, p. 49). Continued access to Northern markets increasingly is affected by food safety and certification standards that have both governmental and nongovernmental origins. In this paper, we analyze how standards imposed by developed markets (Japan, the United States (US), and the European Union (EU)) are likely to affect governance of Vietnam's global value chain (GVC) for production and trade of pond-raised shrimp. Standards that we study here include food safety and certification systems imposed by both public and private institutions. We will argue that food safety and certification standards will differentially affect and marginalize small-scale actors as the GVC for shrimp in Vietnam becomes more industrial and therefore more easily managed and controlled to serve the needs of markets in the global North.

Vietnam has emerged as the sixth largest producer of seafood in the world (Food and Agriculture Organization [FAO], 2010a, pp. 24–26) and in 2008 was ranked fifth in the world in total exports, valued at US\$4.6 billion (FAO, 2010b, p. 15). Vietnam's seafood export revenue continued to increase sharply to US\$6.0 billion in 2011 (Ministry of Agriculture and Rural Development [MARD], 2009–12). This important global role is due primarily to aquaculture and specifically to production of penaeid shrimp (primarily *Penaeus monodon* and *Penaeus vannamei*) and pangasius catfish (*Pangasianodon hypophthalmus*). In 2008, Vietnam was the third largest aquaculture producer in the world, following only China and India (FAO, 2010a, p. 42). In this paper, our focus is on shrimp, the single largest commodity in global

seafood trade, accounting for 15% of total value (FAO, 2010b, p. 48.). More than half of global shrimp production comes from aquaculture in the tropics (FAO, 2010b, p. 49), and Vietnam ranks fourth in the world in farm-raised shrimp production, behind China, Thailand, and Indonesia (FAO, 2010a, pp. 127–136).

The relative importance of food safety standards affecting production and trade has increased because of tariff reductions resulting from World Trade Organization (WTO) negotiations (Deardorff & Stern, 1998; Maskus & Wilson, 2001). The most important tools an importing country can use to raise food safety standards are found in the 1994 Agreements on the Application of Sanitary and Phytosanitary (SPS) Measures and Technical Barriers to Trade (TBT) of the WTO. These Agreements provide countries with guidelines to regulate food

\*The authors gratefully acknowledge the financial support provided by the Norman E. Borlaug Leadership Enhancement in Agriculture Program (Borlaug LEAP) award for this study, and support from Dr. Hillary Egna, Director of AquaFish CRSP from Oregon State University, Dr. Robert Pomeroy from the University of Connecticut, the Borlaug LEAP management team of the University of California at Davis, Dr. Le Thanh Luu from Research Institute for Aquaculture No. 1, and the many people who gave support and help during the fieldwork in Vietnam. The Borlaug LEAP Program played no role in the collection, analysis, interpretation, or writing of this article, or in the decision to submit this article for publication. We also wish to acknowledge support from the WorldFish Center, the Alabama Agricultural Experiment Station at Auburn University, and The Research Council of Norway (Project Number 202374/I10, titled "Governing food in a globalising environment") in the research planning, preparation, and writing of this manuscript. Final revision accepted: January 16, 2013.

safety, health risk, and other market standards of internationally traded products. The SPS Agreement permits governments to provide stricter standards than international norms, provided that the standard regulations are based on adequate risk assessment (Wilson, 2003). An absolute prohibition of antibiotic residues such as chloramphenicol or nitrofurans in imported shrimp is one such standard and is enforced by the EU, Japan, and the US. Increased sensitivity of analytical methods used to detect antibiotics or other contaminants has made governmental food safety analytical standards a moving target (Tran, Wilson, & Anders, 2012).

Governments are not the only actors involved in setting standards as both nongovernmental organizations (NGOs) and global retail giants have or are in the process of setting certification standards for environmental and social accountability and traceability for aquaculture products (Anh, Bush, Mol, & Kroeze, 2011; Vandergeest, 2007). A cacophony of competing management practices and standards has emerged, ranging from wallet-sized buying guides developed by the

Monterey Bay Aquarium and other NGOs to influence individual consumer behavior, to the nascent formation of an Aquaculture Stewardship Council (ASC). The Global Aquaculture Alliance (GAA), an organization headquartered in the US and representing aquaculture producers, seafood traders, and major restaurant chains, has developed its own competing set of standards to win buyers' acceptance.

Increasing stringency of governmental food safety standards and improved analytic capacity combined with rapidly evolving NGO certification systems in aquaculture place a premium on entrepreneurial agility, technical sophistication, and quality control systems that are far from universal among seafood producers and processors in Vietnam as well as other countries of the South. As we explore food safety and certification standards to production and trade of shrimp from Vietnam, we will examine in particular the possibility that these will become barriers which will differentially impact small-scale shrimp farmers and processors, possibly encouraging an industrial model of production including vertical integration

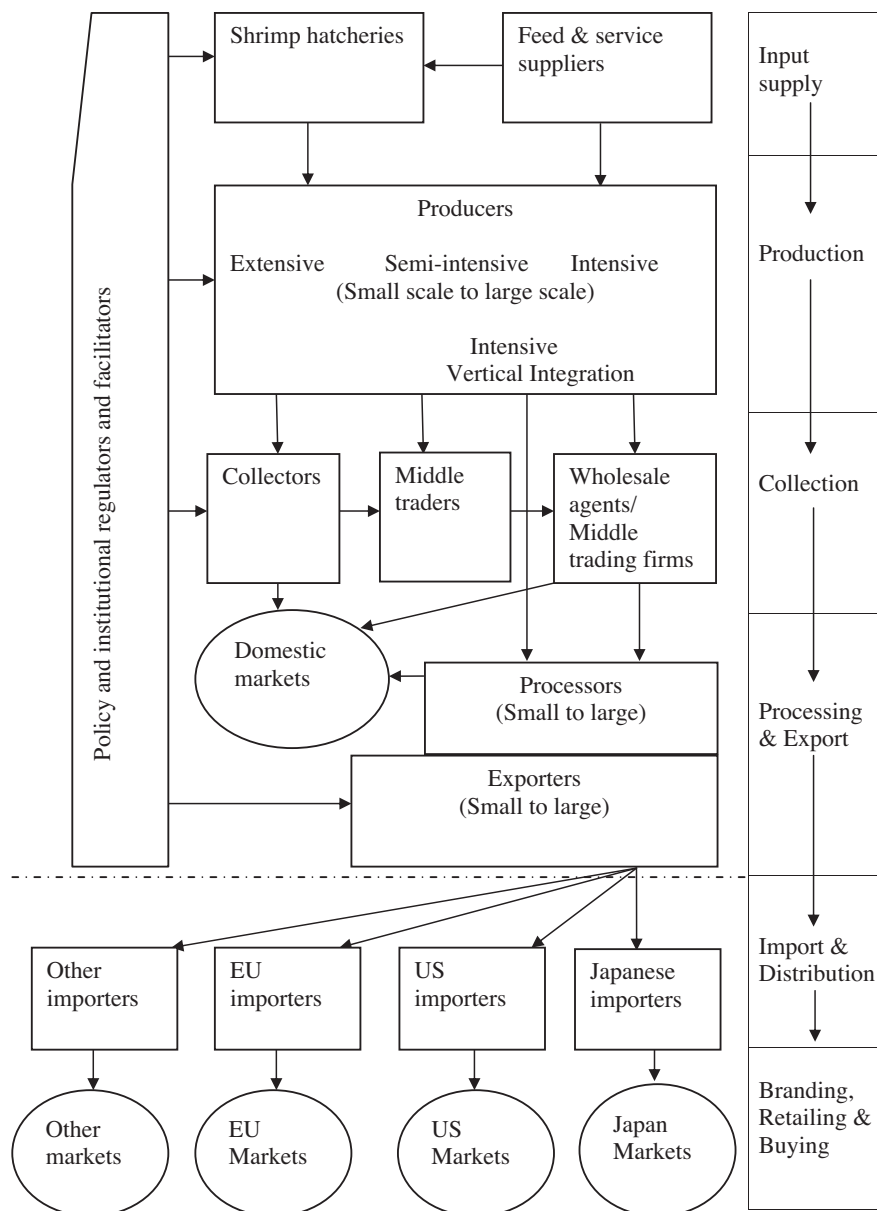


Figure 1. Global value chains or commodity flows for shrimp in Vietnam.

of production, processing, and trade. The focus on small-scale producers is important because, as will be described in more detail below, these producers make up the vast majority of all shrimp farmers in Vietnam and account for the majority of all farmed shrimp.<sup>1</sup>

## 2. GLOBAL VALUE CHAIN

The global value chain (GVC) framework provides the conceptual structure to examine governance issues that shape relationships between actors (Gereffi, Humphrey, & Sturgeon, 2005), in this case shrimp farmers, middlemen, processors, exporters, and importers. A simplified graph showing relationships between actors in the GVC for shrimp in Vietnam (Figure 1) starts from various input suppliers (feed, post-larval shrimp for stocking the ponds) to farmers operating at various scales and levels of intensity, who in turn sell their shrimp to numerous small collectors, who in turn sell shrimp to middlemen who then sell the shrimp to processors. In many cases these processors also are exporters who have clients in other countries. Figure 1 also makes clear that there are other actors involved, including domestic and foreign government agencies which promote shrimp farming and issue licenses to processors and exporters, as well as government agencies, NGOs, and retailers in importing countries which set and enforce their own standards. We will examine below in more detail the set of actors shown in Figure 1.

The GVC approach has been used extensively to examine a wide range of manufacturing and service commodities such as apparel and textiles (Gereffi & Korzeniewicz, 1994b), tourism (Clancy, 1998), services (Rabach & Kim, 1994), electronics (Kenney & Florida, 1994; Sturgeon, 2002), and auto components (Kaplinsky & Morris, 1999). The GVC approach also has been used to study a variety of agricultural products (Guthman, 2009; Raynolds, 2004), including fresh fruits and vegetables (Busch & Bain, 2004; Dolan & Humphrey, 2000; Gibbon, 2001), coffee, cocoa, and tea (Ponte, 2002; Talbot, 2002), as well as forest- and fish-based products (Bush & Oosterveer, 2007; Gellert, 2003; Gronski, 1997; Skladany & Harris, 1995). Most GVC studies focus on questions of governance, especially exploring how lead firms (e.g., transnational brand name corporations and large retailers) exercise control throughout the value chain.

The intellectual lineage of GVC can be traced to world systems theory from which the concept of a commodity chain is derived and defined as “a network of labor and production processes whose end result is a finished commodity” (Hopkins & Wallerstein, 1986, p. 159). Early commodity chain studies were used for analyzing dynamic processes of global capitalism, national development, and industrialization (Bair, 2008; Girvan, 1987; Kaplinsky, 2004). Conceptual refinements in the 1980s and 1990s led to diversification of terms to include value chains, value systems (Porter, 1985), and global commodity chains (Gereffi & Korzeniewicz, 1994a). By the late 1990s, a wide range of chain-based studies have been conducted in the manufacturing, agricultural, extractive, and service sectors using overlapping terms and concepts. An effort to standardize terminology led to a conference where the global value chain concept was adopted (Bair, 2008; Gereffi, Humphrey, Kaplinsky, & Sturgeon, 2001; Sturgeon, 2009).

Gereffi and Korzeniewicz (1994b) examined differences in governance between producer-driven and buyer-driven GVCs. Producer-driven value chains most commonly are found in capital and technology intensive industries such as automobiles, aircraft, and computers, in which transnational manufacturers

or large integrated firms play key roles in coordinating the entire production network (Gereffi & Korzeniewicz, 1994b). Buyer-driven value chains are characteristic of labor-intensive consumer goods production in which large retailers, branding enterprises, and trading companies control decentralized production networks. The shrimp GVC clearly fits into this latter category.

GVC studies focusing on governance issues have drawn attention to ways in which economic relationships are structured by differential power among actors of the GVC. Gibbon and Ponte (2005, p. 77) use the term “coordination” to define the GVC as “the full range of activities, including coordination, that are required to bring a specific product from its conception to its end use and beyond.” The focus on GVC governance helps us examine how relationships between actors (e.g., farmers, traders, middlemen, processors/exporters, foreign buyers) are organized and coordinated (Gereffi *et al.*, 2005). Talbot (2009) notes that multiple governance structures may exist along a chain. For example, local middlemen may use credit to control a set of traders who collect shrimp from small-scale farmers. The operations of middlemen in turn may be controlled by the processor/exporter that sets quality control standards and the processor/exporter in turn must follow the standards established by their buyers, whether foreign or domestic. In this scenario, the foreign or domestic buyer “drives” the overall GVC (Gereffi & Korzeniewicz, 1994b) but does so indirectly because there are multiple layers of relationships (Ponte & Gibbon, 2005; Sturgeon, 2009; Talbot, 2009). Attention to governance also helps us understand that there are other actors who exert influence (e.g., certification bodies) or authoritative power (regulatory agencies of the state) as shrimp moves from one to another point along the GVC so that governance of a chain may be complex and involve different domains of power from the global to the local.

## 3. AGRI-FOOD CHAINS

Studies of agricultural chains have documented how global agri-food systems are transformed into buyer-driven GVCs controlled by powerful transnational corporations, including a small number of corporations which dominate retail food supply in many industrial countries. However, agri-food chain studies also have drawn attention to other actors who play important roles in driving agri-food chains including international traders (Gibbon, 2001), the state (Gellert, 2003), private certification networks (Busch & Bain, 2004; Raynolds, 2004), and NGOs (Guthman, 2007; Raynolds, 2002). These findings highlight the fact that multiple governance patterns commonly exist for global agri-foods (Gereffi, Lee, & Christian, 2009; Talbot, 2009), and that different GVC segments are controlled by different actors.

Over the past two decades a number of commodity chain studies of the global shrimp industry have been carried out (e.g., Gronski, 1997; Islam, 2008; Kagawa & Bailey, 2006; Skladany & Harris, 1995). Studies conducted by Skladany and Harris (1995) and Gronski (1997) drew on insights from the industrial restructuring and value chain literatures to analyze political, economic, and technical forces influencing the emergence of the global shrimp industry, especially the power of transnational and national corporations in defining and dominating concentration, expansion, and organization of the industry.

In this paper we will use the GVC framework to examine governance issues that structure relationships between shrimp farmers, middlemen, processors, exporters in Vietnam, and importers in foreign countries. The focal point of the study

is the impact of public sector standards for food safety and private sector (NGO and corporate) certifications. The suggested intent of these certification schemes is to assure consumers that the shrimp they are buying was produced using a set of best management practices that incorporate both social and environmental criteria. We consider the possibility that these standards and certifications will marginalize small-scale producers by putting them at a competitive disadvantage in the most lucrative global markets.

#### 4. SHRIMP FARMING IN VIETNAM

Vietnam represents an interesting case for exploring impacts of public and private standards on seafood production and trade. Vietnam is a poor country in transition to a market economy with weak market institutions and low financial, technological, and managerial capacities compared to other seafood exporting countries in the region (Kagawa & Bailey, 2006). The country has promoted aquaculture development to boost the economy and earn foreign currency, which it has accomplished through mobilization of hundreds of thousands of small-scale producers. The industry is, however, vulnerable to increasing stringency of public and private standards imposed by markets in Japan, the EU, and the US because documenting production practices and establishing a chain of custody for shrimp is very difficult due to the large number of small-scale producers and traders involved.

The export-oriented shrimp industry in Vietnam has been dominated by small-scale but commercially oriented actors involved in production and trading. As is true elsewhere in Southeast Asia, extensive production systems involving shrimp and fish farming has a long history in Vietnam. Prior to 1986 there was no incentive for promoting shrimp culture in Vietnam because the country mainly traded with the Union of Soviet Socialist Republics and landlocked eastern European countries with low demand for shrimp. Economic reforms of 1986 gradually helped Vietnam develop a market economy and establish trading relations with all countries in the world (Irvin, 1995). This “open door policy” connected the country with developed markets with high demand for shrimp, especially Japan, the US, and the EU.

The first phase of growth in shrimp farming in Vietnam started in the late 1980s and lasted to the late 1990s, characterized by gradual improvements in hatchery production, grow-out culture technology, and processing capacity. Tran *et al.* (2006) report that in 1990 Vietnam had 500 shrimp hatcheries and 93,000 ha of shrimp ponds, producing 38,000 metric tons (0.41 ton/ha). By the year 2000 the number of shrimp hatcheries, cultured area and production in Vietnam climbed to 2,900 establishments, 235,000 ha, and 103,000 metric tons (Tran *et al.*, 2006). The second phase of shrimp industry development in Vietnam was marked by the promulgation of Resolution 09/NQ-CP of the Government in June 2000, allowing farmers to convert low productive and saline rice fields, uncultivated areas, and salt pans in coastal areas into aquaculture ponds. Shrimp farm area skyrocketed from 235,000 ha in 2000 to 478,000 ha in 2001, 530,000 ha in 2003, and to 630,000 ha in 2008 (MARD, 2009–12; Ministry of Fisheries [MoF], 2000–03). According to the Vietnamese Institute for Fisheries Economics and Planning (VIFEP), Vietnam used 650,000 ha to produce 383,000 tons of shrimp in total (0.59 metric ton per ha on average) and obtained an export revenue of US\$1.5 billion in 2009 (VIFEP, 2009).

Development of Vietnam’s export-oriented shrimp industry has important socio-economic and environmental implications,

and has attracted the attention of both development and academic communities worldwide. There is a substantial literature on shrimp farming systems (Boyd & Clay, 1998; Menasveta, 2002; Neiland, Soley, Varley, & Whitmarsh, 2001), economics of shrimp production, and trade (Keefe & Jolly, 2001; Traesupap, Matsuda, & Shima, 1999), as well as discussion of social, political, and environmental problems associated with shrimp farming (Bailey, 1988; Béné, 2005; Hall, 2004; Hatanaka, 2010; Primavera, 1998; Stonich & Bailey, 2000; Vandergeest, 2007; Vandergeest, Flaherty, & Miller, 1999). Concerns also have been expressed regarding antibiotics, biological, and chemical contamination and associated impact on consumer health (e.g., Jonker, Ito, & Fujishima, 2004; Sapkota *et al.*, 2008; US General Accounting Office [GAO], 2001). These concerns have contributed to the imposition of increasingly stringent seafood safety standards by governments as well as social and environmental certification standards by nongovernmental actors in the North.

#### 5. RESEARCH METHODS

Primary data for this paper came from field research in Vietnam. From August 2009 to March 2010, the lead author collected primary data in the Mekong Delta region, the major shrimp bowl of the country, accounting for over 90% of total shrimp farm area and 75% of total farmed shrimp production (VIFEP, 2009). Based on discussions with national and local experts in the fisheries sector, three provinces were chosen. Ca Mau Province was chosen because it is the center for various forms of (modified/improved) extensive/traditional shrimp farming systems, which are the most common ones found in the country. Soc Trang Province represents an area where larger-scale enterprises engaged in intensive shrimp farming are promoted by local authorities. Ben Tre Province was chosen because it has a mix of large and small enterprises engaged in extensive and intensive production systems. Based at the Research Institute for Aquaculture No. 1 (RIA1) in Hanoi, the lead author made monthly visits with an average period of two to 3 weeks per trip to the Mekong Delta to collect data.

In total, semi-structured interviews were conducted in Vietnamese with 63 shrimp farmers in the three selected provinces in the Mekong Delta. Interview questions focused on production, environmental conditions, resource endowments/constraints, and how farmers interacted and bargained with each other and with input suppliers, buyers of their product, and other actors involved in shrimp supply chains. Information also was collected on farmers’ knowledge and perceptions of public and private food safety and certification standards imposed by national or foreign authorities, problems the farmers faced, and solutions that they found. An introduction letter from RIA1 was obtained and sent to provincial departments for agriculture and rural development to ask for their support in conducting the research. Initial field visits were made with the assistance of local staff at provincial or district levels to get acquainted with local areas and community leaders and farmers. Working through such authorities is necessary while conducting field research in Vietnam. Once working relationships were established, local leaders were asked to introduce the lead author to farmers who were willing to participate in the research. Interviews ranged from forty minutes to 2 h and were conducted in a conversational style to allow for rapport and trust building between the interviewer and respondents. The results of the interviews were typed in the evening of the same day or the next day, paraphrasing respondents’

answers. Whenever possible, interviewed respondents were asked to identify other potential respondents, an approach known as the “snow-ball” technique. In addition, the lead author also asked for lists of shrimp farmers and telephone numbers of community leaders if available in order to establish relationships and identify potential research participants.

Using a similar approach, 42 stakeholders other than shrimp farmers were interviewed. These included two shrimp hatchery operators, two feed suppliers, nine shrimp collectors/middle men, 10 seafood processors and exporters, five researchers, nine government officials at district, provincial, and national levels, three officers of seafood industry associations, and two NGO leaders. Semi-structured interview guides developed for farm level interviews were modified to keep relevant questions for each actor category. Questions posed to processors and exporters as well as to higher administrative levels focused more on issues relating to foreign standards for food safety and environmental management since these respondents were familiar with foreign market requirements. In addition to semi-structured interviews with the 105 actors mentioned above, the first author had many informal interviews and interacted at many social gatherings with other farmers and governmental officials where the first author was able to observe behavior and use informal conversations to cross check data collected through semi-structured interviews. Furthermore, in order to gain additional data and understanding, the first author also participated in eight group meetings arranged by community leaders, with a range of 15 and 25 participants at each meeting. The meetings lasted for 2–3 h and provided monthly or annual assessments of shrimp farming operations. The second author spent 2 weeks in the field with the first author and has extensive experience working on aquaculture elsewhere in Southeast Asia. The third author is an economist who specializes in international trade. The fourth author also has extensive experience working on aquaculture in Southeast Asia, including Vietnam.

Secondary data, covering the period 1999–2010, when rapid expansion of the shrimp farming industry in Vietnam took place, also were collected. In many cases as a RIA1 employee since 1997, the first author had been directly involved in collection of data on technical, environmental, socio-economic, and institutional aspects of coastal aquaculture development in Vietnam. These included data from farm surveys and group discussions the first author conducted in various provinces in northern and central Vietnam. With the exception of Ca Mau Province, data from previous studies were not from provinces covered by this study, so no attempt is made to provide time series data. However, because developments in shrimp aquaculture development in one place can affect other places, the first author used email and telephone communications with local governments and RIA1 staff who are working in those provinces where previously he had worked to understand what has happened there since his own direct involvement.

Other secondary data used were reports and statistics provided by government and nongovernmental actors, including both corporate as well as national and international environmental groups, and international development agencies.

## 6. STRUCTURE AND FUNCTION OF GVC FOR SHRIMP IN VIETNAM

GVC for shrimp in Vietnam can be divided into four functional stages namely input and service supplies, grow-out production, shrimp collection, and shrimp processing and export.

These four stages are embedded in place-based policy and institutional as well as environmental space. In this section we briefly describe each of these stages, their internal governance, and governance relationships between stages. The complex structure of the four stages is graphically depicted in Figure 1.

### (a) *Input supply*

The input supply stage involves shrimp hatchery operators, feed and veterinary drug suppliers and financial service providers. Most shrimp hatchery operators in Vietnam work with domestic black tiger shrimp (*P. monodon*) with increasing numbers producing white shrimp (*P. vannamei*), a nonnative species in Vietnamese waters. Shrimp hatcheries are commonly small-scale and operated by family-based networks (VIFEP, 2009). By 1990 about 500 shrimp hatcheries had been established in Vietnam (Chinh, 1995). The number reached a peak of 5080 in 2003 then dropped back to 4300 in 2005. Annually, these hatcheries produce 25–30 billion shrimp post-larvae for grow-out shrimp production (VIFEP, 2009).

Hatchery operators buy wild *P. monodon* broodstock captured by fishermen and import *P. vannamei* broodstock from the US or other countries for production of shrimp post-larvae (“seed”). Small-scale producers usually purchase shrimp seed from local middlemen while large-scale farms often prefer to buy directly from hatchery operators. Large-scale farmers may send their employees to stay in a hatchery during a spawning season to make sure that they will receive good quality seeds, whereas small-scale producers have to rely on middlemen for a quality product. The price of shrimp seed is determined by the market, but bargaining power is skewed toward hatchery operators or middlemen, especially when dealing with small-scale producers.

Feed and veterinary drugs are essential inputs for semi-intensive and intensive shrimp farming. Use of these inputs is very limited in extensive and modified extensive farming systems (described in the following section). VIFEP (2009) estimates that there are 53 shrimp feed producing plants and 105 agencies registered for supplying veterinary drugs and chemicals for shrimp farming in Vietnam, most of them located in Ho Chi Minh City. VIFEP (2009) reports 1799 retail outlets selling veterinary drugs, chemicals, and bio-products to shrimp farmers in Vietnam. Local suppliers set selling prices based on their agreements with feed and drug manufacturing plants or supplying agents. Feed suppliers prefer to receive immediate payments from farmers once a transaction is processed, but suppliers also provide loans for feed and veterinary drugs if they find evidence that the farmer will be able to pay back. Suppliers normally charge higher prices for sales on credit compared to cash sales. For a shrimp crop that takes four months to harvest, loans for inputs usually occur in the third or fourth months, when the shrimp are growing rapidly and require more feed. Making loans at that time reduces the risk of losing money because the crop can be harvested early if shrimp diseases occur. Large and successful farmers can more easily obtain inputs or credits than small-scale producers.

Beyond credit solely for inputs, financial services, for the shrimp industry involve banks, farmer credit unions, and family, friend, or input supplier-based networks. Capital shortage is one of the constraints most often reported by small-scale producers. Nine out of ten of all shrimp farmers interviewed reported that obtaining bank credit was easy during the early 2000s but had become less so over the past decade. Alternative capital sources for small producers include credit from poverty alleviation or small enterprise development programs initiated

by governments or donor agencies. These programs charge lower interest rates than commercial banks but these loans are usually small, limited, and short-term. Only 16% of interviewed farmers were able to access to these loans. When facing a serious financial crisis, small shrimp farmers turn to local money lenders or input suppliers, who charge higher interest rates. Even so, access to these loans depends on socio-cultural and economic relationships and farming credibility.

#### (b) *Shrimp production*

Shrimp production in Vietnam is dominated by small-scale producers using extensive and modified extensive farming systems, including polyculture of shrimp and fish, shrimp in rotation with rice crops, and shrimp grown in small ponds set within mangrove forests managed by state-owned plantations, or local authorities. The essential features differentiating production systems along the extensive to intensive continuum are additional seed stocking, feeding, and management inputs. Shrimp are not actively stocked in traditional extensive farming; rather, pond gates are opened at high tides when post-larval or other small shrimp are allowed to flow into the pond. Up to five individuals per square meter are stocked in modified extensive farming systems. Semi-intensive and intensive farming is associated with higher stocking density ranging from six to 20 individuals per square meter in semi-intensive and 21 to 80 individuals or higher in intensive systems. The higher the stocking density, the greater the cost not only for seed but for feed and often also for antibiotics and other drugs. Antibiotics and other drugs are not needed by extensive operations because lower stocking densities create less stress both from crowding and from water quality issues associated with heavy feeding and decomposition of wastes. Intensive systems require more technically sophisticated management of water quality and disease control.

The VIFEP (2009) estimated that the ratio of intensive/semi-intensive to extensive/improved extensive shrimp farming area in Vietnam in 2007 was 11–89. In 2009, about 650,000 ha were used for shrimp culture, producing 383,600 metric tons (VIFEP, 2009). Extensive farming productivity ranges from 230 kg per ha in the shrimp and mangrove forest system, and up to 450 kg per ha in modified extensive systems (VIFEP, 2009). On average, semi-intensive and intensive productivity are reported at 1.5 metric tons per ha and 3.5 metric tons per ha, respectively. Combining VIFEP and annual reports of the MARD, we estimate that in 2007, about 68,700 ha were used for semi-intensive and intensive, and 555,900 ha for extensive and modified extensive farming practices (MARD, 2009–12; VIFEP, 2009). Production from extensive and modified extensive systems range from 194,600 to 233,500 metric tons, accounting for about 51% to 61% of total farmed shrimp production in 2007. The General Statistical Office of Vietnam [GSO] (2007) reports that there were 330,000 households practicing shrimp aquaculture of which 79,600 households operated semi-intensive and intensive farms in 2006. The average size of extensive and modified extensive farms is around 2 ha, and average size of semi-intensive and intensive farms is around 0.7 ha. There are, of course, some larger farmers using intensive production practices, but at this point they account for a very small fraction of all farms and a small share of total production.

#### (c) *Shrimp collection*

Once producers harvest their crops, shrimp products are sold to traders. As Figure 1 shows, shrimp chains from

extensive and small producers proceed through a number of middle trading levels (collectors) to a wholesale agent who is usually registered with the provincial government. Based on interviews with producers as well as traders, transactions between producers and collectors almost always take the form of verbal agreements without formal contracts but sustained by conventional socio-cultural norms based on friendship and family-based networks.

Few roads exist in shrimp farming areas in the Mekong Delta especially in the eastern part of Ca Mau province where first level traders can only reach farms by boat. Often these traders purchase small quantities (10–20 kg) during a farm visit and return frequently for additional purchases. These first level traders in turn sell their shrimp to a second level of trader and so on, with each level of trader handling progressively larger volumes until the shrimp are sold to a registered wholesale agent. In some cases, shrimp contaminated with antibiotics by one producer are mixed in with other shrimp with no way to tell where the original contamination occurred. Small-scale producers generally use only small amounts of supplemental feed and rarely use antibiotics. However, there can be exceptions to this. Farmers engaged in more intensive production systems often use antibiotics and may sell their shrimp to the same trader or set of traders. The longest middle trading chain encountered involved extensive farmers in Ca Mau and Ben Tre provinces, with shrimp going through five traders before reaching processing plants.

Relationships between traders may be based on personal ties or may involve the provision of credit between one trader and the trader at the next level. Some intensive and large shrimp farms sell products through only one middleman (e.g., a wholesale agent) who will sell shrimp directly to processors. Semi-intensive and some intensive farms sell to a collector who then sells the shrimp to a wholesale agent who then sells to a processing plant. Given the number of people involved before the shrimp reaches the processor, it is very difficult to know from which farm or under what conditions the shrimp were grown.

Due to the small-scale nature of shrimp production and trading, coordination of chain segments from wholesale agents down to traders and producers is beyond the control of shrimp processor/exporters. At each step from wholesaler down to producer, relationships vary from simple market exchanges to economic relationships embedded in other social relationships. Only wholesale agents/collecting units are registered as companies under control of the regulatory networks established by MARD. The middle traders and collectors further down the GVC toward producers are beyond effective control by administrative systems of MARD and seafood processors. With 330,000 small-scale shrimp producers in Vietnam, processing and export actors must rely on a lengthy chain of traders to move shrimp from ponds to processing plants.

Provincial governments regulate middle traders who register as business firms but have no records or effective control over small traders, who often are blamed for poor quality. This poor quality limits the ability of processors and exporters to sell the shrimp to the most lucrative international markets (Loc, 2006).

#### (d) *Processing and export*

Interviews with stakeholders showed that shrimp processors mainly get their supply from wholesale agents. Only a tiny portion (about 4%) of farmed shrimp production is directly bought from semi-intensive and intensive producers by processors. Each processing and export company works with

between five and 15 wholesale agents depending on their processing capacity. Processors generally set prices for wholesale agents who in turn set prices for middlemen who supply them. These middlemen in turn set prices they are willing to pay to the next level of trader, a process repeated to the lowest level of trader. Because each trader has costs and must make a profit, the longer the chain, the lower the price is likely to be for the farmer.

Of 554 registered seafood processing companies with permits to export seafood products by the National Agro-Forestry-Fishery Quality Assurance Department [NAFIQAD], more than two-thirds are located in the Mekong Delta. Processing capacity varies substantially, ranging from primary/simple processing carried out by wholesale agents to advanced/sophisticated processing standards possessed by large companies. Every seafood processor/exporter (10) reported they were concerned about increasing stringency of public food safety standards and the emergence of voluntary certification systems imposed by export markets. Four out of 10 processor/exporters said that they differentiate products to serve multiple markets from the EU, Japan, and the US from other foreign markets as well as from domestic markets, six of the 10 expressed concerns that the new standards and certifications may lead them to being displaced from export markets.

The largest shrimp exporters often possess processing facilities and operate as integrated firms. In some cases, these firms also own and operate shrimp farms but rely on other farms for most of their raw products. Governance patterns between wholesale agents and processors are variable, ranging from relational to captive relationships. Processors usually are better able to set prices during peak shrimp harvesting seasons. However, if shrimp become scarce due to crop failures or during the off-season, the power of wholesale agents will rise to the extent that they control the flow of product between competing processors.

In Vietnam, pressures to address seafood safety concerns (e.g., antibiotics, chemical, and biological contaminations) to ensure continued access to exported markets have resulted in heavier public regulations on processors, middlemen traders, producers, and input suppliers implemented through the regulatory framework established under MARD. The NAFIQAD has the responsibility of inspecting seafood processing companies and makes sure that standards required by foreign markets such as Hazard Analysis Critical Control Points (HACCP) systems, Sanitation Standard Operating Procedures (SSOP), Good Manufacturing Practices (GMP), and mandatory antibiotics and chemical residue monitoring programs are implemented. National Agro-Forestry (2010) also works with foreign food safety administrations to grant export permits (e.g., the health certificate required by the EU market) to processing and export companies when companies meet foreign food safety standards. Responsibility for supervising input suppliers, producers, and middle trading actors is shared between the Fisheries Administration Directorate and the Department of Animal Health at the national and provincial levels.

## 7. GOVERNANCE OF GVC FOR SHRIMP IN VIETNAM

Relationships between Vietnamese processor/exporters and foreign shrimp importers have their own unique histories. Vietnamese seafood firms entered captive relationships with Japanese seafood importers in the 1980s and early 1990s. During this period, Vietnam's seafood processing and export enterprises (mostly owned by national or local governments)

harvested abundant seafood resources but had low processing capabilities and limited access to seafood markets. Demand for seafood is high in Japan, and trading companies from that country helped establish seafood processing plants by installing equipment and training technical staff. Japanese investors frequently sent technical staff to Vietnam to support Vietnamese enterprises and made sure that seafood products were processed and packed in accordance with their orders. In the 1980s, more than 80% of Vietnamese exported seafood products went to Japan (Loc, 2006). With economic reform introduced in 1986 and the lift of the American embargo on Vietnam in 1994, Vietnamese seafood enterprises were able to find more markets for their seafood products and relax dependent trading relationships with Japanese seafood importers. However, traces of dependent relationships were still present in some Vietnamese seafood enterprises in the early 2000s as documented by Kagawa and Bailey (2006).

Figure 2 integrates the GVC for shrimp in Vietnam described in Figure 1 with the public and private regulatory networks affecting organization and governance of shrimp chains. Figure 2 consists of four quadrants divided by two dotted lines, one vertical and one horizontal. The two upper quadrants define public (governmental) and private (nongovernmental) regulatory networks operating in Vietnam (upper left quadrant) and in foreign countries (upper right quadrant) which import Vietnamese shrimp. The two lower quadrants of Figure 2 contain key actors directly participating in shrimp GVC in Vietnam and the environments in which shrimp chains are embedded. Segments of the shrimp GVC in Vietnam are presented in the left lower quadrant and global shrimp markets are in the right lower quadrant. From Vietnam, four groups of GVC are identified, connecting actors in the shrimp industry in Vietnam to EU, Japan, US, and other markets. Shrimp supply flows from left to right, and governing power to coordinate GVC and the money flow will be from right to left, as indicated by arrows. Arrows in actor boxes express horizontal dynamics of actors responding to increasing stringency of food safety and certification standards imposed by public and private networks. Up arrows indicate successful actors "racing to the top" (i.e., gaining or maintaining access to the most lucrative markets) and down arrows depict failing actors being displaced from shrimp GVC and "sinking to the bottom" (i.e., losing such access). Setting up the shrimp GVC in three dimensions, the two lower quadrants are in a horizontal dimension and the two upper quadrants are in a vertical dimension. As described in Figure 2, the shrimp GVC in Vietnam differs markedly from that of Thailand (Goss, Burch, & Rickson, 2000, p. 518) which increasingly has a more vertically integrated structure.

### (a) Governance by the state

Similar to findings in other agri-food chain studies (Busch & Bain, 2004; Raynolds, 2004; Talbot, 2002), interviews with stakeholders reveal that the shrimp GVC in Vietnam is heavily regulated by national agencies as well as by those in importing countries. Public regulations in Vietnam and foreign countries are particularly focused on food safety. National governments in the global North are setting standards based on risk assessment approaches such as HACCP systems mandated in the US since 1997, and the food safety and traceability principles specified in the EU regulation No 178/2002 in 2002. Border inspections, product detention, and rejection by importing governments can have serious implications for shrimp buyers in import markets and exporters in Vietnam (Tran *et al.*, 2012). If food safety violations are found, not only will the

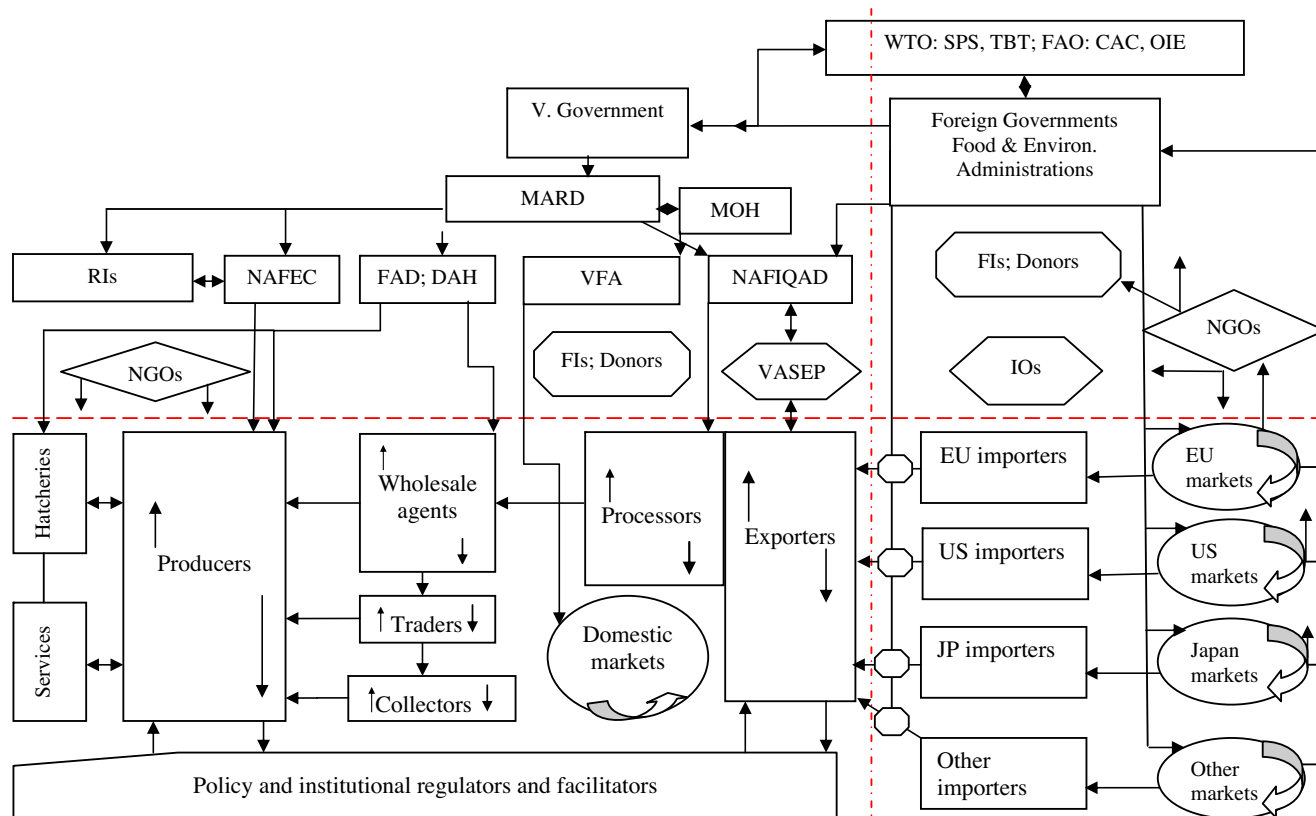


Figure 2. Governance of global value chains for shrimp in Vietnam.

original shipment be rejected but additional scrutiny immediately will be imposed on all future shipments of that company. If a pattern of problems emerges, shipments from an entire country can be placed on a watch list and be subject to additional scrutiny, reflecting concern over improper state governance of the sector. The regulatory power of importing countries is an important driver of the shrimp GVC. This power not only affects the exporters, it also puts pressure on the Vietnamese government and has led to creation of the regulatory framework established under MARD. The Vietnamese government plays an important role in driving the shrimp GVC to ensure that requirements are met to maintain access to global shrimp markets. Government officials interviewed for this study reported that as foreign markets increased stringency of seafood standards, the central and provincial governments responded by enacting and enforcing stricter inspection and monitoring systems. Historically Vietnam had been a centrally planned economy with a “big government” and governmental networks continue to exert strong control over economic activity, creating favorable conditions for the shrimp industry to respond effectively to international market requirements. However, the ability of the government to exert control along the GVC is limited by structural factors starting at the farm gate. Hundreds of thousands of small-scale shrimp producers served by many thousands of unregistered small-scale traders make tracing the precise origins of shrimp arriving at the processor/exporter’s gate all but impossible.

#### (b) The role of NGOs in shrimp GVC governance

Despite increasing stringency of governmental regulations, a number of NGOs have been successful in using public concern over food safety as well as social and environmental

sustainability to effectively question the ability of governments to govern international seafood trade, including trade of shrimp. These certification systems have been embraced by major retailers and so have become important in the governance of GVCs for shrimp. A benchmark study by the World Wildlife Fund (World Wide Fund for Nature [WWF], 2007) turned up more than 30 certification schemes for aquaculture.

One of the first certification schemes to hit the marketplace was established by the Global Aquaculture Alliance (GAA), a US-based industry group which created the Aquaculture Certification Council (ACC). The ACC certifies producers, feed mills, hatcheries, and processors which follow best aquaculture practices for the production of shrimp, salmon, tilapia, channel catfish, and pangasius catfish. The ACC moved quickly into the certification business and currently has 57 grocers and restaurateurs who accept the ACC certification (GAA, 2012).

Some NGOs have expressed reluctance to accept certification standards from industry-based organizations as an acceptable basis for governance of international seafood trade (Vandergeest, 2007). NGOs have developed private regulatory/certification systems to encourage food retail corporations to address food safety as well as social and environmental responsibility, using third-party certification rather than self-reports or certification by business partners.

The Global Good Agriculture Practices (GLOBALG.A.P.) in Germany has established a certification process for many agricultural products and has expanded to include shrimp and other aquaculture products. GLOBALG.A.P. provides certification from “feed to fork” and includes worker and producer welfare as a voluntary add-on to the supply chain assessment. Additionally, GLOBALG.A.P. has specific training modules for small holders in aquaculture (GLOBALG.A.P., 2012).



More recently, the WWF and the Dutch Sustainable Trade Initiative inaugurated the Aquaculture Stewardship Council (ASC) which is patterned after the Marine Stewardship Council (MSC), which certifies wild fisheries, and the Forest Stewardship Council, which certifies forest products. In all three cases the WWF played a key role, and all three certification bodies use Accreditation Services International to manage third-party accreditation and annual audits of accredited producers. The ASC was built on a five-year process of “Aquaculture Dialogues” involving a wide range of stakeholders focusing on eight separate species (including shrimp) that are important in international trade. The Aquaculture Stewardship Council began accrediting aquaculture operations in 2011 (WWF, 2007). The ASC certification standards emphasize environmental stewardship and fair pay and working conditions for workers and producers but do not directly cover food safety.

The ACC, GLOBALG.A.P., and the ASC are three of the most significant certification bodies in the aquaculture field, but there are others. From the perspective of governance within shrimp GVCs, it is important to recognize that certification is a relatively recent phenomenon and represents a dynamic and fluid set of issues which processor/exporters need to consider along with governmental food safety standards. Keeping abreast of both governmental standards and NGO certification requirements and understanding how these affect access to the most lucrative markets requires a sophisticated understanding of domestic markets in the US and the EU. (To our knowledge, the Japanese market has not yet been influenced by NGO certification schemes, relying instead on close working relationships between processor/exporters and Japanese trading houses; see Kagawa & Bailey, 2006). Certification also has financial costs which may be burdensome for many actors in Vietnam’s shrimp GVC. For small-scale producers, the financial cost could be covered by grants or perhaps shared by a cooperative organization of producers, but in both cases financial costs would be replaced by transaction costs.

The influence of private regulatory/NGO networks on organization and governance of shrimp GVC in Vietnam is limited at present, though aquaculture certification institutions are active in international shrimp markets (Hatanaka, 2010; Vandergeest, 2007), as well as in Vietnam. Several aquaculture certification schemes at the demonstration stage have been initiated by international NGOs in Vietnam. At this stage, NGOs are experimenting with a dual strategy. On the one hand, capacity-building projects are being sponsored by NGOs and donor agencies to create preliminary foundations for certification standards and convince producers to adopt voluntary standards. On the other hand, efforts are also made by NGOs to persuade buyers and retailers in import markets to impose their voluntary certification standards. If pilot projects are successful in selling certified products in global markets, a premium price may be offered to lure producers to adopt voluntary certification systems.

NGOs also have organized campaigns to influence consumers, governments, and retailers/corporations in the industrial North to encourage adoption of third-party and NGO-led certification systems. Large retailers such as Wal-Mart have dramatically increased the share of certified seafood sold in its store and required noncertified suppliers to move toward certification (Wal-Mart., 2011). The two certification bodies used by Wal-Mart are the Marine Stewardship Council for marine fish products and the Aquaculture Certification Council (ACC) for farmed fish. The ACC lists 57 retail grocers and restaurants that feature ACC-certified products in the US, including such major corporations as Albertsons, Wal-Mart,

Target, Winn-Dixie, Kroger, Ralphs, and Darden Restaurants. Some of these same retail giants also have entered into partnerships with the Aquaculture Stewardship Council, which also provides certifications for aquaculture products for some of the largest European retailers, including Marks & Spencer (United Kingdom), Royal Greenland A/S (Europe), Edeka (Germany), METRO Group (global), and Royal Ahold (global) (WWF, 2007). An FAO report by Washington and Ababouch (2011) notes that in recent years private certification systems in fisheries and aquaculture have become increasingly helpful to corporate retailers in providing some assurance of food safety and also providing a measure of insurance against negative media coverage that would come from the sale of noncertified products.

### (c) Retail power and governance

Shrimp markets are dominated by large retail corporations in the global North. Because there are a large number of potential suppliers in Asia and Latin America and a relatively small number of buyers, we have defined the shrimp GVC for Vietnam as buyer-driven. Governments establish minimal food safety standards, but the buyers are in a position to establish additional quality standards or adherence to certification schemes of their choosing. At this point, the ability of shrimp processor/exporters in Vietnam to supply certified shrimp to international markets is limited by the large number of producers and the fragmented system of trading between producer and processor/exporter. These factors complicate the chain of custody necessary for achieving certification. Because major retailers increasingly are convinced that selling certified products is in their best interest (Washington & Ababouch, 2011), we believe Vietnamese processor/exporters will have to find a way of meeting this demand.

Shrimp processor/exporters in Vietnam have constraints in controlling quality and trace-ability along the value chain from the farm gate to their own gate, particularly when product comes from small-scale farms. They do have some ability to accept or reject shipments from wholesale agents who are their primary source of supply, but these wholesale agents in turn depend on traders who themselves depend on smaller traders, who in some cases buy shrimp from even smaller traders. At the base of this pyramid are hundreds of thousands of shrimp farmers, most of whom are small-scale producers. These producers may depend on an array of input suppliers, local traders, and financial service providers. Wholesale agents may loan money to traders and expect to have exclusive rights over shrimp the traders collect. These traders in turn may use loans to other traders, and loans may tie producers to particular traders. But these ties are to ensure ownership of product, not to influence product quality. With the exception of a few pilot projects limited in participation and scale, shrimp certification programs or even public health standards are not significant factors in determining farm management practices. This is so because governance of the shrimp GVC is weak and fragmented.

Most of Vietnam’s 330,000 shrimp farms are operated by rural households coming from a range of previous rural subsistence livelihoods such as rice farming, salt producing, and fishing with limited technical know-how. The government’s ability to coordinate producers is limited, as is that of shrimp processors. Many shrimp farmers operate from communities where there are no roads. Under these conditions, processors cannot work directly with shrimp producers but have to organize and coordinate shrimp chains through various levels of middleman traders.

## 8. DISCUSSION AND IMPLICATIONS

Global trade can be understood as organized in the form of GVCs geographically spread across countries and functionally integrated and coordinated by powerful actors and institutions at various points along the chains (Gereffi, 1999; Gereffi *et al.*, 2001). We have described governance of the GVC for shrimp produced in Vietnam as fragmented at the level of producer and local trader but with more organized relationships between processor/exporters and buyers in countries of the global North. Government agencies in Vietnam and in importing countries are important actors in the shrimp GVC because they set, monitor, and enforce food safety standards. But it is the importer which buys the product at an agreed upon price and with agreed upon standards. These buyers are moving toward adoption of third-party certification standards which provide them with certain assurances of quality and public acceptability. At this point in Vietnam, NGO-designed certification systems have had limited impact at the farm level, but this is likely to change in the future. The question is whether the fragmented governance system can be organized in such a way that certification systems that depend on chains of custody from farm to processor/exporter can be established.

A moral beauty contest orchestrated by a variety of actors is transforming and re-shaping structure, function, and governance of the GVC for shrimp in Vietnam and worldwide. On the one hand are the rights to consume safe and certified products in the industrial North, while on the other hand are the rights of small-scale producers to earn a livelihood in the developing South. Affluent consumers in the industrial North will certainly benefit from increasingly stringent food safety standards.

Food safety standards alone are not likely to be a serious obstacle for small-scale producers. For the most part, shrimp produced by small-scale producers have limited exposure to antibiotics or other prohibited chemicals because the low intensity of their production system does not require such inputs. Problems can arise if shrimp from a low intensity operation are mixed by traders with shrimp from semi-intensive or intensive operations where the use of antibiotics is more common due to the stress of crowding in a pond with high stocking rates. Food safety standards can be enforced at the gate of the processor/exporter and then again at the border of the importing country, so that the focus of GVC governance can be at those levels. However, when social and environmental standards of NGOs are included in the certification process, governance issues become more complex and need to be extended further down the GVC to the producer. Here the current fragmented nature of GVC governance poses a significant obstacle. It is one thing for an NGO to establish a pilot project for a set of producers in one community and quite another to document adherence to social and environmental standards of hundreds of thousands of small-scale producers and the many thousands of traders who buy their product. Certification standards promoted by NGOs and industrial organizations such as ASC and GLOBALG.A.P. are designed to improve social and environmental performance of global aquaculture production. The irony is that these certification standards could serve to marginalize small-scale producers and local traders who are the foundation of the current industry.

The inability to trace the origins of shrimp arriving at the processors' doorstep, and the possibility that they have been through many hands and so may have been mishandled in a way that affects quality and food safety may lead some processors to consider producing shrimp themselves or to promote

vertical integration such as is found in Thailand (Goss *et al.*, 2000) where greater control can be exerted over the production process. Both approaches would facilitate traceability, and some processors might think this would guarantee higher quality and as a result a premium price. From a processor/exporter's perspective, the current system is not well managed and introduces troubling levels of uncertainty. Buying from a small number of larger producers would reduce risk of loss due to an export shipment being rejected at the border of an importing country. The net result of this logic would be to marginalize small-scale shrimp farmers and traders, leaving them to serve a small domestic market and perhaps the highly fluctuating and less lucrative markets of regional importers such as China and South Korea, but leaving to larger farmers and more technically sophisticated processor/exporters the more lucrative export markets of the EU, Japan, and the US.

Shrimp traders represent a problematic link in GVC governance for shrimp in Vietnam, but play important roles in the production system, traveling by small boats to remote locations to purchase small quantities of shrimp. Economic relations between small-scale shrimp farmers and their buyers often are colored by social relationships. As Ruddle (2011) points out in the context of buyers of marine fish in Vietnam, these buyers provide valuable services not otherwise available to producers. They understand farming communities, are willing to stay in rural settings, and are also able to communicate and conduct successful transactions with parties residing in urban areas. Addressing quality control issues involving these traders is a matter of technical support and training either from MARD or industry. If Vietnam's shrimp farming industry is going to continue to be based on small-scale producers operating in isolated parts of coastal Vietnam, these producers are going to need to be served by small-scale traders.

Third-party aquaculture certification systems are more likely to support nonindustrial production systems if they are more flexibly applied and are based on a more nuanced understanding of local conditions. Local governance systems based on cooperatives or other associations of producers could be developed to spread the cost of certification across larger numbers of small-scale producers and to rationalize the collection and sale of shrimp. Such community-based governance systems could be organized in such a way that these would be achieving the goals of certification, i.e., positive social and environmental outcomes, keeping the production of shrimp in Vietnam the domain of small-scale family farmers.

## 9. CONCLUSIONS

We have used the global value chain (GVC) framework to understand governance of Vietnam's shrimp farming industry, an important source of employment and foreign exchange earnings for that country. Small-scale producers dominate shrimp production in Vietnam. Most production is centered in the Mekong Delta. Many thousands of traders visiting remote farms in small boats provide the first linkage between producers and the global market. We have characterized this link as fragmented in the sense that there is no centralized governance at this point in the GVC.

We have defined the GVC for shrimp in Vietnam to be buyer-driven, by which we mean that buyers in the global North are in the position to dictate standards for the product they purchase. Traditionally, the national governments of importing countries have taken the lead in developing food safety standards. In response, the government of Vietnam has worked hard to ensure that their exports meet the

standards of importers. More recently, additional standards have begun to shape the international market for shrimp, particularly in the US and the EU. These new standards have been developed by NGOs and address a mix of social, economic, and environmental concerns. To date, these NGO standards and certifications given to those who adhere to these standards have had limited impact on the shrimp GVC in Vietnam. We believe it is likely that NGO certifications will be necessary in the future to assure access to the most lucrative markets in the US and the EU, but that the fragmented nature of production and initial marketing will make certification difficult for small-scale producers in Vietnam. The situation in

Thailand, however, appears to be quite different because the GVC is increasingly vertically integrated. As a consequence, if third-party certifications do in fact become necessary to gain market access, small-scale producers in Vietnam and the traders who serve them are likely to become marginalized from the most lucrative markets. In their place, we anticipate a relatively small number of large-scale and intensive operations will emerge where the logic of GVC governance can be applied. We believe this outcome is contrary to the stated purposes of some but not all of the international third-party aquaculture certification programs and that such unintended consequences deserve further consideration.

## NOTES

1. In the context of shrimp farming in Vietnam, we follow the definition of small-scale established by the government (Decree 56/2009/ND-CP). A shrimp farmer is considered to be small-scale if they operate less than two hectares of ponds using limited inputs or less than one hectare if using inputs more intensively. As will be described in more detail below, most farmers in Vietnam use limited inputs in the form of stocking materials and feed and are commonly described as using extensive or improved extensive production systems. Other farmers use intensive or semi-

intensive production practices, with higher stocking rates and therefore higher feed requirements. Thus the definition of small-scale has two dimensions, the area devoted to production and the relative intensity of input use. Higher stocking rates and increased feeding represent significant investments of financial capital, equally important as the area under production to distinguish between producers on the continuum from extensive to intensive production.

## REFERENCES

- Anh, P. T. H. I., Bush, S. R., Mol, A. P. J., & Kroeze, C. (2011). The multi-level environmental governance of Vietnamese aquaculture: Global certification, national standards, local cooperatives. *Journal of Environmental Policy & Planning*, *13*, 373–397.
- Bailey, C. (1988). The social consequences of tropical shrimp mariculture development. *Ocean and Shoreline Management*, *11*, 31–44.
- Bair, J. (2008). Global commodity chains: Genealogy and review. In J. Bain (Ed.), *Frontiers of commodity chain research* (pp. 1–34). Stanford: Stanford University Press.
- Béné, C. (2005). The good, the bad and the ugly: Discourse, policy controversies and the role of science in the politics of shrimp farming development. *Development Policy Review*, *23*, 585–614.
- Boyd, C. E., & Clay, J. W. (1998). Shrimp aquaculture and the environment. *Scientific American*, *278*, 58.
- Busch, L., & Bain, C. (2004). New! Improved? The transformation of the global agrifood system. *Rural Sociology*, *69*, 321–346.
- Bush, S. R., & Oosterveer, P. (2007). The missing link: Intersecting governance and trade in the space of place and the space of flows. *Sociologia Ruralis*, *47*, 384–399.
- Chinh, N. (1995). Several ideas on *P. monodon* culture. *Fishery Review*, *1*, 19–21.
- Clancy, M. (1998). Commodity chains, services and development: Theory and preliminary evidence from the tourism industry. *Review of International Political Economy*, *5*, 122–148.
- Deardorff, A. V., & Stern, R. M. (1998). *Measurement of nontariff barriers: Studies in international economics*. Ann Arbor, MI, USA: University of Michigan Press.
- Dolan, C., & Humphrey, J. (2000). Governance and trade in fresh vegetables: The impact of UK supermarkets on the African horticulture industry. *Journal of Development Studies*, *37*, 147.
- Food and Agriculture Organization [FAO]. (2010a). *Fishery and aquaculture statistics, 2008: Aquaculture production*. FAO Retrieved from [ftp://ftp.fao.org/FI/CDrom/CD\\_yearbook\\_2008/navigation/index\\_content\\_aquaculture\\_e.htm#C](ftp://ftp.fao.org/FI/CDrom/CD_yearbook_2008/navigation/index_content_aquaculture_e.htm#C).
- Food and Agriculture Organization [FAO]. (2010b). *Fishery and aquaculture statistics, 2008: Commodities*. FAO Retrieved from [ftp://ftp.fao.org/FI/CDrom/CD\\_yearbook\\_2008/navigation/index\\_content\\_commodities\\_e.htm](ftp://ftp.fao.org/FI/CDrom/CD_yearbook_2008/navigation/index_content_commodities_e.htm).
- Gellert, P. K. (2003). Renegotiating a timber commodity chain: Lessons from Indonesia on the political construction of global commodity chains. *Sociological Forum*, *18*, 53.
- General Statistical Office of Vietnam [GSO]. (2007). *Results of rural, agriculture, and fisheries census in 2006 Hanoi*. Vietnam: General Statistical Office of Vietnam.
- Gereffi, G. (1999). International trade and industrial upgrading in the apparel commodity chain. *Journal of International Economics*, *48*, 37–70.
- Gereffi, G., Humphrey, J., Kaplinsky, R., & Sturgeon, T. J. (2001). Introduction: Globalisation, value chains and development. *IDS Bulletin*, *32*, 1–8.
- Gereffi, G., Humphrey, J., & Sturgeon, T. J. (2005). The governance of global value chains. *Review of International Political Economy*, *12*, 78–104.
- Gereffi, G., & Korzeniewicz, M. (1994a). *Commodity chains and global capitalism*. Westport, CT: Praeger Publishers.
- Gereffi, G., & Korzeniewicz, M. (1994b). The organization of buyer-driven global commodity chains. In G. Gereffi, & M. Korzeniewicz (Eds.), *Commodity chains and global capitalism* (pp. 95–122). Westport, CT: Praeger Publishers.
- Gereffi, G., Lee, J., & Christian, M. (2009). US-based food and agricultural value chains and their relevance to healthy diets. *Journal of Hunger & Environmental Nutrition*, *4*, 357–374.
- Gibbon, P. (2001). Upgrading primary production: A global commodity chain approach. *World Development*, *29*, 345.
- Gibbon, P., & Ponte, S. (2005). *Trading down: Africa, value chains, and the global economy*. Philadelphia, PA: Temple University Press.
- Girvan, N. P. (1987). Transnational corporations and non-fuel primary commodities in developing countries. *World Development*, *15*, 713–740.
- Global Aquaculture Alliance [GAA]. (2012). *Where to buy*. Retrieved from <http://www.gaalliance.org/bap/wheretobuy.php>.
- Global Good Agriculture Practices [GLOBALG.A.P.]. (2012). *Integrated farm assurance version 4; documents aquaculture (english)*. Retrieved from [http://www.globalgap.org/cms/front\\_content.php?idart=1446](http://www.globalgap.org/cms/front_content.php?idart=1446).
- Goss, J., Burch, D., & Rickson, R. (2000). Agri-food restructuring and third world transnationals: Thailand, the CP group and the global shrimp industry. *World Development*, *28*, 513–530.
- Gronski, R. (1997). *Development and degradation: Intensive shrimp culture and ecological rebuke in southern Thailand*. Unpublished PhD Dissertation, University of Missouri, Columbia.
- Guthman, J. (2007). The polanyian way? Voluntary food labels as neoliberal governance. *Antipode*, *39*, 456–478.
- Guthman, J. (2009). Unveiling the unveiling: Commodity chains, commodity fetishism, and the “value” of voluntary, ethical food labels. In J. Bain (Ed.), *Frontiers of commodity chain research* (pp. 190–206). Stanford, CA: Stanford University Press.
- Hall, D. (2004). Explaining the diversity of southeast Asian shrimp aquaculture. *Journal of Agrarian Change*, *4*, 315–335.

- Hatanaka, M. (2010). Certification, partnership, and morality in an organic shrimp network: Rethinking transnational alternative agrifood networks. *World Development*, 38, 706–716.
- Hopkins, T. K., & Wallerstein, I. (1986). Commodity chains in the world-economy prior to 1800. *Review (Fernand Braudel Center)*, 10, 157–170.
- Irvin, G. (1995). Vietnam: Assessing the achievements of *Doi Moi*. *Journal of Development Studies*, 31, 725.
- Islam, M. S. (2008). From pond to plate: Towards a twin-driven commodity chain in Bangladesh shrimp aquaculture. *Food Policy*, 33, 209–223.
- Jonker, T. H., Ito, H., & Fujishima, H. (2004). *Food safety and quality standards in Japan: Compliance of suppliers from developing countries*. Washington, D.C.: World Bank.
- Kagawa, M., & Bailey, C. (2006). Trade linkages in shrimp exports: Japan, Thailand and Vietnam. *Development Policy Review*, 24, 303–319.
- Kaplinsky, R. (2004). Spreading the gains from globalization: What can be learned from value-chain analysis?. *Problems of Economic Transition*, 47, 74–115.
- Kaplinsky, R., & Morris, M. (1999). Trade policy reform and the competitive response in Kwazulu Natal Province, South Africa. *World Development*, 27, 717–737.
- Keefe, A. M., & Jolly, C. M. (2001). Price flexibility and international shrimp supply. *Aquaculture Economics and Management*, 5, 37–48.
- Kenney, M., & Florida, R. (1994). Japanese maquiladoras: Production organization and global commodity chains. *World Development*, 22, 27–44.
- Loc, V. T. T. (2006). *Seafood supply chain quality management: The shrimp supply chain quality improvement perspective of seafood companies in the Mekong Delta, Vietnam*. Unpublished PhD Dissertation, University of Groningen, Groningen.
- Maskus, K. E., & Wilson, J. S. (2001). *Quantifying the impact of technical barriers to trade: Can it be done?: Studies in international economics*. Ann Arbor: University of Michigan Press.
- Menasveta, P. (2002). Improved shrimp growout systems for disease prevention and environmental sustainability in Asia. *Reviews in Fisheries Science*, 10, 391–402.
- Ministry of Agriculture and Rural Development [MARD]. (2009–2012). *Report on implementation of 2008 plan implementation and planning tasks and solutions for agriforestry and fisheries sector in 2009*. Annual administrative report. Hanoi, Vietnam: MARD.
- Ministry of Fisheries [MoF]. (2000–2003). *Report on progress of year 2000–2002 plan implementation and measures for implementation of 2001–2003 fisheries plans*. Hanoi, Vietnam: MoF.
- National Agro-Forestry and Fisheries Quality Assurance Department [NAFIQAD]. (2010). *List of seafood processing enterprises approved to export seafood products to EU, Korea, China, Russia, Brazil, and Japan*. Hanoi, Vietnam: NAFIQAD.
- Neiland, A. E., Soley, N., Varley, J. B., & Whitmarsh, D. J. (2001). Shrimp aquaculture: Economic perspectives for policy development. *Marine Policy*, 25, 265–279.
- Ponte, S. (2002). The 'latte revolution'? Regulation, markets and consumption in the global coffee chain. *World Development*, 30, 1099–1122.
- Ponte, S., & Gibbon, P. (2005). Quality standards, conventions and the governance of global value chains. *Economy and Society*, 34, 1–31.
- Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. New York: The Free Press.
- Primavera, J. H. (1998). Tropical shrimp farming and its sustainability. In S. de Silva (Ed.), *Tropical Mariculture* (pp. 257–289). London: Academic Press.
- Rabach, E., & Kim, E. M. (1994). Where is the chain in commodity chains? The service sector nexus. In G. Gereffi, & M. Korzeniewicz (Eds.), *Commodity chains and global capitalism* (pp. 123–142). Westport, CT: Praeger Publishing.
- Raynolds, L. T. (2002). Consumer/producer links in fair trade coffee networks. *Sociologia Ruralis*, 42, 404.
- Raynolds, L. T. (2004). The globalization of organic agro-food networks. *World Development*, 32, 725–743.
- Ruddle, K. (2011). "Informal" credit systems in fishing communities: Issues and examples from Vietnam. *Human Organization*, 70, 224–232.
- Sapkota, A., Sapkota, A. R., Kucharski, M., Burke, J., McKenzie, S., Walker, P., et al. (2008). Aquaculture practices and potential human health risks: Current knowledge and future priorities. *Environment International*, 34, 1215–1226.
- Skladany, M., & Harris, C. K. (1995). On global pond: International development and commodity chains in the shrimp industry. In P. McMichael (Ed.), *Food and agrarian orders in the world-economy* (pp. 169–191). Westport, Conn. and London: Greenwood, Praeger.
- Stonich, S. C., & Bailey, C. (2000). Resisting the blue revolution: Contending coalitions surrounding industrial shrimp farming. *Human Organization*, 59, 23–36.
- Sturgeon, T. J. (2002). Modular production networks: A new American model of industrial organization. *Industrial and Corporate Change*, 11, 451–496.
- Sturgeon, T. J. (2009). From commodity chains to value chains: Interdisciplinary theory building in an age of globalization. In J. Bair (Ed.), *Frontiers of commodity chain research* (pp. 110–135). Stanford, CA: Stanford University Press.
- Talbot, J. M. (2002). Tropical commodity chains, forward integration strategies and international inequality: Coffee, cocoa and tea. *Review of International Political Economy*, 9, 701–734.
- Talbot, J. M. (2009). The comparative advantages of tropical commodity chain analysis. In J. Bain (Ed.), *Frontiers of commodity chain research* (pp. 93–109). Stanford, CA: Stanford University Press.
- Traesupap, S., Matsuda, Y., & Shima, H. (1999). An econometric estimation of Japanese shrimp supply and demand during the 1990s. *Aquaculture Economics and Management*, 3, 215–221.
- Tran, N., Dinh, T. V., Bui, H. T. T., Trinh, T. Q., Le, K. V., & Tuong, L. P. (2006). The shrimp industry in Vietnam: Status, opportunities and challenges. In A. AtiqRahman, A. H. G. Quddus, B. Pokrant, & M. L. Ali (Eds.), *Shrimp Farming and Industry: Sustainability, Trade and Livelihoods* (pp. 235–254). Dhaka, Bangladesh: The University Press Limited.
- Tran, N., Wilson, N. L. W., & Anders, S. (2012). Standard harmonization as chasing zero (tolerance limits): The impact of veterinary drug residue standards on crustacean imports in the EU, Japan, and North America. *American Journal of Agricultural Economics*, 94(2), 496–502. <http://dx.doi.org/10.1093/ajae/aar079>.
- US General Accounting Office [GAO]. (2001). *Federal oversight of seafood does not sufficiently protect consumers*. Report to the Committee on Agriculture, Nutrition, and Forestry, US Senate (US Senate GAO-01-204) Washington, D.C.: GAO. Retrieved from <http://www.gao.gov/new.items/d01204.pdf>.
- Vandergeest, P. (2007). Certification and communities: Alternatives for regulating the environmental and social impacts of shrimp farming. *World Development*, 35, 1152–1171.
- Vandergeest, P., Flaherty, M., & Miller, P. (1999). A political ecology of shrimp aquaculture in Thailand. *Rural Sociology*, 64, 573–596.
- Vietnamese Institute for Fisheries Economics and Planning [VIFEP]. (2009). *Master plan for crustacean culture development up to 2020*. Hanoi, Vietnam: VIFEP.
- Wal-Mart (2011). *Global responsibility report*. Retrieved from [http://www.walmartstores.com/sites/responsibilityreport/2011/Goal3\\_sell\\_products.aspx](http://www.walmartstores.com/sites/responsibilityreport/2011/Goal3_sell_products.aspx).
- Washington, S., & Ababouch, L. (2011). Private standards and certification in fisheries and aquaculture: Current practice and emerging issues. *FAO fisheries and aquaculture technical paper 553*. Rome: UN Food and Agriculture Organization (FAO).
- Wilson, N. L. W. (2003). Clarifying the alphabet soup of the TBT and the SPS in the WTO. *Drake Journal of Agricultural Law*, 8, 703.
- World Wide Fund for Nature [WWF]. (2007). *Benchmarking study on international aquaculture certification programmes*. Oslo and Zurich: World Wildlife Fund (WWF).