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The Challenge of Adverse Selection to Domestic Seafood Markets in Vietnam: Assessing Consumer Demand and Supply-Side Policy Options

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Abstract

The Vietnamese seafood industry has grown rapidly over the past few decades, largely rallying behind huge foreign demand. Institutions surrounding the production and processing of seafood for export have supported efforts to implement reliable regulations and eco-label certifications in line with demand for safe, environmentally friendly, and otherwise high quality products. No comparable efforts exist in the domestic market. Adverse selection is identified as the core problem with the lack of higher end goods on the domestic market, resulting from asymmetric information between producers and consumers, as well as moral hazard between actors in the supply chain. This study finds that consumers would be willing to pay a premium for credence attributes, or qualities which have values determined by consumer trust in information provided at point-of-purchase, for seafood products, but that they do not trust supermarkets enough to support such a higher end market. It is projected that in the coming years, as a middle class of concerned consumers eating more seafood enter the market, that there will be even bigger discrepancies between what is available relative to demand. It is suggested that in order to overcome adverse selection in the domestic seafood market, policy be implemented that provides additional support to farmer and fisher groups and that more stringently enforces standards that do exist for private and semi-private agents in the value chain. Overcoming the information asymmetries in the domestic market has not only the potential to improve market function and consumer wellbeing, but also to support medium-scale producers and beneficiaries of ecological public goods.

Keywords: Adverse Selection, Moral Hazard, Asymmetric Information, Aquaculture, Fisheries Management, Consumers, Policy, Certification, Vietnam, Supermarkets, Sustainable
Introduction

The past 30 years have brought about profound changes to all aspects of the Vietnamese economy and society, broadly speaking. The Doi Moi reforms, a series of policies implementing market reforms to Vietnam’s version of communism starting in the late 1980s, brought about rapid market liberalization and globalization. One aspect of Vietnamese society and economic structure that has fundamentally shifted over this span of time has been its food systems. Pre-Doi Moi, extremely low levels of consumption, coupled with very limited access to foreign markets, severely limited incentive for improvements in food production and investment. However, once Vietnam opened its economy and had access to markets beyond the Soviet Bloc—most notably the U.S., EU, and Japan—the government saw enormous potential to develop its food industries, particularly shrimp aquaculture geared toward export (Tran et al. 2013). The Vietnamese government invested heavily in promoting high value aquaculture, or seafood farming, as a means of poverty alleviation, capitalizing on the country’s enormous potential for employment in the seafood sector (“Fisheries and Aquaculture Sector Study” 2005; Cuyvers and Van Binh 2008). This focus on a policy of promoting the advance of aquaculture and processing for export has driven tremendous growth in the country’s seafood sector. Vietnam has become the 6th largest overall seafood producer in the world—3rd largest if looking only comparing aquaculture production (Tran et al. 2013). In the period 1985-2008, Vietnam increased the area of land under aquaculture production from 32,100 ha to 530,650 ha (Khai and Yabe 2015). In 2011, Vietnam’s seafood sector directly employed around 700,000 people and was valued at more than 10% of the entire country’s GDP, with a 2012 seafood output of 5.82 million metric tons—more than 4 times 1995 levels (Marschke and Wilkings 2014; Nguyen 2015; Armitage and Marschke 2013). While efforts on promoting the industry have centered on the most popular export products—shrimp and Vietnamese catfish (pangasius)—28% of aquaculture production is still classified as “traditional freshwater fish species” according to
Nguyen (2015). Over time, capture fisheries production has increased as well, though has not been as lucrative for fishermen involved. Capture fisheries are considered by the government to be an important source of rural employment, since there are few alternative sources of income. However, government support is tenuous because wild fisheries are neither as lucrative as aquaculture, nor sustainable, prompting a search for alternative management strategies. While wild catch yields have increased overall, the industry growth has been from new rural fishers entering the capture fisheries market, because per capita yields themselves have decreased under increasing competition and poor management in overfished waters (Viet Anh et al. 2014; P. V. Anh et al. 2014; Dao Manh and Thuoc 2003).

The declining per capita yields of Vietnamese offshore fisheries are indicative of some of the problems which have inevitably developed in the rapid and substantial expansion of an industry that is so integrally tied to environmental, health, and other quality concerns—especially as awareness towards these issues has grown, responding to these concerns has proven even more complicated. Foreign consumers have long been concerned about food safety and the quality of products they purchase imported from Vietnam, stemming from scares over chemical contamination and allegations of fraud which have led to large fluctuations in demand (Marschke and Wilkings 2014). While it has not always been clear that concerns with product quality are justified, there are reasons why making informed decisions about purchases of Vietnamese aquaculture products could have meaningful implications for consumers anywhere. There are water quality concerns affiliated with aquaculture effluent, such as the leakage of nutrients, pesticides, and antibiotics (P. T. Anh et al. 2011; Jonell et al. 2013; Marschke and Wilkings 2014). A significant environmental issue directly linked to aquaculture production, which is gaining significant attention, is the sourcing of feed materials for carnivorous fish. The demand for wild trash fish for use as feed can have very detrimental trophic consequences to Vietnam’s coastal ecosystems, as well as create additional greenhouse gases and pressure on agriculture (Marschke and Wilkings 2014; Jonell et al. 2013;
Armitage and Marschke 2013). While this was generally considered more of a problem in the 1990s, when farms were expanding in mangrove forests, it remains true that when any land is converted to aquaculture, it has the potential for significant habitat alteration, biodiversity loss, opportunity cost, and ecosystem service loss which must be considered (Marschke and Wilkings 2014; Jonell et al. 2013; Armitage and Marschke 2013). Further concerns may include the spread of disease between farmed species and wild species, escape of invasive species, lifecycle energy consumption of production, and seed sourcing issues (Jonell et al. 2013; Marschke and Wilkings 2014).

Seafood importers/exporters have been aware of specific food safety and appearance concerns in Western countries as well as the growing importance of environmental concerns to the purchase decisions of foreign consumers. The United States, the European Union, and Japan have responded to these concerns by adopting regulatory standards for the import of seafood products (Tran et al. 2013). Non-governmental organizations have to fill in policy and market gaps to provide concerned consumers about the quality of products, particularly through eco-label certification schemes (Tran et al. 2013; Ha and Bush 2010). Vietnamese processing companies have worked to meet various standards for export, and the Vietnamese government has long implemented policies to support producers and processors meeting export standards as part of its promotion of aquaculture and seafood processing as a valuable source of economic opportunities (Bush and Belton 2011; Tran et al. 2013; Belton et al. 2011). Many of the standards espoused by the Vietnamese government can be directly attributed to trade deals (Mol 2009). The policies focus on supporting quality of processed seafood because it is the easiest policy target and can be tied to direct foreign market incentives for the industry. However, this system favors the best-off and largest producers and processors, and limits the species covered by certification. And, it limits the degree to which domestic consumers benefit from standards imposed by foreign markets to seafood products that are coming from regulated processors—which is not where the majority of domestic seafood consumption comes from.
Despite the massive size of Asian seafood markets, the lack of perceived domestic demand for certified fish, and export-orientation of existing certification schemes, has prevented locally consumed species, such as carp, from being certified—limiting the overall efficacy of certification efforts (Marschke and Wilkings 2014; Jonell et al. 2013). The domestic seafood market has essentially become a dumping ground for farmers who cannot meet the quality or safety requirements imposed by foreign markets (Loc, Bush, and Sinh 2009).

The Vietnamese aquaculture industry may favor export markets, in terms of quality defined broadly as credence attributes—or qualities dictated by trust between consumer and producer rather than observable by the consumer—and safety, but the institutions surrounding capture fisheries are even poorer and more environmentally costly. Fisheries have been depleted more than twice as fast as what is sustainable, according to a World Bank report (“Fisheries and Aquaculture Sector Study” 2005). “Inappropriate exploitation patterns,” post-harvest loss, and habitat degradation are further concerns facing the very poorly regulated industry (Dao Manh and Thuoc 2003). While some foreign standards have been imposed technically on Vietnamese capture fisheries, there has not been enough interest in wild fisheries for the kind of investment seen in aquaculture management to take place—leaving capture fisheries with comparatively minimal regulation consisting of a few partially successful efforts at co-management, or management based coordinated collective action plans between policymakers and community stakeholders (P. V. Anh et al. 2014).

While existing policy frameworks have proven beneficial for a small number of upper-middle class, large aquaculture producers, and foreign consumers, the focus on high value exports has led to the government largely overlooking: 1) the interests of domestic consumers 2) the potential to improve the livelihoods of smaller scale producers, and 3) the need for further investment in capture fisheries management. This study argues that lack of access to reliable information about quality of food has held back private incentive for market optimization through
the provision of higher credence attributes in seafood. Informational channels are particularly underdeveloped for capture fisheries, where greater information could give a boost to sustainable management and to meeting consumer interests. While extensive supply-side literature exists for analyzing optimal value chain governance in Vietnam, this study seeks to provide original insight into the under-assessed state of consumer demand for seafood of different qualities, relative to consumer trust in supermarkets. The demand of Vietnamese consumers for products with similar attributes to those demanded by Americans, Europeans, and Japanese has gone underappreciated in the cost-benefit analysis of policy formation regarding the allocation of resources toward the seafood industry in Vietnam. Especially as Vietnam’s middle class grows, the under-acknowledged domestic demand for higher quality seafood products may justify more substantial institutional support towards improving the quality of information available to consumers. If effectively implemented, such policies may optimize welfare for a number of producers and consumers alike.

**Asymmetric Information and Food Markets**

This study approaches issues surrounding domestic Vietnamese seafood markets and governance from the perspective of informational asymmetries and the consequences thereof. The existing body of literature surrounding the Vietnamese seafood industry focuses on bridging information gaps for export markets and looking at the costs and benefits of governance from a supply-side perspective across value chains. However, much of the literature downplays the intrinsic significance of the dissemination of information itself as at the core of promoting normative and market improvements to the existing market structures, especially where domestic consumers are concerned. Furthermore, existing literature tends to overlook the potential latent demand in domestic markets for bringing about quality transformations in the seafood supply, emphasizing the driving force of foreign consumers whose interests are
supported by stronger institutions instead. This study finds evidence that it is inappropriate to overlook investment in domestic market credence, because a lack of trust from domestic consumers may have significant effects in holding back sustainable transformations to the industry.

Vietnamese consumers have indeed been keenly aware of food safety issues, particularly chemical food poisoning, for many years, but have been limited in their purchasing decisions out of uncertainty and resulting market failures in providing quality products (Hoang and Nakayasu 2006; Figuie et al. 2004). Media has played an important role in shaping food safety concerns in Vietnam, starting in the 1990s with dramatic scares surrounding chemical contamination of vegetables as chemical usage increased unrestricted in an industrializing food system (Mergenthaler, Weinberger, and Qaim 2009a; Figuie et al. 2004). Mergenthaler, Weinberger, and Qaim (2009) report that 90% of Vietnamese people have heard about food safety issues. While concerns have been most pronounced for vegetables, and consumers are also generally more concerned about fruits and meats than seafood, 37% of people identified that they were worried about the quality of seafood, citing the use of chemical preservatives as their top concern in 2002 (Figuie et al. 2004). Recognizing consumer concerns, the “Safe Vegetables” program was initiated in 1995 to encourage safe growing practices (Mergenthaler, Weinberger, and Qaim 2009a). However, a lack of enforcement of standards, coupled with no effective labeling system led to a lack of consumer trust. This resulted in limited willingness to pay for these premium products (sometimes 2-3 times the price of conventional products), and subsequently, a lack of incentive for producers to actually produce premium products without a clear market or enforcement mechanisms (Mergenthaler, Weinberger, and Qaim 2009a; Mergenthaler, Weinberger, and Qaim 2009b; Hoang and Nakayasu 2006). The market failure from inadequate credibility throws into doubt the efficacy of such a market intervention.

The “Safe Vegetables” program mentioned briefly above is an illustration of many of the problems that face the Vietnamese seafood industry’s apparent inability to supply higher quality
products to domestic consumers regardless of potential demand. Producers have a high degree of knowledge as to the credence attributes of their products, but have no effective way of reliably conveying this information to consumers. This leaves consumers with very little information about the quality of their seafood beyond more traditionally defined, observable qualities such as appearance and taste. This asymmetry of information between sellers and buyers provides incentives for producers, middlemen, supermarkets, and consumers alike to behave in ways that lead to market failures through moral hazard and adverse selection. This prevents any socially optimal market allocation from being reached through market mechanisms. Market and non-market fixes to these problems have been realized in countries with strong support for credence mechanisms, such as those importing Vietnamese seafood. These forces are important to understand in the context of providing new policy support for informational networks in Vietnam.

The overarching market failure problem associated with asymmetric information in this case is adverse selection. Though most commonly applied to insurance markets, this case is very conducive to the analysis George Akerlof established in his famous 1970 article “The Market for "Lemons": Quality Uncertainty and the Market Mechanism.” In markets where consumers cannot be sure of the quality of a product before purchase, sellers have an incentive to attempt to sell low quality products as higher quality products (Akerlof 1970). The market quality of goods is driven down because suppliers of high quality goods face lower gains to trade than suppliers of low quality products that can pass off their products as premium (Akerlof 1970). With no product differentiation, products would have to be sold at the same price, so producers of high quality products would be driven out of the market because in order to sell their products, they would have to accept less than the true value of their product (Akerlof 1970). This could lead to complete market failure as prices and quality are constantly driven down such that nobody is willing to sell or buy the product. In practice though, only a partial market failure is typically seen.
In the case of Vietnamese seafood markets, personal relationships with traditional retailers and the “branding” of supermarkets appear to provide enough consumer trust that a domestic market remains active, but information and trust are still so sparse that adverse selection results in the seafood that is available being much cheaper and lower quality than would be seen under socially optimal market conditions that should exist with perfect information (Hoang and Nakayasu 2006; Figuié and Moustier 2009). The highest quality producers are unaffected by the information asymmetries of the domestic market, because they have technical and logistical support from processors and certifiers in providing information to foreign consumers, and thus have a clear market demand for their product. However, would-be domestic suppliers of higher quality seafood (likely medium scale producers) lack the trust of consumers, so face an incentive to provide cheaper, lower quality goods or exit the market, limiting the development of higher-end domestic seafood markets to meet potential demand and improve social welfare. This partial market failure warrants intervention to increase overall welfare.

Various aspects of the adverse selection model have found use in explaining existing components of Vietnamese food supply chains, and have been explored as a benchmark in the justification of the provision of standards such as “organic” labels in other countries. Seafood retailers face significant moral hazard, or incentive to deceive the other agent in a market interaction (in this case, the supermarket’s customers). While in order to have repeat customers, a supermarket may have incentive to provide an adequate quality good so that consumers are willing to make continued purchases (McCluskey 2000). This incentive does not exist with credence goods such as the seafood where quality is based on unobservable traits (e.g. environmental responsibility, sourcing, and even safety in most cases). Without market intervention, the retailers of these goods likely face low incentive to provide greater quality guarantees relative to the cost of providing more information (McCluskey 2000). In Vietnam, consumers place enough trust in supermarkets that they can pass off lower quality products as
higher quality in some cases, further reducing the incentive to make changes (Moustier et al. 2010). Furthermore, producers themselves face moral hazard on their production practices. While generally knowledgeable about chemical usage, without a way to convey their chemical usage practices to consumers, and with the ability to skirt detection of non-compliance with processors and pass off their seafood as higher quality, some aquaculture farmers don't see an incentive to actually improve their practices (Loc, Bush, and Sinh 2009). When unconcerned about getting caught or facing consequences, another moral hazard incentive exists for middlemen. They have a profit-maximizing incentive to mix different quality products, such as non-certified and certified shrimp, to pass them off as higher quality before bringing them to a collecting station or another middleman (Ha et al. 2012). Without clearly enforced transfer of information between fisheries and consumers, supply-side incentives dictate a system of deception and low quality products at low prices. These downward market pressures exist regardless of whether consumers would be better off and even willing to pay a premium for better, potentially safer and more environmentally responsible products. A 2002 study looking at organic food labels in North America estimated that perfect labeling would increase consumer welfare by 12.5%, but due to the market unraveling caused by asymmetric information, mislabeling of half of organic products would result in consumers opting for conventional products (Giannakas 2002). This makes it easy to see how the high degree of uncertainty among Vietnamese consumers has translated to sub-optimal outcomes and suggests the importance of further investment in regulation of information in the industry. Consumers would be deterred from purchasing higher quality seafood products based on suspicion or doubt about the true nature of such products even if aware of potential quality problems and interested in paying more for trustworthy improvements—ultimately placing the burden of the provision of better products on the information available to consumers (Brecard et al. 2009).
Seafood Value Chains and Governance in Vietnam

In order to better understand the information climate in the Vietnamese seafood industry, as well as the implications of various aspects of the industry and potential governance strategies, it is warranted to take a closer look at existing value chains and the institutions which govern policy in Vietnamese aquaculture and capture fisheries. Global value chains associated with shrimp aquaculture and pangasius aquaculture have been extensively explored in existing literature, illustrating the complicated supply chain factors in these heavily globalized sub-subsectors. However, it becomes readily apparent through these analyses that domestic consumers and small producer considerations are marginalized by existing market structures because foreign markets are perceived as more lucrative, and both foreign and domestic regulatory institutions and certification schemes favor export. This focus on high value exports has sidelined developments and research in more locally consumed aquaculture species, and capture fisheries as a whole.

The large number of middlemen in Vietnamese seafood value chains, especially in domestic supply chains, confound and limit the influence of consumer demand and policy changes on supply-side decision making (Tran et al. 2013; Loc, Bush, and Sinh 2009; Belton et al. 2011; Cuyvers and Van Binh 2008). Processors, who almost entirely supply exporters, have in some cases been able to establish direct linkages to producers or collectives through vertical integration, or at least reduce the number middle traders and increase management of producers (Tran et al. 2013; Loc, Bush, and Sinh 2009; Bush and Belton 2011). This supply consolidation driven by processors has favored a small number of larger, wealthier producers who are able to change their practices and efficiently vertically integrate their operations, whereas small-scale producers and the majority of domestic supply remains heavily fragmented. Many exchanges between producer and retail—even when going to a processing plant, shrimp may change hands five times (Tran et al. 2013; Belton et al. 2011). Initial
collectors and other middlemen often mix products from different farms together before selling larger quantities to wholesalers, making it very difficult to trace the origin, and thus quality of seafood products that go through a chain of middlemen before reaching market outlets—this is especially true when unregistered middlemen are involved, as they don’t even fall under the purview of provincial policy (Tran et al. 2013; Loc, Bush, and Sinh 2009). The larger firms that have been able to integrate have had an easier time covering costs and adopting certification and regulatory standards, whereas coordination of such efforts to small producers supplying the domestic market has been very difficult because of the high technical costs associated of improvements with the fragmented nature of producers (Tran et al. 2013; Jonell et al. 2013; Belton et al. 2011). Where certification schemes have been implemented in Vietnamese seafood value chains, it has been done so largely by foreign certification standards, favoring species that are primarily favored by foreign consumers, inherently limiting the spillover to domestic markets (Jonell et al. 2013). As small farmers have very little negotiating power (having to accept prices set by retailers, processors, middlemen, etc.), and products change hands so many times, producers end up with less profit from the existing system of market linkages (Tran et al. 2013). Furthermore, at least in shrimp production, small scale farmers tend to use less antibiotics, but these may get mixed with products from farms practicing intensive aquaculture, which is likely more contaminated (Tran et al. 2013). Small scale producers may face another quality issue that would affect the credence value of their product. Because of its affordability and flexibility, they are more likely to use homemade feed, which is not as traceable and is not subject to the same safety and quality oversight as commercial feed (Cuyvers and Van Binh 2008; Bush and Belton 2011).

The Vietnamese Ministry of Rural Development (MARD) has established regulation of safety standards in processing plants to assure adherence to the requirements dictated by foreign markets. Many chemicals are outright banned, and some regulation is implemented to oversee the other linkages in the supply chain, both at a national and provincial level (Tran et al.
2013; Cuyvers and Van Binh 2008). It remains unclear to what extent these policies are enforced and whether existing regulation benefits domestic consumers as well. Despite successful regulation of processors the government has had difficulty monitoring scattered traders and producers, and has left much of the regulatory process to foreign NGOs and companies (Tran et al. 2013). Loc, Bush, and Sinh (2009) suggest that there has indeed been a lack of enforcement of environmental regulations, in general, because in order to instate any environmental regulation, the government would initially need to provide support in terms of providing technical resources and credit access to enable producers to cover the costs of improvements. In many places, supermarkets have implemented higher private standards to set their products apart from other markets, and have been able to offer farmers a premium for their products. Vietnam’s heavily decentralized supply chains have posed a challenge for supermarkets to overcome on their own—especially when they face the moral hazard incentive to market their products as a premium without changing much in the supply chain (Moustier et al. 2010).

Regulation in Vietnam’s capture fisheries is even spottier than for aquaculture, and the challenges faced by this subset of the industry are even more significant. While fish from marine fisheries that are destined for export markets go through processing plants that have the same Hazard Analysis Critical Control Point (HACCP) system that aquaculture products do, there appears to be no post-harvest regulation in place to monitor domestic supply, nor does there appear to be any monitoring of environmental stewardship beyond fledgling efforts to introduce certification for export markets (Dao Manh and Thuoc 2003; P. V. Anh et al. 2014). Middlemen play an especially important role in Vietnam’s coastal fisheries where they not only purchase and resell fish, but are also key sources of financing for fishermen and enter into exclusive purchasing arrangements with the fishermen to whom they provide loans (Dao Manh and Thuoc 2003). Middlemen also act as sorters, determine quality, size, and species themselves, selecting high value products for export and low value products for the domestic market (Dao
Manh and Thuoc 2003). Extensive national guidelines exist for managing fisheries, promoting environmental responsibility and fisherman livelihoods, but responsibilities are delegated to local governments, which have had varying degrees of success in sustainably managing coastal fisheries (Dao Manh and Thuoc 2003; Armitage and Marschke 2013; Pomeroy, Thi Nguyen, and Thong 2009). Furthermore, regulations have been very difficult to enforce in many instances due to technical constraints and relatively large incentives for individual non-compliance (Dao Manh and Thuoc 2003; P. V. Anh et al. 2014; Pomeroy, Thi Nguyen, and Thong 2009). Much of the challenge has been in taking local livelihoods into consideration in fishery management, as fishermen in capture fisheries tend to be very poor and lack alternative sources of income, unlike aquaculture producers (Dao Manh and Thuoc 2003; P. V. Anh et al. 2014; Pomeroy, Thi Nguyen, and Thong 2009). While co-management has expanded in recent years, environmental considerations remain the pressing concern with wild seafood products in Vietnam as destructive fishing practices continue and harvests still exceed sustainable yields (Dao Manh and Thuoc 2003; Armitage and Marschke 2013; Pomeroy, Thi Nguyen, and Thong 2009). Resulting in part from poverty in coastal communities, the continued degradation of fisheries is also a source of hardship as economic opportunities decline under unsustainable management regimes (Pomeroy, Thi Nguyen, and Thong 2009).

**Vietnamese Seafood Consumers**

Existing literature clearly delineates the problems with the Vietnamese seafood industry. Analysis of value chains and their governance in the context of asymmetric information has the potential to inform policy to improve the quality of domestic seafood and potentially improve the wellbeing of middle class consumers and even some producers. Evidence of latent demand among domestic consumers for better seafood products is necessary to provide justification for the theory that adverse selection is indeed causing a market failure in Vietnam. This research
seeks to provide original insight to this question based on a smaller body of existing demand-side literature as justification for future information based interventions to domestic seafood markets.

Seafood consumption in Vietnam is growing, and is already one of the largest components of Vietnamese diets, and major source of protein consumption (Figuié 2003; Armitage and Marschke 2013). Vietnamese incomes are growing rapidly—between 2002 and 2010 per capita expenditures nearly doubled (K. Hoang and H. Meyers 2016). As Vietnamese incomes continue to rise, and it continues to urbanize, consumption of seafood can be expected to increase even more, increasing several percent a year as it has been in recent years (K. Hoang and H. Meyers 2016; Jonell et al. 2013). Hoang and Meyers (2016), taking into account growing incomes and urbanization, predict that Vietnamese meat and fish consumption could increase to between 32.3 and 50.5 kg by 2020 and 37.5 to 80.1 kg in 2030 from 27 kg in 2010. Regardless of the specific increases in seafood consumption, the market for seafood products in Vietnam will grow substantially in coming years irrespective of quality. However, it seems that credence attributes will make a difference given that Vietnamese consumers are interested in food safety, which has already been discussed, and that they may also have a potential interest in environmental conservation, for which research is still just beginning

While very little literature exists assessing consumer valuation of environmental preservation, what does exist suggests that consumers would be willing to pay to protect the environment. Khai and Yabe (2015) found that consumers in the Mekong Delta were not willing to pay a high enough premium to cover costs of certification for agriculture products to preserve individual species, but were quite responsive eco-labels that could be more directly tied to personal benefit, such as pesticide reduction and organic certification. Willingness to pay to preserve biodiversity in a broader sense was around the hypothetical cost of certification (Khai and Yabe 2015). It is not clear how the costs of meeting certification standards in practice would relate to the benchmark cost used in the study, whether results would be the same for seafood,
or whether the results would be applicable to other markets in Vietnam, but nevertheless shows the potential market for products tied to credence information within Vietnam itself. The study also found that younger, better educated consumers tended to be more willing to pay, suggesting the potential for a larger market for trustworthy, high quality seafood products in the coming years as this band of consumers gains purchasing power. The trend of increased willingness to pay with income and other similar results were seen in another study in the Mekong Delta, which specifically used contingent valuation methods to determine consumers would pay a 59% premium for organic vegetables (Khai 2015). That same study, however, cautioned that while safety concerns translate to higher willingness to pay for safety attributes, environmental concerns did not necessarily translate to purchasing organic products (Khai 2015).

Supermarkets themselves have played an interesting role in existing literature. The interactions they facilitate between suppliers and consumers in Vietnam make them an important target for the original data collected for this report. Existing literature suggests that consumers prefer alternative markets, if they have a personal relationship with the retailer, but believe supermarkets are more reliable than random informal retailers (Hoang and Nakayasu 2006; Figuié and Moustier 2009). In the case of “Safe Vegetables,” research suggests that consumers may not really understand the implications of different labeling, and trust supermarket labeling more than they should, due to the likely misplaced belief that a supermarket closely monitors its supply chain and justifiably charges higher prices than traditional markets (Hoang and Nakayasu 2006; Figuié and Moustier 2009). Supermarkets have the potential to make greater changes than they do. However, without further changes in the information available to consumers, they are likely to deceive them. Their potential for improvement, but current state as beneficiaries of moral hazard, makes them integral to the analysis of consumer demand and seafood market outcomes in Vietnam. Low income consumers are less likely to shop at supermarkets in Vietnam than middle class or wealthy
consumers (Figuié and Moustier 2009). This means that studying supermarkets may produce a biased sample of consumers, but it is efficient for the purposes of this study, as middle income consumers have been identified as the consumers of greatest interest in considering the role of information in seafood market conditions. While addressing the concerns of middle class consumers may lead to social justice concerns in the long run, it is the most cost-effective start to addressing seafood supply concerns in Vietnam. Furthermore, the potential benefits to producers, and beneficiaries of the public good of fisheries management must be considered in any discussion of potential food justice concerns, so as not to understate the reach of benefits that management efforts primarily targeting middle class consumers may have. Thus, trust in supermarkets is a crucial means of analysis for consumer valuation of seafood credence attributes.

**Methodology**

*Study Design and Sample Data*

Data was collected over approximately two weeks in the beginning of April, 2016. A total of 162 consumers were asked to take the survey. There were four incomplete and unusable forms, and 67 complete forms used for analysis, making for a response rate of 41.36% (though the response rate on willingness to pay questions was actually much lower). The survey was conducted in two supermarkets in Ho Chi Minh City and two supermarkets in Hanoi. The surveys were written in English and translated to Vietnamese by three separate translators to assure accurate translations—nevertheless, several survey questions were thrown out (including one assessing employment status). Randomization was attempted for supermarket selection and survey timing, but resistance from supermarket chains severely limited options for data collection, introducing a potential source of bias (only three foreign chains allowed the study, even with two government notarized support letters) and substantially reducing the
amount of data collected. While the locations of supermarkets and consumers sampled at each varied, there may still be bias that cannot be discerned by the researcher due to the inability to randomize supermarket selection. Although the intent of the survey process was to collect opinions of a sample of “all supermarket shoppers in Ho Chi Minh City and Hanoi,” the constraints placed on survey collection make it difficult to claim that results reflect “all.” However, results, to the degree they are statistically significant given the small sample size, are consistent with what previous literature reports for results—suggesting minimal selection bias. Cities were originally intended to be strata, but due to small response (especially in Ho Chi Minh City where only 23 samples were collected), the data was pooled to increase statistical significance. Though the demographic characteristics of the samples from each city were not completely analogous, there was no statistically significant difference in supermarket trust, seafood purchase frequency, or most other non-demographic responses—however, Hanoi consumers purchase a statistically significantly greater amount of seafood from non-supermarket retailers, and Ho Chi Minh City consumers care more about whether their seafood is imported). Therefore, for the purposes of the analysis presented in this study, the pooled sample will suffice. Were a larger sample possible, the two cities as a dummy may prove useful for some analysis due to subtle cultural differences between the two populations (Mergenthaler, Weinberger, and Qaim 2009b; Figuié and Moustier 2009). The demographic characteristics of the pooled sample population are reported in Table 1. Stratification of data collection was attempted along gender and age lines to establish a representative sample. However, lower than expected response rates, coupled with poor compliance to survey guidelines among research team volunteers prevented quotas from being filled as designed, and presenting a source of bias in analysis—this resulted in more females than males taking the survey because of the higher frequency with which they shopped as well as a probable higher response rate. A systemic sampling method was used for randomization in conjunction with quota sampling at each location—every 5th person entering the supermarket was asked to complete a survey.
Younger people tended to be more likely to respond than older consumers. There is strong existing evidence that young and female consumers are more likely to be supportive of addressing environmental issues (Brecard et al. 2009). Survey participants may have been thrown off when selecting the importance of various credence attributes due to a late-discovered translation error that may have left some thinking the question was asking about trust (this effect is evidenced by a lack of significant Pearson correlation between several attribute-importance questions and their corresponding willingness to pay questions). Because of this error, looking at the importance of seafood characteristics alone does not reveal much. The importance consumers attribute to certain seafood attributes logically correlates to both purchase frequency and willingness to pay. Such trends would be expected were a larger sample available and sample data not biased by poor question wording. Surveyors suggest that one of the reasons for a particularly low response rate to willingness to pay questions was that consumers found it difficult to assign a specific monetary premium to individual credence attributes. The effect this may have had is difficult to take under consideration, and will be further explored in the discussion of the results. Time and technical constraints prevented the use of more robust willingness to pay methodology, such as contingent valuation or revealed preferences, to reduce this problem. Furthermore, time and technical restraints made a larger, more purely randomized sample unfeasible. More robust studies may be warranted as a follow up to this study to determine more precise cost-benefit calculations in determining the appropriate scale of policy intervention.
Table 1. Demographic Characteristics of Pooled Sample and Supermarket Trust

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24</td>
<td>35.82</td>
</tr>
<tr>
<td>Female</td>
<td>43</td>
<td>64.18</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>21</td>
<td>31.34</td>
</tr>
<tr>
<td>26-35</td>
<td>15</td>
<td>22.39</td>
</tr>
<tr>
<td>36-55</td>
<td>25</td>
<td>37.31</td>
</tr>
<tr>
<td>56+</td>
<td>6</td>
<td>8.96</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>2</td>
<td>3.03</td>
</tr>
<tr>
<td>High school</td>
<td>2</td>
<td>3.03</td>
</tr>
<tr>
<td>College or above</td>
<td>62</td>
<td>93.94</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Income</td>
<td>11</td>
<td>16.42</td>
</tr>
<tr>
<td>(0-5.000.000 VND/Mo)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle Income</td>
<td>45</td>
<td>67.17</td>
</tr>
<tr>
<td>(5.000.001-20.000.000 VND/Mo)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Income</td>
<td>11</td>
<td>16.42</td>
</tr>
<tr>
<td>(&gt;20.000.000 VND/Mo)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Media Use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;2 hours/Day</td>
<td>49</td>
<td>73.14</td>
</tr>
<tr>
<td>&gt;2 Hours/Day</td>
<td>18</td>
<td>26.87</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Supermarket Trust</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distrust/neutral</td>
<td>42</td>
<td>62.69%</td>
</tr>
<tr>
<td>Trust</td>
<td>25</td>
<td>37.31%</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Author’s Calculation from Supermarket Survey Data
*The official exchange rate in April, 2016 was 1 USD = 22,300 VND
Statistical Justification and Regression Modelling

The correlation between domestic policy understanding and supermarket trust is only statistically significant using a Pearson correlation statistic—perhaps a reflection of the ambiguity of domestic policy currently, which likely downplays its significance in how consumers trust their food supply. Given a larger sample size, or perhaps policy playing a more distinct role in domestic supply chains, a more significant correlation would logically be expected and warrant its inclusion in the regression modeling. A lack of correlation between domestic policy understanding and willingness to pay responses, is likely further evidence of the ambiguity surrounding policy’s role in domestic seafood supply at the moment.

Likely due in part to a small sample size, very limited correlations were found between demographic characteristics and trust. Of the sociodemographic characteristics assessed, only age, gender, and income provide statistically significant correlations. Gender is significantly correlated with trust in supermarkets at a 97.5% level of confidence, only according to a Spearman correlation statistic. Age is significantly correlated with trust at a 95% level using a Pearson correlation statistic, but not for the potentially more applicable Spearman correlation statistic. Income is significantly correlated with trust with a 99% level of significance using a Pearson correlation statistic, but it too fails to provide significant results using a Spearman correlation statistic. Income and age are themselves highly correlated, at a 99.9% level of significance for both tests, which is a logical correlation given an assumption of career income growth. In terms of data analysis however, this could be a source of significant multicollinearity—as they convey very similar, but discrete demographic information. This multicollinearity likely substantially increases the standard errors in regression modelling, which is of particular concern given the small sample size of the study, and could help explain the lack of statistically significant regression models.

There are not significant correlations between trust and purchase frequencies. This result may indicate that seafood quality changes how consumers value seafood more than it
changes the quantity consumers are willing to purchase. However, it is also probable that the small sample size is a significant factor in the lack of correlation, given the likelihood that logically there would be some correlation. Unfortunately, due to small sample size and lack of statistical power, there were no statistically significant results positively correlating access to greater information and higher trust in supermarkets with increased purchases. However, it is expected that these results are likely with further sampling, given the trend already seen with just over 30 samples and consumers’ views of certain attributes being determinants of making purchases.

The regression analysis for this study was originally intended to include both a regression of trust in supermarkets on sociodemographic factors, and one regressing supermarket purchase frequency on sociodemographic factors, access to information, importance placed on credence attributes, and consumer trust. Unfortunately, the small sample size only resulted in significant results for a probit model of the former—assessing how demographic variables predict trust—due to a significant lack of correlation between variables that should logically be correlated, as has been seen above. The probit model with robust correlations is presented here.

Probit Regression Model:

\[ Y = \beta X + \epsilon \]

\[ y_i = \begin{cases} 1 & p_i \\ 0 & 1 - p_i \end{cases} \]

Assumption of normal standard error distribution:

\[ \Phi^{-1}(p_i) = \sum_{k=0}^{k=n} \beta_k x_{ik} \]

\[ \Pr(y_i = 1|x_i) = \Phi(x_i\beta') \]
This regression model uses the binary outcome of trust in supermarkets \((y=1)\) versus indifference or distrust \((y=0)\) as the dependent variable. For the probit model \(\beta X\) represents normally distributed \(z\)-values \((Z \sim N(1,0))\) for sociodemographic variables. Education was dropped from the model because it is a perfect predictor of trust (doesn’t add any explanatory power to the model) with the small sample size. Media use was dropped from the model because it was not found to be significantly correlated with trust by either a Spearman or Pearson correlation statistic. Significant correlations were found for other elements of the model. The distribution of sample errors is represented by \(\varepsilon\). This model uses the assumption that errors follow the standard normal distribution \((\varepsilon \sim N(1,0))\). Regression results represent coefficient \(\beta_i\) changes to the \(z\)-score for \(y\) per unit change in \(x\). Marginal effects are also given for statistically significant results, indicating predicted changes in \(y\) per unit change in \(x\).

**Results**

A two-sample t-test with equal variances reveals at a 92.5% confidence level \((P=.0735)\) that 18-25 year olds have less trust in supermarkets. The probit regression model (Table 2) also found that being age 26-35 and 36-55 were statistically significant predictors of increased trust \((P=.071\) and \(P=.033)\). This modelling also found that consumers identified as female are negatively correlated with trust \((P=.071)\). This result is replicated in a t-test of mean trust between men and women showing that women have statistically significant lower trust at the 98% level of confidence \((P=.0129)\). This has important implications since the population of supermarket shoppers is heavily skewed toward women. A particular lack of trust within this group could limit purchases and expenditures if trust determines demand. While the sample size

**The assumption that errors follow the standard normal distribution is actually violated by an empirical test of the data. However, the assumption would logically hold given a large enough sample size, so in accordance with convention, the model may still be applied. A logit model using the standard logistic normal distribution for sample errors \((\varepsilon \sim \text{logistic}(1,0))\) was run to test the robustness of the probit model, and nearly identical results were found.**
is not large enough for a robust regression supporting this hypothesized correlation between trust and purchasing decisions, it seems likely that this is the case given the self-reported willingness to pay premiums for credence attributes (Table 3).

<table>
<thead>
<tr>
<th>Table 2. Probit Regression of Trust in Supermarkets on Age and Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Age 26-35</td>
</tr>
<tr>
<td>Age 36-55</td>
</tr>
<tr>
<td>Age 56+</td>
</tr>
<tr>
<td>Middle Income</td>
</tr>
<tr>
<td>Upper Income</td>
</tr>
<tr>
<td>Constant</td>
</tr>
</tbody>
</table>

Source: Author’s Calculation from Supermarket Survey Data

It is interesting to consider a t-test of supermarket seafood purchase frequency among middle income consumers compared to other income groups—middle income consumers purchase more seafood than other income groups at a 98% level of confidence (P=.0105). This is consistent with the findings of Mergenthaler, Weinberger, and Qaim (2009), who report that willingness to pay is highly correlated with household income in Vietnam. Likely due to small sample size, other demographic data collected is not correlated with seafood purchase frequencies. If younger consumers have less trust in supermarkets—as the prior t-test results and regression model suggest—and continue to lack trust in supermarkets as they move into the middle income group, consumption levels of seafood may be lackluster if that distrust translates into alternative or reduced purchases. The age group 36-55 places statistically significantly (P=.0051) more importance on health and safety than other age groups. This is
likely a reflection of this age group having a statistically significantly larger income than other age groups (P=.0001)—with a mean income difference more than 1.5 income groups higher—giving them greater purchasing power to be selective about the quality of products they choose. Hoang and Nakayasu (2006) found middle age and higher income Vietnamese consumers were more likely to opt for food products perceived as higher quality. It is also likely that members of this age group have families, which may be a factor in their purchase decisions—unfortunately, data on families was not collected.

A broader look at confidence intervals in the data collected reveals that supermarket shoppers have a neutral to slightly positive trust in supermarkets. They trust supermarkets about as much as other markets, such as traditional informal retailers, maybe slightly more on average. They have a moderate to slightly poor understanding of domestic policies effecting seafood supply. There was no statistically significant difference in number of monthly seafood purchases from supermarkets and other sources.

Reported willingness to pay for products identified as having different qualities varied, but overall willingness to pay is likely significant enough to cover some of the costs of any structural changes to the supply chain. Results are reported in Table 3. In the U.S., consumers pay an average premium of 25-30% for organic goods (McCluskey 2000). It is not known, and cannot be determined accurately what sweeping policy changes in Vietnam could cost, or what the changes in market price would be, but using U.S. organic price premiums as a benchmark, it seems plausible that the average consumer would be willing to buy the product, were reliable information available providing guarantee of its credence attributes. It is particularly interesting to note that both farmed and wild, as well as domestic and international, had significant premiums in terms of willingness to pay in the eyes of consumers. This would suggest that the information itself is valuable to consumers and takes precedent over other concerns, such as the origin of the seafood product. It is also possible that a label such as farmed or domestic alone is enough information to inform an educated purchase decision. The willingness to pay
results of this study suggest a willingness to pay for environmental attributes, which is in line with previous studies of food labelling in the Mekong Delta (Khai and Yabe 2015; Khai 2015). These results will add to a still minimal body of literature regarding the growth of environmental awareness amongst Vietnamese consumers. Health and safety, as well as interest in product “freshness” remain top concerns among Vietnamese consumers. It is interesting to note the importance that consumers appear to place on “wild” seafood because that alone could drive demand for environmentally destructive supply-side behavior if not tied to responsible environmental stewardship.

Table 3. Estimated Willingness to Pay for Seafood Attributes

<table>
<thead>
<tr>
<th></th>
<th>Observations</th>
<th>Mean</th>
<th>Standard Error</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthier/Safer</td>
<td>32</td>
<td>26.34375</td>
<td>4.421951</td>
<td>17.32512 35.36238</td>
</tr>
<tr>
<td>Freshness</td>
<td>24</td>
<td>29.54167</td>
<td>5.586192</td>
<td>17.98575 41.09759</td>
</tr>
<tr>
<td>Wild</td>
<td>25</td>
<td>27.02</td>
<td>5.731381</td>
<td>15.19101 38.84899</td>
</tr>
<tr>
<td>Environmental Responsibility</td>
<td>25</td>
<td>24.22</td>
<td>5.615609</td>
<td>12.62995 35.81005</td>
</tr>
<tr>
<td>International</td>
<td>23</td>
<td>22.30435</td>
<td>5.47639</td>
<td>10.94701 33.66169</td>
</tr>
<tr>
<td>Domestic</td>
<td>25</td>
<td>21.82</td>
<td>5.188198</td>
<td>11.11209 32.52791</td>
</tr>
<tr>
<td>Farmed</td>
<td>24</td>
<td>18.97917</td>
<td>4.063856</td>
<td>10.57244 27.38589</td>
</tr>
</tbody>
</table>

Source: Author’s Calculations from Supermarket Survey Data

Trust in supermarkets and willingness to pay for health and safety are highly correlated. The more trust consumers have in supermarkets, the more they appear willing to pay for products that have been labeled assuring that they are safe. This may be indicative of the importance of trust in consumer decision-making as to whether they purchase premium products at supermarkets. Trust was not found to be correlated with willingness to pay for any other credence attributes, likely a result of small sample size. The willingness to pay for premium attributes given reliable information expressed by consumers, coupled with the current
lack of trust in supermarkets would suggest that with a larger sample size, more correlation would be found between trust and willingness to pay.

**Discussion**

Assessing these results in the context of existing literature provides further insight on how the data gathered may reflect broader consumer interests and translate to sound policy actions. It is important to note that intentions do not always translate to purchase decisions in practice. Brecard et al. (2009) reports that the European Commission found that while 75% of European consumers indicate a willingness to pay a premium for environmentally responsible products, in practice, only 17% reported that they did indeed make such purchases recently. The study cites a lack of reliable consumer information to be a key contributing factor to this phenomenon (Brecard et al. 2009). This is one of the reasons that this study seeks to promote improved consumer information as the primary means by which to bring about industry change and promote social welfare. However, the European study also cites the consumer concern that making environmentally responsible purchases means consuming less overall, which could have an impact on Vietnamese consumers regardless of the availability of information if prices are higher (Brecard et al. 2009).

While neither contingent valuation nor revealed preferences were used to valuate consumer willingness to pay, and a small sample size may introduce further bias, there is good reason to believe from existing literature that the results are indeed indicative of a strong latent demand for better seafood. Consumers are likely to tie together health and environmental concerns when making seafood purchase decisions, providing both intrinsic and extrinsic motivations for the purchase of environmentally responsible seafood (Brecard et al. 2009). This bundling of attributes may reinforce consumer willingness to pay for products that can be attributed to addressing multiple of their credence concerns. Furthermore, government
regulations and non-governmental channels through which people can directly or indirectly address their concerns on matters such as environmental sustainability or food safety, may reduce willingness to pay for those attributes by crowding out individual incentive to take action (Brecard et al. 2009). This is because consumers may feel as if their concerns are already being ameliorated by other means, or that collective action is already addressing an issue that may be relevant to purchase decisions, such that individual action seems less important. For example, the promotion of ecological sustainability through food purchases, which can be seen as a public good, is less likely to gain additional support from individuals who already feel they are contributing to environmental causes through an NGO, if they believe many other people are, or if there is extensive government policy protecting the environment (Brecard et al. 2009). In Vietnam, where civil society environmental groups are heavily restricted by the government, and the government has done little itself to promote food safety or enforce environmental standards, the opposite effect may be expected where consumers are willing to pay a significant premium to make up for the lack of other channels addressing their concerns (Mol 2009; Mergenthaler, Weinberger, and Qaim 2009a). There is no effective way of measuring the magnitude of this reverse crowding-out effect, as compared to the magnitude to which respondents may have inflated their willingness to pay, not accounting for the loss aversion effects that can limit price premiums paid at the point of purchase.

Policy Recommendations

A common concern echoed throughout the existing body of literature on expanding high-quality seafood supply, follows from basic economic theory—that producers will not invest in improvements if it is not to match a clear market demand that would benefit them (Ha and Bush 2010; Ha et al. 2012; Marschke and Wilkings 2014). Furthermore, certification schemes are often implemented with the intent that if “top performers” can be certified, it would apply
pressure to the whole industry to make improvements and bring about more dramatic social 
benefits (Jonell et al. 2013). However, this seems extremely unlikely if the producers facing 
higher costs to improve their practices do not see clear incentive to do so—or even see 
incentive to produce at very low costs and quality, which has been seen as the case under 
market competition with adverse selection. The data analyzed for this study suggests that 
demand may exist, and that the potential for broader change is already latent. Given the 
importance of demand-side pressures to the industry, policy must take a more proactive 
approach to improving product traceability, in the hope that market incentives will drive further 
Pareto-improving changes. As suggested by Ha and Bush (2010), the success of certification of 
higher quality products is determined by the transparent exchange of information by 
stakeslloes in the supply chain—not only do consumers need to trust the source of the product 
to make a purchase, but individual actors along the value chain must trust each other for 
efficient transactions and for the carry-over of market incentives from consumers to producers. 
This is a challenge with which stakeholders in the Vietnamese supply chain have struggled, 
especially in less consolidated domestic supply-side networks. A growing body of evidence from 
a variety of policy experiments may provide the outlines for governance changes that would 
more efficiently address informational concerns. Part of the problem driving inadequate 
investment in regulation of the Vietnamese seafood industry has likely been the high costs of 
organization in such a large and scattered industry, relative to low perceived benefits to a 
concentrated group of stakeholders. This study has already shown that prior estimates of the 
benefits of greater intervention may be underplayed, while in the following paragraphs it 
suggests ways in which the costs may be lowered. The changes recommended can neither be 
implemented by the government nor by non-governmental entities alone, as this study suggests 
that sharing in the costs may lead to the most efficient realization of socially optimal outcomes. 
The government should play an important role in facilitating transformations in the governance 
of the industry in partnership with private entities if the reliability of information in the industry is
to be improved and trust established. This approach to governance is likely to prompt the market to provide products of a more optimal quality for domestic consumers and help accomplish broader policy objectives, including public health and ecological sustainability. The government may also be able to take a more global approach to how it regulates the industry in order to address issues that span the supply chain, including energy usage and sourcing of feed (Jonell et al. 2013).

In the past few years, the Vietnamese government has implemented its own certification scheme, VietGAP. The effort aims to have 80% of aquaculture farms compliant with certification standards by 2020 (Armitage and Marschke 2013). VietGAP is intended to be a gateway of sorts to other certification schemes. Its standards may not be quite as stringent as existing certification schemes, but are quite similar, leading many farmers view it as the most realistic certification option (Marschke and Wilkings 2014). VietGAP covers certification costs, but the standards are estimated to add 20%-25% in production costs, which is still difficult for many farmers to cover, especially when faced with the uncertainty of how much they could charge, the uncertainly of demand, and the uncertainty of how money will transfer through the supply chain (Marschke and Wilkings 2014). So while the broader scope, and clear ambition of the program are a step in the right direction, the Vietnamese government will need to do more to support farmers adopting the measures, and ensure that consumers are educated about measures taken to improve tractability so that consumers know they are getting a better quality product. A concentrated effort will especially be needed to see that more than the “low-hanging fruit” of high performers are included in broader industry regulation schemes. In including more producers, the magnitude of environmental improvements can increase and more producers can see economic benefits, leading to greater social benefits. The government has the potential to help balance trust in labeling with expanding coverage, something that certifiers have struggled to accomplish (Jonell et al. 2013). Furthermore, using the Safe Vegetable program as a lesson, quality standards and labelling must not be completely decentralized, and
enforcement mechanisms must be in place in order for schemes going forward to be successful, and to be trusted by consumers (Mergenthaler, Weinberger, and Qaim 2009a).

**Associations and Investment in Small Producers**

Though not completely analogous from a policy standpoint, the challenges associated with increasing accountability and improving production quality in capture fisheries and aquaculture are largely factors of organizational obstacles and high technical costs which may be best approached through collective action. Top-down management in Vietnam’s coastal fisheries has been ineffective because of an inability to cost effectively enforce regulations and address underlying economic motivations for fisheries exploitation. Developing co-management programs has been a promising, more localized, attempt to overcome the challenges facing industry regulation—but these efforts have been under supported thus far (Pomeroy, Thi Nguyen, and Thong 2009). To reduce the costs of managing a vast number of fishers, and in order to better address the concerns of fishing communities in the management process, fishing associations have been developed. Fishers view these groups as a means to be involved in decision making, a source of incentive for collaboration, an opportunity to be engaged in discussion with authorities, a way to learn about important fisheries issues and to support land use rights, and a way of actually monitoring fishing areas (Armitage and Marschke 2013). These efforts suggest improvements in collective action and environmental improvements are attainable, if not guaranteed (Armitage and Marschke 2013). The Vietnamese government has identified a number of objectives to achieve sustainable coastal fisheries, including productivity/efficiency, distributional equality, environmental integrity, efficient water and land use, and institutional efficiency and effectiveness (Dao Manh and Thuoc 2003). Overlooked in these objectives, however, is the potential for fishers’ associations to increase the traceability of their products and the potential to provide a market incentive to further the other co-management objectives. These associations, developed in conjunction with co-management
efforts, may be the best way of improving the reliability of capture fishery quality if they can reduce technical costs of changes in record keeping for their members, and increase their market position by reducing reliance on middlemen and establishing more direct links with processors and retailers. While privileged market access can provide an incentive on its own, if these groups are able to accomplish these supply-side changes, they may even be able to market their products for a premium, which would offer further incentive for compliance with regulatory standards improved ecological stewardship. These concepts, which have the potential to bring broader improvements to Vietnam’s capture fisheries. Using organizations to improve the transfer of information and establish market incentives has been much more extensively explored in Vietnam’s aquaculture. Collectives of aquaculture farmers have proved promising mechanisms of improvement, but there is a need for greater investment in small producers to bring about larger changes.

More holistic regulatory approaches may ultimately be necessary to improve the reliability of information at supermarkets for consumers to express their demand for better products, but farmer organizations are one of the most promising singular changes that can be implemented. Farmer groups bring together farmers to share knowledge and financial costs associated with adopting standards, while providing more direct connections between producers and sellers, and increasing the transfer of information between producer and consumer (Moustier et al. 2010). Farmer organizations have more negotiating power and reduced technical costs than individual farmers through economies of scale, so they are able to cut out some middlemen (Moustier et al. 2010; Ha et al. 2012). Farmers are able to provide more reliable information to consumers, and are driven by profits to improve their standards and realize greater price premiums for doing so, due to fewer supply chain transfers (Moustier et al. 2010). Farmers involved in group certification efforts face a collective action problem without adequate enforcement mechanisms. The transparency they seek to promote, and which provides a basis for consumer trust and thus a market incentive for improvements, is
undermined by an individual incentive for each farmer to attempt to free ride within the group (Marschke and Wilkings 2014; Kalfagianni and Pattberg 2013). This moral hazard should be overcome with social re-enforcement mechanisms, such as those which have been effective in microfinance (Kodongo and Kendi 2013). Individual profitability can be tied to collective success or failure, providing low cost incentive for mutual enforcement of standards within the group, reinforcing the market incentives to comply with standards by raising the costs of deviating from what is expected of farmers under the collective active action and causing group failure if regulation finds non-compliance. Through these internal, social enforcement mechanisms, and economies of scale, farmer groups make for a very cost-effective way of implementing successful certification efforts (Ha et al. 2012; Bush and Belton 2011). Farmer groups have proven an important aspect of vertical integration with processing companies, and it is likely that they would be crucial to expanding the role of supermarkets in the supply chain. These groups have been the most efficient way for farmers to meet the standards of processors (Bush and Belton 2011). The have not only allowed for improved upstream control of and reliability of quality, but have provided farmers additional incentive for compliance through the reliable source of income they provide (Bush and Belton 2011). The government and international organizations alike have recognized the worth of such aquaculture organizations (Ha and Bush 2010). Though the government has been supportive, it seems that in many instances, a more proactive role by the government would lead to a higher degree of success, and likely more trust from consumers. The limited supporting role of the government thus far has meant that the greatest success has been seen with larger producers, limiting the impact of existing efforts, and necessitating more active government involvement to realize the greater benefits that are possible from farm groups (Ha and Bush 2010).

Small scale producers have limited negotiating power when purchasing inputs in terms of quality or price, practice less sustainable aquaculture, lack market power and formal contracts when selling their products (leaving them vulnerable to market fluctuations), have
higher transaction costs, have limited access to credit at reasonable interest rates, may lack technical information, are generally out of reach from government policy, and may be structurally or infrastructural excluded from more vertically integrated markets (Tran et al. 2013; Cuyvers and Van Binh 2008; Belton et al. 2011; Jonell et al. 2013; Marschke and Wilkings 2014). This severely limits their ability to meet certification standards or convey information to consumers. As farmer groups reduce the costs of making changes and may allow for more reliable information transfer, they could have valuable applications not only through private institutions that support collectives of larger farms, but through broader government support for somewhat smaller scale producers. Strategic support of these smaller farmers with collective integration of tractability elements has the potential to provide expanded market opportunities for producers, improve provision of environmental and health public goods, and improve consumer welfare. However, an initial case of implementing ‘best management practices’ (BMP) with clusters of small shrimp farmers in India suggests that while small producers can be involved in successful production improvements, it requires substantial financial and institutional support (Belton et al. 2011). A separate study in the Mekong Delta found similar results, suggesting that farmer cooperatives helped small farmers meet standards, improve efficiency, and improve their negotiation position, but that these changes were not without limitations dealing with financing and technical knowledge (P. T. Anh et al. 2011). Government support for certification alone likely is not enough for smaller farmers, who will need further technical and financial support to actually improve capacity and meet standards, or will not be able to provide traceable, higher quality products regardless of demand (Marschke and Wilkings 2014; P. T. Anh et al. 2011; Moustier et al. 2010). While this may suggest the investment is not appropriate in all cases when it remains costly even with farmer groups, it seems that the cost-benefit analysis may favor some further investment, at least among mid-level producers who cannot readily meet export standards, but are unlikely to disappear from the market, and may be easier to support than the smallest of producers (Belton et al. 2011).
Supermarket Vertical Integration and Government Enforcement Mechanisms

The government is well situated to enforce regulatory standards and improve seafood accountability in the eyes of consumers if less costly ways of doing this can be found because consumers place significant trust in the government to manage food supply (Figuie et al. 2004). This study has found that despite the potential for trust, consumers are not highly aware of government policies managing the seafood sector. It follows that if measures are taken to improve the reliable transfer of information along domestic value chains, a government campaign to educate consumers about changes could have a significant impact on how they trust labelling, and thus their demand for higher quality products at a supermarket. This is a task that cannot be done without government support because consumers do not trust branding. They are aware of the presence of “fakes” and they also recognize that retailers generally do not know where their food is coming from (Figuie et al. 2004). This mistrust would likely apply to new products, unless the government can educate them and provide some assurance regarding the reliability of a given label, such as VietGAP, or even the knowledge that a supermarket is actually compliant with measures of higher quality. Government standardization of eco-labeling or regulatory standards is more cost-effective and enforceable than third-party guidelines—and would provide a better heuristic to aid consumer purchases at supermarkets in Vietnam because it has greater potential to be easily recognized by consumers as premium value than any alternative (McCluskey 2000).

The government has already implemented quality checks in processing factories, primarily to support the Vietnamese export aquaculture business by assuring processors meet export standards. These checks represent an important, cost efficient measure that can be taken to increase industry accountability and build consumer trust. Previously, the government has attempted to mandate standards, but has had not had any success with them because of a lack of enforcement mechanisms (Ha and Bush 2010). It would not likely be effective or efficient to monitor producers themselves because of the size and geographic distribution of the industry.
Farmer groups and supermarkets, on the other hand, may be prime targets for efficient enforcement mechanisms. Consistent monitoring of standards would be too expensive, but the government could change incentive structures to raise the expected cost of noncompliance to be higher than the expected benefit of falsifying quality information (McCluskey 2000). This can be accomplished by having strictly enforced, thoroughly conducted audits implemented on a regular, but random basis (Kalfagianni and Pattberg 2013; McCluskey 2000). In the case of collectives of farmers, this encourages strong collective action to avoid loss of market access that could result from any member deviating from labeling guidelines. At the supermarket level, this would remove the moral hazard that supermarkets currently face to falsely market credence goods as higher quality than they are. This would incentivize supermarkets to be the powerful private (and in some cases, state-owned) sector supply-side regulators that they have the potential to be. In countries with better established supermarket markets, supermarkets have played the role of supply-chain consolidators in order to strengthen their control over the quality and prices of products they carry because it is in their best interests to appeal to concerned consumers who may be deterred by substandard products (Figuié and Moustier 2009). This affinity for supply consolidation is what gives supermarkets an edge on the scattered retailers in traditional markets for adopting provisions of guaranteed quality and meet potential demand under conditions of limited regulation (Figuié and Moustier 2009). Holding supermarkets more accountable for their products in Vietnam may catalyze this kind of change, as supermarkets find themselves with more incentive to find cost effective ways to consolidate their supply chains in similar ways that processing plants have done already. This market driven change has the potential to cut out middlemen and dramatically increase the traceability and quality of products with minimal use of public resources—leading to potentially very efficient solutions to improving aggregate welfare as dictated by seafood markets (Mergenthaler, Weinberger, and Qaim 2009b).
Another possibly highly efficient and effective enforcement mechanism, which can be tied into this framework, would be stricter oversight of contracts. Contracts between farmers and purchasers are poorly enforced and typically informal, leaving farmers vulnerable to price fluctuations (Loc, Bush, and Sinh 2009). This likely translates into high discounting of future utility among farmers, due to uncertainty over income and in turn, a lack of interest in investing in certification standards (Ha et al. 2012). Giving farmers reliable market access, as farmer organizations and processors have arranged, has the potential to free up financial resources. This can allow for longer term investments and market considerations, potentially translating to more consumer information and higher quality products. Under these scenarios of improved government enforcement, coupled with market incentives for the provision of information, taxpayers would cover the limited public goods of enforcements provided by the government. While the government enforcement would be publically funded, the costs of improvements would be concentrated on the primary beneficiaries of improvements (e.g. middle class consumers) through the market incentives created, reducing distributional concerns associated with the public funding of limited public goods. Supply-side actors would share costs with consumers—each side receiving benefits as well. As long as the benefits of labeling regulations outweigh the costs—as seems to be the case given the potential for a large domestic market of seafood with more information and relatively low costs for enforcement mechanisms—such interventions would be warranted (McCluskey 2000).

Vertical integration is ultimately the best way to control quality of seafood from seed to supermarket. Expanding farmer associations and enforcement mechanisms are likely the best way to facilitate this shift. Indeed, the proximity between producers and factories has been associated with greater success in Vietnamese shrimp farming due to the enhanced oversight provided and the ability for processors to facilitate exchange of technical support (Bush and Belton 2011). Though there is a likelihood of market incentives even at the producer level, another advantage to vertical integration is that privileged market access on its own is an
incentive for farmers to meet certification or regulation (Bush and Belton 2011). Limiting and removing the role of traders or middlemen in these vertically integrating supply chains is essential to building trust and a market for higher quality seafood because these agents have interests that are both at odds with producers and consumers. Maximizing their profits means a moral hazard to “cheat” and provide misinformation about lower quality products, suggesting they are upper tier products, to make more money. This unravels the linkage of information identifying products from producer to consumer, displacing the entire market. When they do comply with higher standards, they may still have the opportunity to enlarge their profit margins by cutting out the premium that would go to farmers—limiting incentive for farmers to meet those standards to begin with if they can’t get more money for a product that is more expensive to produce (Ha et al. 2012). There appears no cost-effective way to hold them accountable either, suggesting that their role would diminish as farmer collectives and supermarkets gain more prominence and establish more direct linkages. Policy must be ready to address the potential impacts this may have on rural unemployment and income levels.

**Concluding Remarks**

Vietnamese institutions, international organizations, and foreign governments alike, over the past 20-plus years, have adapted policy and targeted market-based changes to the way Vietnamese fisheries operate. These measures have been implemented due to the uncertainty about quality of seafood products, particularly environmental and safety factors, and a lack of traceability of these credence attributes. While certification standards and regulatory changes have largely only benefited foreign consumers and top producers in Vietnam, these experiences must now provide insight as to how Vietnam can transform its seafood value chain governance to meet a growing domestic market for higher quality products. These experiences should inform policy changes which address the inadequate state of domestic institutions to remedy the
market failures imposed by asymmetric information. A growing middle class set of consumers who shop at supermarkets have the potential to help drive more dramatic improvements in the management of coastal fisheries and operations of aquaculture farms. However, a lack of trust and information about policy stands in the way of domestic consumers from making the purchases they desire, and holding back the potential involvement of a greater portion of producers in improved production and capture standards. This study remains too small and limited in scope to adequately measure latent demand for cost-benefit analysis, and it remains difficult to infer precise costs to policy changes. However, it is apparent that there is potential for significant societal gain if asymmetric information and moral hazard concerns can be addressed in a way that alleviates the market failure of adverse selection. Information must not just be seen as part of the fix, accompanying new regulations, enforcement mechanisms, or certification measures, but as the central means by which to provide incentive to generate a sustainable market for higher value goods domestically. There are potentially transformative, cost effective management tools that remain under-explored and under-supported, such as enhanced up-chain enforcement measures and additional investment in the success of farmer and fisher groups. Proactive policy measures are especially urgently needed in Vietnam’s poorly managed capture fisheries, where supplying ecologically responsible catches has the potential to be an incentive for better management of declining fisheries. Though the up-front costs of investing in the domestic seafood market may be relatively high, and may not seem as lucrative as export markets, a more supportive role in improving the industry’s accountability and quality standards now has significant potential for the benefit of a number of stakeholders in the long run. The author of this study hopes domestic consumers and medium-sized producers, as well as all who benefit from common pool public goods, will be considered as stakeholders in this calculus. A high degree of trust in supply chains should be seen as a tool to drive sustainable industry growth and consumer wellbeing in Vietnam, not just a means to export market access.
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