International Journal of Business Management and Economic Review

Vol. 1, No. 03; 2018

ISSN: 2581-4664

GOVERNANCE STRUCTURE OF SEA FOOD VALUE CHAIN QUALITY MANAGEMENT

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ABSTRACT

This research explores the link between vertical coordination and the critical factors of managing production quality in the seafood value chain of Vietnam. It examines the importance of coordinating the activities in a supply chain in order to improve the quality of production. The value chain concept, total quality management, the theory of institutions and transaction cost economics, will be applied to analyze how the coordinated efforts of various stakeholders can be developed to achieve a better product quality and safety assurance. Conclusion and managerial implications are drawn from the analysis pointing at the development of closer value chain relationship between fish farmers and processing/export firms in the seafood value chain in Vietnam.

Keyword: seafood, value chain, quality management, cost economics.

INTRODUCTION

In the last decades, the organization of food supply chain has changed toward closer vertical integration between the stages in the chain (Boger, 2001; Hobbs, 2000). As seafood industry concern, the vertical integration systems between fish farmers and processing/export firms have dramatically shifted toward long- term contract coordination. The major problem in the seafood sector is a lack of techno-managerial coordination to guarantee quality in the whole chain. There are four major issues behind it (1) new and stricter rules concerning fish quality and safety of import markets; (2) the lack of fish culture techniques at farm level; (3) the opportunistic behaviour of chain stakeholders; (4) the lack of quality assurance system at the chain level (Khoi, 2007).

Moreover, it has been indicated that consumers demand for food quality and safety has been a pivotal factor in increasing vertical integration in the fish industry. A variety of theories of industrial organization and inter-firm relations provide a useful basis for understanding the nature of vertical integration and its effect on firm's performance. From the perspective of transaction cost economics (TCE), vertical integration is viewed as one form of governance structure that is determined by attributes of transaction and assumptions of human behaviour (Williamson, 1985). Also, agency theory discusses on problems of measuring individual performances and the importance of incentives in vertically integrated firms (Jensen and Meckling, 1976; Eisenhardt, 1985).

In our best knowledge, little empirical studies have been done to explore the relationship between quality management and vertical integration in the seafood value chain in Vietnam. This

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is the motivation for this research.

2. Theoretical perspective

2.1 Transaction cost economics (TCE) and quality management:
The application of TCE becomes more and more popular in empirical studies dealing with vertical coordination in agriculture (Frank and Henderson, 1992; Hobbs and Young, 2001; Boger, 2001, Szabo et al. 2004; Montaigne et al. 2005). Coase (1937) uses the concept of transaction costs to explain the organization of firms and the way in which they interact along the supply chain. Transaction cost theory is based on three behavioral assumptions: bounded rationality, opportunism, and risk neutrality. Williamson (1985) proposes that certain transaction characteristics affect vertical coordination or the choice of governance structure. Raynaud et al. (2005) argued that governance structure choice is a function of the (firm or chain) strategy for guaranteeing quality (including food safety). Asset specificity represents the degree to which an investment is specialized to a particular supplier or buyer, provoking switching costs. Sunk costs enforce opportunistic behavior and create hold-up problems. Uncertainty contains the degree of unanticipated environmental changes or behavioral responses by the business partner. Besides prices, quality uncertainty is a major concern in agribusiness due to the different food crises especially in the fish industry (Kambewa, 2006). Frequency refers to how regularly transactions are conducted. TCE offers one perspective on the relationship between market organization and product quality. When product quality attributes are difficult to measure the producers may engage in opportunistic behavior to exploit private information by failing to perform as agreed, such as shirking or cutting corners on quality, also referred to as moral hazard. This is expected to lead to contracts with added security features to mitigate the hazard (Martinez, 2002). TCE provides the most common theoretical framework for contracts and vertical coordination in food production. Contracts may reduce moral hazard problems through centralized decisions about input factors (feed, veterinary, etc.) and production standards. The problem of adverse selection in case of unobservable quality attributes is decreased by contract systems with inherent monitoring approaches. A long-term orientation could enhance the processor's ability to introduce new technologies. Den Ouden et al (1996) identify growing quality requirements of customers as a major driving force of contracts and vertical integration. In particular, product differentiation in order to meet changing consumer demands regarding credence attributes such as food safety and environmental issues is considered a main driver of closer ties in the food supply chain. Transmitting the changing demands to the farm stages is considered more transaction cost efficient under contracts and in vertically integrated systems. Lawrence et al. (1997) argue that under these circumstances long-term contracts allow transaction cost savings compared to traditional marketing channels. Farmers may also save transaction costs through long-term contracts, e.g., by settling a premium for higher quality with a one-time negotiation.

2.3 Value chain
According to Porter (1985), value activities are divided into two broad types, primary activities and support activities. This model does not give us a full explanation of how the linkages in the value system are developed. So, it is important to link it with theories of inter-organization in

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order to develop business relationships among chain actors.

Primary activities are the activities that include the creating of a product, marketing, delivering the product to buyers, as well as after-sales assistance/service. Primary activities are classified into five categories which include inbound logistics (activities associated with receiving, storing, and disseminating inputs to the product such as selecting and developing brood-stock, receiving and storing fish raw material, material handling, warehousing, inventory control, vehicle scheduling and returns to suppliers); operations (activities associated with transforming inputs into the final product form such as spawning,shipping); marketing and sales (activities associated with providing a means by which buyers can purchase the fish product and inducing them to buy through advertising, pricing, price information, promotion, channel selection, channel relation, and pricing); and service (activities associated with providing services to enhance or obtain the value of the fish product after it is sold and delivered, such as training fish farmers, consulting, installing, repairing supplying parts, adjusting products).

Support activities underpin the primary activities and each other by exchanging inputs. Support activities are classified into four categories, namely procurement, technology development, human resource management, and firm infrastructure. Procurement (activities associated with purchasing inputs used in the firm's value chain, not to the purchased inputs themselves: purchasing inputs include ponds/ cages, fishing nets, incubating machines, circulation tanks, water pumps, grinding machines, boats, land, ice, fuel, machinery, laboratory equipment, office equipment, and buildings. Technology development (activities that can be roughly divided into efforts to improve fish cultured and processing facilities such as fishing methods, qualification rules or technology embodied in process equipment. Human resource management (activities associated with recruiting, hiring, training, developing, and compensating and (if necessary) lying off personnel. Firm infrastructure (activities associated with general management, planning to get access to fish, financial activities carried out, drawing up contracts, and fish quality management).

The value chain of seafood is presented in figure 1. This figure summarizes the stakeholders who are directly and indirectly involved in the chain, from production to consumption both at the domestic market and at the export market for Seafood.

In the value chain of the Seafood, many actors participated in both primary activities and support activities. Primary actors who are directly involved in the transformation of inputs into outputs include hatcheries, fingerling traders, fish farmers, export traders, local traders, retailers, and processing/export firms. Supporting actors who facilitate the activities of the primary actors include feed mills, service providers, and suppliers of intermediate inputs, institutions, and infrastructure.

To summarize, how value chain activities are carried out determines costs and affects profits. A firm that seeks a cost leadership position reduces the amount of resources it consumes and the price it pays for them. Decisions governing each activity in the value chain determine the nature and quality of the output. A firm that seeks to gain an advantage through the differentiation does so by performing its value chain activities, particularly transformation of the input, differently from or better than its competitors. Improving value chain functions is one of the means of achieving competitive advantage. This idea is especially more important and applicable to firms involved in food businesses. For example, the value chain analysis is helpful for quality

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assurance of fish and its products, which requires an organized way of investigating all the activities in production process of the product.

2.4 Quality performance objectives

Quality must be quantifiable in order to measure the effectiveness of the production system. Nevertheless, it is important to know which other dimensions determine the total performance of the supply chain. The quality in the chain should not be adapted in such a way the total performance is reduced. Therefore, besides the quality description, a quality concept has to be selected in order to measure the total quality performance. In order to quantify the production quality, several concepts are available in literature (Table 1). These concepts are based on the measurement of several quality aspects. It is very likely that performance objectives will influence each other. In the fish industry, consumers not only have concerns about physical product features but also on quality aspects that related to production primary activities. Therefore, all these aspects should be incorporated in one concept that integrates management and product based aspects.

Table 1: Classification of quality concepts on the basis of performance objectives

Concepts	Product quality	Availability	Costs	Flexibility	Reliability	Service	Other dimensions
Garvin	X	-	-	-	X	X	-
Evans and Lindsay	X	X	-	-	-	X	-
De Toni et al.	X	-	X	-	-	-	Total quality offered: a. In-bound quality b. Internal quality c. Out-bound quality
Isaksson and Wiklund	X	-	X	-	-	X	Capacity environment
Challik and Waszink	-	X	X	-	-	-	Scope
Sloof et al.	X	X	X	-	-	-	-
De Groote et al.	X	X	X	X	-	-	Improvement rate: a. Quality b. Past improvement c. Future ambition

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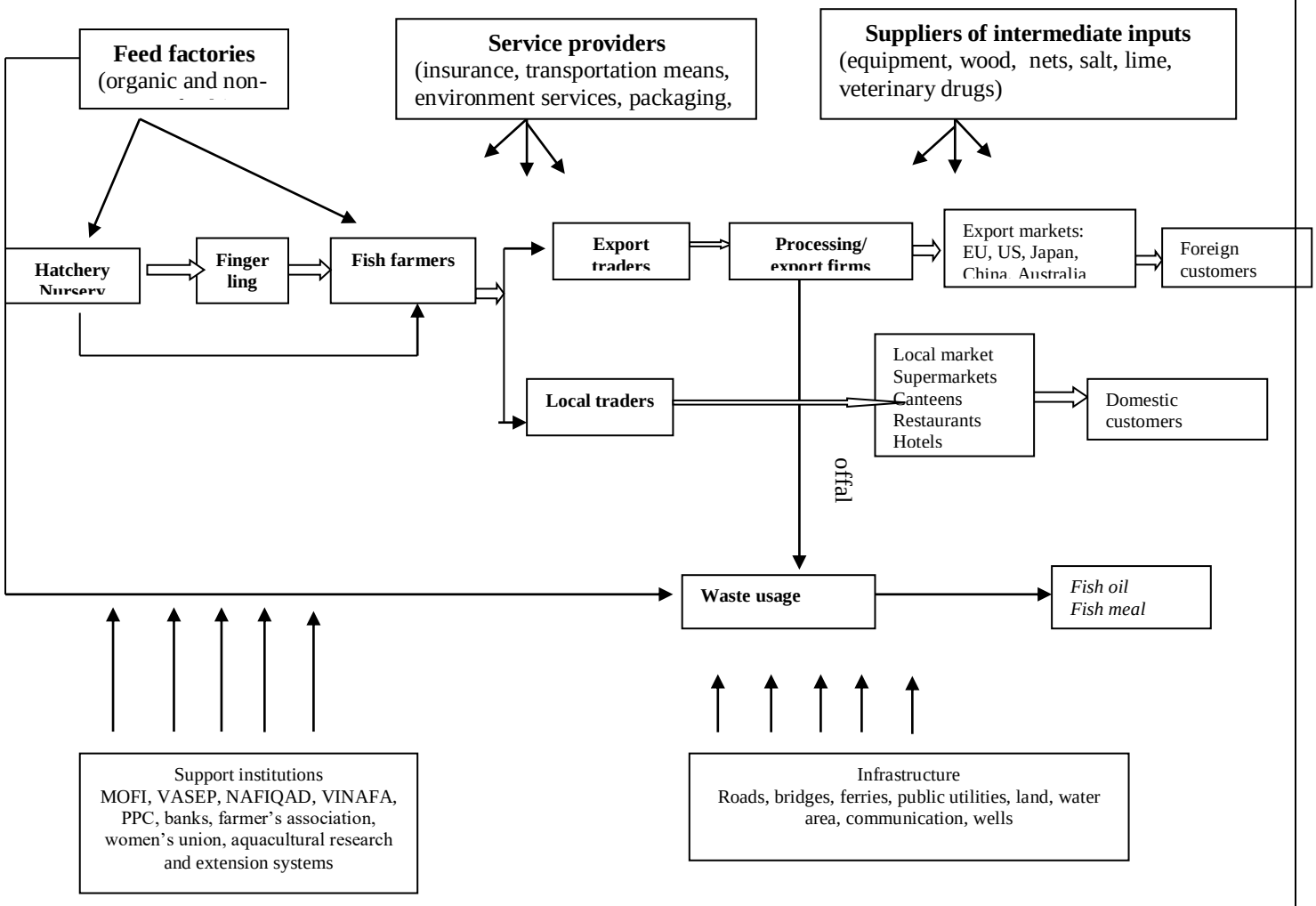
Luning et al	X	X	X	X	X		-
Noori and Radford	X	X	X	X	X		-
Slack et al.	X	X	X	X	X		-

Source: Moderated by Authors, 2018

Based on the concepts, the following performance objectives have been selected in order to evaluate the quality management. Every stage of the supply chain can be analyzed using the performance objectives. These dimensions will be discussed in general with the seafood supply chain in mind.

***Figure 1*: SEAFOOD VALUE CHAIN IN THE MEKONG RIVER DELTA, VIETNAM**



Source: Complied by authors, 2018

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. Conceptual framework of governance structure for value chain quality management

Based on the above literature review, the following conceptual framework (figure 2) can be drawn. The model has four constructs: quality control, quality assurance, quality improvement and value chain of seafood export. We will explain the relationship between four dimensions as below

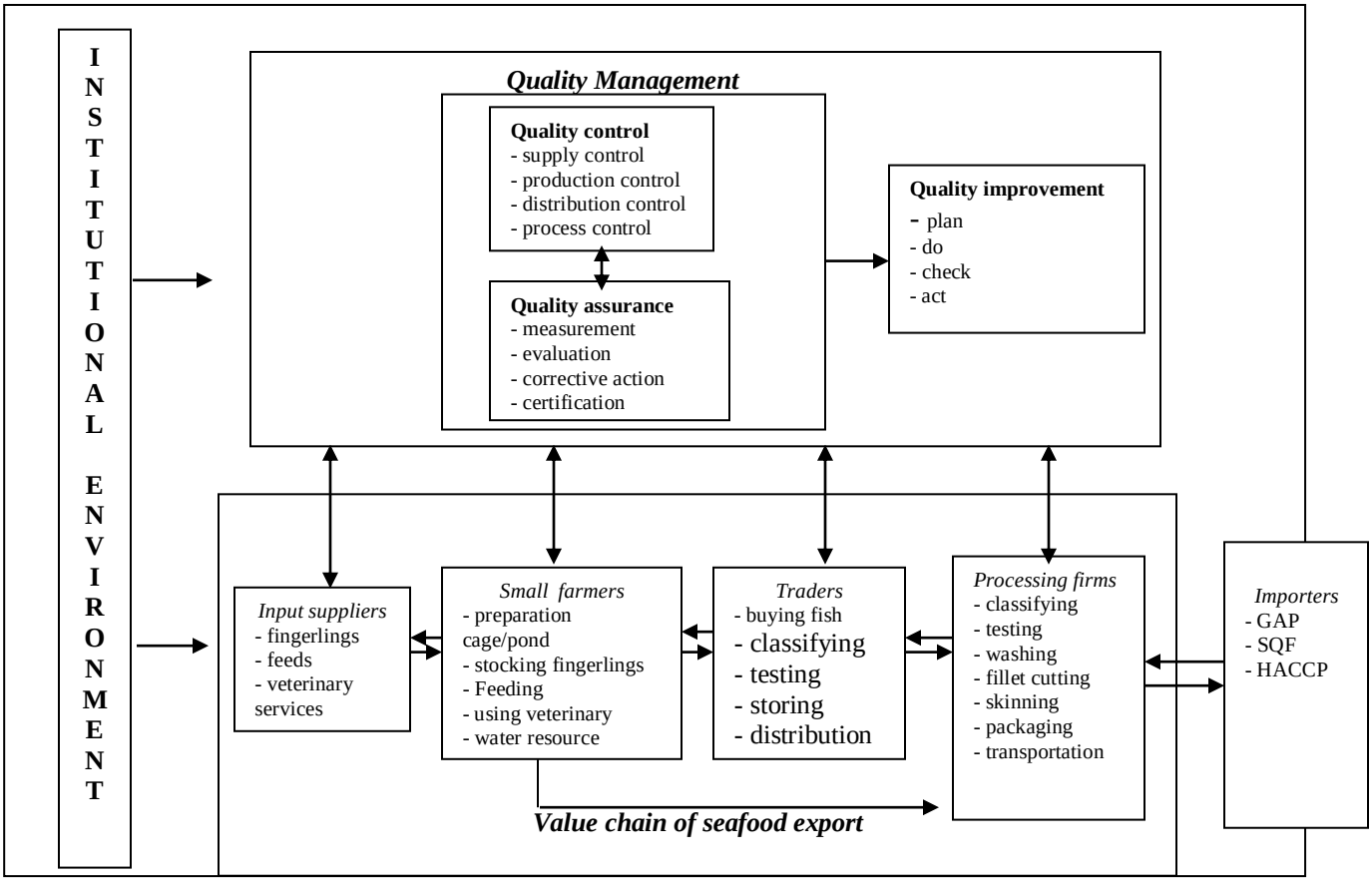

Figure 2: Seafood value chain quality management model (Luning et al., 2006 and further moderated by author)

3.1 Explanation of conceptual framework

In order to obtain a good quality end product, quality is more and more managed along the whole chain from the supplier of raw materials to consumption. In order words, we need to organize the supply chain quality management in order to improve product quality to meet the consumer demands. Figure 2 shows the quality management model in the Pangsius value chain. This integrated conceptual framework consists of two key dimensions namely quality management and business relationships between the value chain actors. The arrows reflect the relationship

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between these dimensions. Fish quality management is complicated because it involves the complex characteristics of fish raw material due to variability, restricted shelf life and the large range of chemical, physical and microbial processes. The fish supply chain management is also complex and consists of a large number of linkages. Moreover, many people are involved in production operations along the food supply chain. Therefore, human behavior plays a crucial role due to unpredictable and changeable handling. Luning (2002) proposed the techno-managerial approach for food quality management as a way to analyze and solve the complex quality issues. Both the use of technology to understand behavior of living fish materials and the use of managerial sciences to understand human behavior is needed. Hence, both technological aspects (i.e fish characteristics and technological conditions) and managerial aspects (i.e human behavior and administrative conditions) should be managed in order to improve fish quality products.

In this model, we focus on three main elements of quality management namely quality control, quality assurance and quality improvement. Quality control refers to the operational process aiming to fulfil quality requirements. In the chain quality management, the relationship between quality control and business performance will be analyzed with respect to the four basic control processes: input, the supply control; transformation, the production control; output, the distribution control and processing, the process control. On the other hand, quality assurance refers to the procedures and responsibility respecting to ensure that the product fulfils or exceeds customer expectations. Quality assurance measures the physical process and the quality system; information is collected on how quality is realized and to what extent quality expectations of the customer are met. As for each process performance in the chain, the quality assurance includes four basic steps: measurement, evaluation, corrective action and certification. Quality improvement is the result of quality management that includes increasing customer satisfaction, achieving higher quality levels, reducing cost, increasing productivity and accelerating the process. The quality improvement includes four stages namely plan, do, check, act. These quality requirements and expectations are transformed into processing/export company's performance quality objectives. To implement these objectives, partnership relations between processing/export firms and their chain actors are crucial (Luning& Marcelis, 2006). The chain stakeholders comprise input suppliers such as hatcheries, feed wholesalers, veterinary drugs services; small farmers, traders, processing/export firms. The activities of the chain stakeholders in the process performance will be assessed based on the elements of quality management such as quality control, and quality assurance at the chain level that related to the requirements of importers. The organization is generally considered as open systems that interact with their environments in the continuous process of transforming resource inputs into output products in the form of quality end products. Therefore, it is needed the role of institutional environment in order to establish regulatory control programs to ensure food quality and wholesomeness at the primary production level. To do this effectively, provincial extension centres and the departments of agriculture and aquaculture are important support channels for training, implementation of instructions, and inspection.

3.2 Application to the practical problem

As already mentioned, one of the major problems of the Vietnamese seafood industry concerns

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organizing an effective fish supply chain quality management and the above discussed theories provide a useful basis for analyzing different organizational forms. In particular, the TCE explanation discusses three forms of governance structures: market, hierarchy and cooperative arrangements. We believe that spot/auction market relationship is not a feasible option to solve the current problem of the Vietnamese Seafood industry. This is because if the processing firms purchase fish from the spot market, then the regularity of the supply will be compromised in the sense that the supply of quality and delivery of large quantities of fish cannot be guaranteed. This is especially true considering the specification made by the export market where they give more value to buyers who consistently supply fish.

On the other hand, to avoid the risk associated with quality and uncertainty of fish supply, processing firms may opt for vertical integration, by integrating backward and performing the activities of the fish farmers.

- Quality control is the operational techniques and the processes applied to fulfil requirements for quality (ISO, 1998). In the other hand, quality control involves both technological and management elements. Much of the focus has been on integral quality management system. These systems include all steps in the process performance such as supply of raw materials, distribution, food processing, packaging, transportation and logistics, maintenance of production equipment and training stakeholders. In the chain quality management, quality control relates to supply control, production control, distribution control and process control. The input suppliers are the crucial in quality supply control. In this step, the small fish farmers can select suppliers who have the capability of supplying the good quality of fingerlings, feeds and veterinary drugs. Choosing input suppliers involves many factors. The small farmers should consider price, quality, location, past experience with the suppliers and service after sale. The next step of quality control is production control at farm level. In order to control quality, the small farmers should use biological products instead of antibiotics in culture environment management. However, nobody can control the farmer's use of veterinary drugs when fish disease occur (own survey, 2006). Moreover, the small farmers should focus on the preparation of cage/pond and water resource to control fish quality. In the distribution stage, most quality problems at this stage are from traders. The processing firms are unable to control and manage most of activities of their traders. Although the traders have a basic knowledge of the quality control and storage techniques, their knowledge is still limited. The traders use banned chemicals and other substances to treat fish materials before selling them on to the processing firms (Khoi, 2006). Moreover, the traders usually use visual controls to inspect the colour, size and weight of seafood. Visual controls are an insufficient means of detecting hazards (Khoi, 2006). In order to control traders' fish quality, the processing firms play a very important role in terms of instruction in maintenance techniques, quality control awareness. Moreover, the processing firms can make official contracts that specify requirements for fish material quality and that introduce attractive policies (support of capital, equipment, training, and price information). The indicators of quality need to be clear to the traders in term of size, color and weight of fish materials. In contrast, processing firms need to guarantee stable business for the traders in order to convince them to provide good fish material on a long-term basis. The process control is done in processing/export firm. The processing firms have monitoring processes for a complete quality control of the seafood. The processing firms have to implement the standard prescribed by

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international quality standards. In currently (2006), most processing firms applied HACCP approach for quality control to guarantee the product quality. After conducting quality control in the supply chain, quality assurance is a feasible measure to improve fish quality in quality management process.

In short, nobody (the small farmers, the traders, the processing firms, the government and the extension centre) can guarantee 100% quality in seafood materials, keeping them free from the diseases, hazards and other contaminants, when even seafood controlled strictly by the company fall short due to uncontrollable hazards from fingerlings, feeds and veterinary drugs use. Solutions for Seafood quality improvement should combine technological aspects with attention for appropriate type of quality management. This should occur via the chain, from primary production to distribution. To do so, the industry support organizations should prioritize technology investment especially in primary production of small farmers.

4. CONCLUSION AND FURTHER RESEARCH

This study represents one of the first empirical studies with regard to upstream Seafood supply chain quality management in Vietnam. It was aimed at investigating the relationships among vertical integration, quality management and business relationships of the seafood chain. Based on literature review, the research result generates some significant theoretical and managerial implications. This study contributes to the literature of TCE and quality management by validating the relationships among vertical integration and quality improvement. It is deemed valuable as not much empirical study has been done in this sector so far. The quality of seafood is the result of all the activities performed and all the facilities and equipments used during production, harvesting, processing, distribution, and export. Fish quality management directly affects to the fish yield and quality, as well as the production costs and profit level of fish farming practices. The processing/export firms should forge strategic partnerships and develop closer coordination relationship with their suppliers. Investment in quality management is crucial to improve customers' satisfaction and bring the benefit for the whole chain actors. A better coordinating of activities between stakeholders in the Seafood supply chain is recommended.

This study focuses on the relationship between the upstream parts of the seafood value chain. Further empirical research should be conducted to gain more insight into the relationship in the downstream part between the processing/export firms and importers or retailers. This will give a clear picture of the seafood value chain quality management.

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