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DEVELOPMENT AQUACULTURE QUALITY MANAGEMENT SYSTEM IN VIETNAM

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ABSTRACT This paper deals with the importance of quality management in designing an export-oriented aquaculture value chain. It discusses assumptions and concepts of global value chain from the perspective of quality management. Consequently, we derived a model for analysing quality management processes in Pangasius industry. It deals with relationships between chain stakeholders. We identified instruments for designing sustainable business relations among aquaculture value chain.

KEYWORDS : value chain, quality management, quality assurance, Pangasius industry

INTRODUCTION

During the last half of the twentieth century the complexity of agro-food supply chains has increased considerably. Raw materials are obtained from sources worldwide, an ever-increasing number of processing technologies are used, and a broad range of products is produced. In addition, consumer expectations are continuously changing, with customers demanding more convenience and fresher foods with more natural ingredients. Food quality management has become increasingly important in the agro-food sector (Spiegel et al., 2003), due to changing consumer requirements, increasing competition, environmental concern, and governmental interests. Higher consumer demands regarding quality, traceability and environmental friendliness pose challenges for primary producers, especially smallholders in developing countries (Henson et al. 2000; Humphrey and Oetero, 2000).

The implementation of quality management has evolved from quality control to quality assurance. At this moment, the food industry applies various (combinations of) quality assurance systems such as good practices (e.g. GMP, GHP, GAP), HACCP, ISO, BRC, etc., (Luning et al., 2006).

THEORETICAL APPROACHES

This section discusses concepts of Porter's value chain model, resource dependence theory, industrial district (clustering) theory, transaction cost theory and theory of institutions in the light of quality management.

Quality management and the Global Value Chain

Quality management includes quality control and quality assurance.

Quality control (QC) involves determining what to control, establishing units of measurement for gathering data, establishing standards of performance, measuring actual performance, interpreting the difference between actual performance and the standard, and taking action on the difference in order to prevent quality problems in the next batch/production. Improvement is a form of control in the control process where attention is paid to structural causes and solutions (Luning et al., 2006).

Luning et al., 2006, defines quality control as a combination of technological and managerial quality functions. In an established food supply chain the quality control should be implemented in the process and product of each member. To guarantee quality, these control activities must be directed to critical control points (CCPs). According to Reilly and Kaferstein (1997), important CCPs in quality control at aquaculture farm level are site selection, water management, the use of feeds, the use of antibiotics for fish disease treatment, and harvest.

Quality assurance (QA) encompasses all planned and systematic actions necessary to ensure that a product complies with the expected quality requirements. It also provides customers and consumers with the assurance that quality requirements will be met. Quality assurance focuses on system quality instead of product quality. The system must be audited to ensure that it is adequate both in the design and use. Food products are not only tested on their product characteristics, but also on production, packaging, handling and distribution. Quality control is embedded in quality assurance. Control activities form the basis of QA systems, such as HACCP (safety guarantee by using critical control points). The implementation of quality assurance systems, especially in the agricultural-food business, is an issue of the greatest importance. Several characteristics of food chains pose challenges to the QA system: agricultural products are often perishable and subject to rapid decay due to physiological processes and/or microbiological contamination, most agricultural products are harvested seasonally, and products are often heterogeneous with respect to desired quality parameters, such as size and color; diseases must be prevented and cured, and establishing which measures to allow and how to check their use is not a simple task.Cultivation differences and seasonal variables are difficult to control. Moreover, primary production of agricultural products is undertaken in large part by farms operating on a small scale, e.g., fish culture (Khoi, 2007). Against this background that the total food supply chain must assure and demonstrate that the highest standards of quality and safety are maintained (Hoogland et al., 1998).

Food quality management has become increasingly imporant in the food industry, a fact demonstrated by an increase of applied QA systems and higher requirements within these systems by consumers (Spiegel, 2004; Luning et al., 2006). Moreover, consumer perceptions towards food safety and quality have increased, as reflected in the media attention given to a variety of food safety and quality issues (Luning and Marcelis, 2007). To meet these trends, quality assurance has focused on the fulfillment of quality requirements and proving confidence in meeting customer requirements. In essence, all parties involved in the production process must apply quality assurance measures to control all aspects through the chain that may influence product quality.

In the agro-food industry, QA systems like GMP, HACCP and ISO are widely applied. GMP aims at combining procedures for manufacturing and quality control in such a way that products are manufactured consistently at a quality appropriate to their intended use (IFTS, 1991). HACCP aims to assure the production of safe food products by identifying and controlling the critical production steps (Leaper, 1997; NACMCF, 1998). ISO aims to achieve uniformity in products and/or services, and to prevent technical barriers in trade throughout the world.

At the moment, the basic QA systems are often combined to assure several quality aspects, e.g. the combination of HACCP and ISO 9000 (Barendsz, 1998; Robert, 1999). Moreover, QA systems are often developed specifically for an industry like EUREP-GAP (Euro Retailer Produce- Good Agricultural Practice), for example, which is integrated into new systems such as BRC (British Retail Consortium) and SQF (Safe Quality Food) (EUREP-GAP, 2001). However, total quality cannot be realized by using these specific quality systems, because they each cover only a portion of a quality system. A quality system is defined here as the organizational structure, responsi bilities, processes, procedures, and resources that facilitate quality management. Quality management includes the total activities and decisions performed in an organization to produce and maintain a product with a desired quality level at minimal cost.

3. GLOBAL VALUE CHAIN

In this study, institutional economics is used to analyze the institutional environment that coordinates the connection of smallholders to export markets and helps them comply with quality requirements of foreign customers. The Global Value Chain (GVC) approach applies these insights to understand business relationships in the supply chain. This approach reveals the structure of business relations (including transactions and human behavior) related to information, product, and financial flows through the chains. Hence, the GVC approach offers an opportunity to capture the synergy of intra- and inter-company integration and management (Porter, 1985; Lambert and Cooper, 2000; Luning et al., 2006).

The value chain literature views inter-firm cooperation within the chains as the source of competitive advantage (Porter, 1985; Humphrey and Schmitz, 2000). In agri-food business, the value chains are organized linkages among groups of producers, traders, processors and service providers who join together in order to improve quality and value through their activities (Ruben et al., 2007). According to Porter (1985), the value chain describes the full range of activities that are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), to delivery to consumers, and to final disposal after use. Every firm is part of the value system, and by effective cooperation the entire performance of the value system is improved.

GVC analysis focuses on the vertical relationships between buyers and suppliers and the movement of a product from producer to consumer (Ponte and Gibbon, 2005). Gereffi et al. (2005) identify three variables that play a key role in determining how GVCs are governed and transformed: (1) the complexity of transactions, (2) ability to codify transactions, and (3) capabilities in the supply-base. All variables that determine the shape of the GVC governance structure are related to technology, information (complexity, codification) and the ability of suppliers to learn (capabilities). On the basis of these three variables, the researchers distinguish five different chain governance types: (1) market, (2) modular, (3) relational, (4) captive, and (5) hierarchy.

Gereffi's concept applies insights from transaction cost economics (TCE) and institutional economics (Williamson, 1985). Williamson defines a governance structure as “the institutional framework within which the integrity of a transaction is decided.” According to this theory, the governance structure depends on uncertainty and asset specificity (transaction-specific investments). Asset specificity represents the degree to which an investment is specialized for the needs of a particular supplier or buyer, provoking switching costs. These costs facilitate opportunistic behavior and create hold-up problems. Williamson argues that transaction costs seriously hamper the buy decision if uncertainty and asset specificity apply simultaneously.

Asset specificity and uncertainty are related to Gereffi's concepts of complexity and ability to codify a transaction. If uncertainty is low and no transaction specific investments are needed, i.e. product specification fits within the standards of the industry, the complexity of a transaction will be low. However, the complexity of a transaction may increase if product specifications are unique for a specific buyer. This occurrence involves transaction-specific investments and, consequently, strengthens the financial consequences of uncertainty. In this case, codifiability is used as an instrument to mitigate part of the uncertainty. The latter situation is relevant for many GVCs in the food industry as it relates to quality standards. Quality standards are key and some are codified to reduce uncertainty (quality assurance). Some of the quality standards are transaction specific and involve specific investments. As a result, the transaction costs in monitoring and certifying of the quality standards are high.

Gereffi et al. 2005 show five possible types of governance. *Market* governance is dominant when transactions are easily codified, product specifications are simple and suppliers have the capability to produce without much input from buyers. In the market -based system, there are no specific standards exist to adhere to because the product is standardized. This factor implies that there are low barriers to entry since all products are essentially the same. Due to the standards regarding food quality and food safety, the market governance type is not rampant in GVCs.

Hierarchy (vertical integration) governance occurs when product specifications cannot be codified, transactions are complex and competent suppliers are not available; as a result, the buyer must develop design and production skills in-house. This governance form is difficult to match with smallholders, as it implies the integration of smallholder production in the organization of a processing or export firm.

Captive governance arises when the possibility of codifying complex product specifications exists, but the capability of suppliers is low. Consequently, a higher degree of monitoring and intervention by the buyer and to a transactional dependence of the supplier on the buyer occur. This governance type is only feasible if quality assurance is easily organized.

Modular governance types arise when the ability to codify specifications extends to complex products and when suppliers have the competencies to supply the required modules. As a result, the need for buyers to monitor closely and control design and production processes is lowered. This governance type is also sufficient if quality assurance is easily controlled.

Relational governance types occur when product specifications cannot be easily codified, products are complex, and supplier capabilities are high. This governance type leads to frequent communication between buyers and suppliers within the framework of a certain degree of mutual dependence, which is regulated through reputation, social ties and/or spatial proximity. As a result, interdependence between actors in the food chain is increasing and traditional outsourcing relations are gradually replaced by preferred supplier regimes (Reardon and Timmer, 2006).

**Technological and managerial approach in food quality management*

Food quality management involves the complex characteristics of food, such as variability, restricted shelf life, potential safety hazards, and the large range of chemical, physical and microbial processes, in addition to the raw materials of food. According to Luning et al. (2006), food quality management is complicated because it deals with dynamic and complex food systems and people systems involved in realizing food quality. Poon and Lijianage (2003) also observe that food quality management embraces the integrated use of technological disciplines as well as the integrated use of managerial sciences. Both the use of technology to understand behavior of living fish materials and the use of managerial sciences to understand human behavior are needed. Hence, both technological aspects (i.e. fish characteristics and technological conditions) and managerial aspects (i.e. human behavior and administrative conditions) must be managed to improve food quality products.

Luning et al. (2002) propose a techno-managerial approach for food quality management as a way to analyze and solve the complex quality issues. They distinguish between three different approaches: the managerial, the technological and the techno-managerial approach, as illustrated in figure 3.1. The approaches differ in the extent to which they integrate managerial and technological sciences. Technological measures for solving quality issues include, for example, obtaining a better understanding of the chemical mechanisms, the development of more sensitive (e.g., microbial) analyses, and reducing defects by genetic modifications. Managerial measures concern human behavior and human working environments that affect food safety. The techno-managerial approach stresses that integrating the technological and managerial aspects is necessary to predict food systems behavior, and to generate improvements in the system.

2. CONCEPTUAL FRAMEWORK

The model presented in figure 1 represents an integrative approach for the study of quality management. This is a challenging perspective. In contrast to most studies quality management is not studied from a firm but from a chain perspective. Moreover, it examines the governance structures that create the incentives for actors in the chain, on the basis of a comprehensive study of the primary processes. Several studies that address quality management at chain level focus on governance structures, and business relationships (Lazzarini, 2001; Hobbs, 2001; Han, J el al., 2006), while others focus on the use of proper technologies in primary processes and quality assurance (Henson et al 2001; Unnevehr, 2000; Dolan and Humphrey, 2000). Both approaches address relevant queries but may fail to address crucial aspects of channel design if these are beyond the scope of the chosen partial approach. For example, the quality standards in the export markets will require the introduction of new technologies. However, in order to make these changes successful, the quality management system and the prevailing governance structures coordinating business relationships, have to be fine-tuned simultaneously.

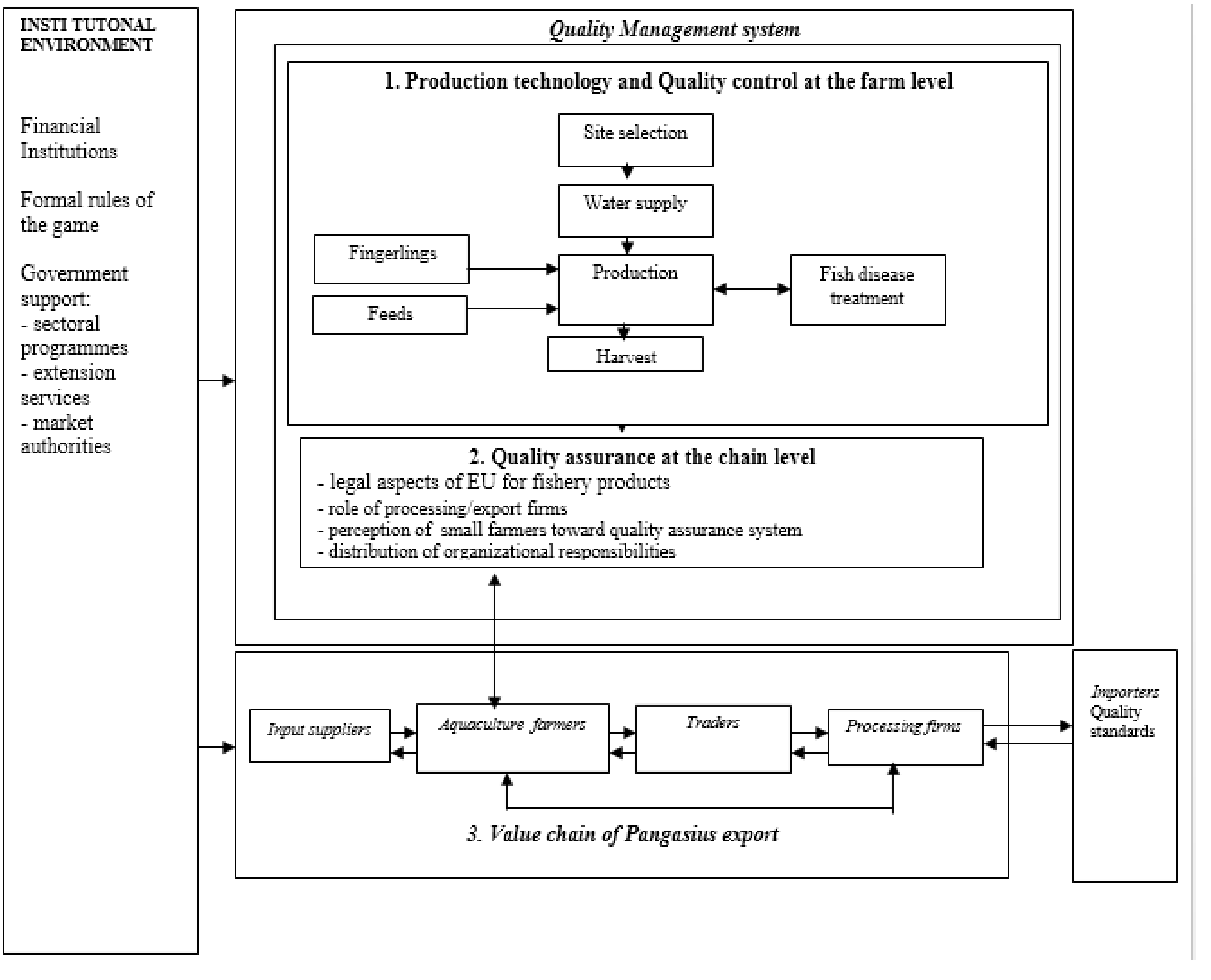

Figure 1 : Aquaculture quality management model (Reilly and Kaferstein., 1997, Luning et al., 2002, and further moderated by author)

5. CONCLUSIONS

This paper attempts to bridge differences between the various theories of business relations by integrating their assumptions and limitations into the discussion of global value chain theory. The theoretical discussions and the field research confirm the usefulness of food quality management, global value chains and the inclusion of smallholders in export supply chains. It begins with an overview of quality management, as this is the most critical issue in export chains. In addition, the literature review has also shown the role of government and other support organizations in managing food quality and safety among chain actors. Subsequently, the literature review shows that the GVC approach is useful as a framework for our study. The GVC approach is used to analyze the challenges and possibilities of integrating smallholders in export chains.

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