

# Quality Assurance System at the Fish Processing Firm

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**Abstract:** *This paper examines the quality assurance system at the fish processing firms. The information about the processing firms has been collected by interviewing the quality control managers of five processing/export firms in the Mekong River Delta. The processing firms are selected that produce for the export markets and they include all three kinds of ownerships (joint stock, private, and state-owned firms) and located in survey area.*

**Keywords:** quality assurance system, Mekong River Delta, fish processing firm

## 1. Introduction

At the moment, there are around 40 Pangasius processing companies mainly located in An Giang, Dong Thap and Can Tho provinces with a capacity of 3,300 MT/day. The information about the processing firms has been collected by interviewing the quality control managers of five big processing/export firms. The processing firms are selected that produce for the export markets and they include all three kinds of ownerships (joint stock, private, and state-owned firms) and located in survey area. Moreover, these companies are large and medium sized according to Vietnamese government [According to decree No.91/2001/CP-ND of the Vietnamese government, SMEs “are independent business entities which have registered their business in accordance with prevailing laws, with registered capital of not more than VND 10 billion (equivalent to about US\$650,000) or an annual average number of employees of not more than 300 people”]. The information focuses on quality control of raw material and processing operations done by processing/export firms in order to meet the requirements of NAFIQAD and EU inspectors. Practically, processing firms are inspected and approved on an individual basis by NAFIQAD to ensure that they comply with EU requirements for fishery products (for example raw material control for antibiotic residues, identification of critical points in the processing establishment and implementation of methods for monitoring and checking such critical points, taking export fish samples for analysis in an approved laboratory, and keeping a written record of these controls for at least two years). Moreover, the European Commission represented by the FVO periodically undertakes checks to ensure that the NAFIQAD conduct this task in a satisfactory manner. In addition, fish processing firms are urged to undertake ‘own checks’ based on the principle of Hazard Analysis Critical Control Point (HACCP).

## 2. The Description of Pangasius Export Markets

Pangasius is mainly produced for export. At the moment, the major importers of Pangasius are the EU, the USA, Russia, and Asean. The largest market is the EU (44%), Russia (13%), ASEAN (9%), and USA (5%), Australia (3%),

China/Hongkong (5%), and other new markets such as Ukraine, Egypt, and Mexico. The EU importers recognized Pangasius fillet products as whitefish which costs about half as much compared to other quality white fish (VASEP, 2017). Among EU markets, the average unit price of Pangasius products is the cheapest comparing fish products from other countries (FAO, 2017). In terms of unit price, the Netherlands and the USA paid the highest average price per imported kilo, Russia and the Ukraine paid the lowest.

The criteria applied for fish quality are color, size, disease and antibiotic residues. The first two criteria, color and size [The color and size of fish are affected by farming practices such as quality inputs, pond location, water supply, and good aquaculture technology], are important for the price of fish and export markets. The US and EU prefer white and pink meat and are willing to pay a higher price for it. While yellow meat can only be sold for a lower price (lower quality standard) to markets in Eastern Europe such as Russia and Ukraine and ASEAN countries such as Singapore and South Korean (VASEP, 2017). Moreover, the accepted Pangasius size of fillet is more flexible in Russia and ASEAN markets. The other two quality criteria, disease and antibiotic residues [Disease and antibiotic residues are affected by veterinary drugs used for disease treatment], concern product safety for consumer health. These criteria can not be controlled based on visual checks only. To fulfill the stringent safety and traceability criteria of export markets, fish supplies from farmers needs to be tested at the harvest.

To consolidate and expand their position in the international markets processing/export companies facilitate better management systems to meet international standards. These systems are particularly important as retailers and consumers in the EU and US are expanding their focus to include environmental and social standards such as HACCP, organic and Global-GAP standards. The processing firms buy what they sell in the EU and the US markets. The major importers usually order the fish quality and quantity in advance (6 months to 1 year), and the processing firms base on the orders (volume, quality, size, trimming, packaging, price, etc.) a buying strategy. In the buying contract, the price is determined by referencing in the European fish price report which indicated the major fish price of each country monthly. In addition, fish prices are determined by supply

and demand in competitive marketplace and the negotiation between exporters and importers.

Moreover, the processing/export firms will sell what they buy in other markets such as Russia, ASEAN with lower price and quality. They purchase fish raw materials from small-scale farmers to supply these markets. As a result, small-scale farmers get a lower price and they lack long-term business relationships with the processing/export firms because the processing firms contact them occasionally if they lack raw material.

### 3. The Power of Suppliers

At the moment, processing/export firms in the MRD purchase Pangasius raw materials from different sources. There are four sources of fish raw materials namely company's own farms; affiliated farms; fishery associations; and independent farms. Table 1 shows the sourcing strategy of five interviewed Pangasius processing firms.

**Table 1:** Sources of Pangasius raw materials

Companies	Number of employees	Type of company	Production capacity (MT/day)	Source of Pangasius raw materials			
				Own farming	Affiliated farms	Fishery association	Independent farms
A	1,200	Joint stock	200-250	60%	30%	5%	5%
B	400	Joint stock	80-100	60%	10%	10%	20%
C	1000	Private	150-200	30%	30%	20%	20%
D	1,100	Joint stock	200-250	50%	30%	10%	10%
E	280	State-owned	50-80	30%	25%	15%	30%

Source: Survey results, 2017.

The interviewed processing firms (2017) showed some strategies with respect to what to sell on different markets. For the markets with high quality requirements such as the EU and the USA, the processing firms tend to use raw materials from their own farms or affiliated farms in order to be able to assure quality and to supply fish with a higher percentage of white and pink color. These markets require companies to provide details about their operations to guarantee quality. Therefore, the processing firms which concentrate on EU and USA markets tend to apply good aquaculture farming practices and certified inputs for Pangasius production. However, other markets such as Russia and ASEAN markets are less strictly in food safety and quality; moreover, the fish price is also lower than EU and USA markets. The processing firms which concentrate on Russia and ASEAN markets tend to procure raw materials comes from traditional farmers because they can get benefits from outsourcing such as decrease of risks of losses caused by fish diseases, reduction of production cost which apply for advanced production system.

Survey (2017) also revealed that the relationship between small-scale farmers (individual farmers and FA members) and processing firms is characterized by informal agreements rather than enforceable contracts. There are no guarantees that the processing firms will purchase the fish from the farmer (Khoi et al., 2017).

It is remarkable to observe that about 50% of the raw materials come from companies' own farm (hierarchy governance form according to Gereffi, 2005); 25% from affiliated companies' farms (captive governance form); 12% from FA (relational governance form) and 13% from individual farms (market governance form). Hierarchy governance form has a joint ownership of resources on the farm and firm level. In this form, the fish quality can be assured by quality management system. Captive government form represents integrated relationship between farmers and processing firms. In this form, farmers remain legally autonomous but they are heavily dependent on processing firms who provides all critical resources such as fingerlings,

feeds, drugs, etc. Relational governance firm relates to frequent communication between processing firms and farmers' association in order to get better quality assurance of fish. Market governance form is spot market exchange between individual farmers and processing firms. In this term, buyers and suppliers negotiate only short-term relationship and they are ready to change their purchasing behavior quickly.

Hence, we argue that small-scale farmers' position can be stronger by improving relationships and coordination between farmers and processors. The experiences in fish farming at India (Umesh et al., 2009) demonstrated that small-scale farmers need to adopt BMPs to produce fish quality and improve prices (refer to chapter 11). This could be achieved only through working in farmer groups or relational governance form. By cooperation, the ability to adopt codification schemes is stronger. Consequently, the supplier's capability to meet the buyer requirements tends to increase.

### 4. Quality assurance system of fish which come from the company's own farms and affiliated farms

The first source of Pangasius raw materials is from the processing companies' own farms. According to Gereffi (2005) this is hierarchy governance form. In this form, the processing firms take direct ownership of the operations. The company's own farms are established in the region where water circulates well and residential density is low. Ponds are designed and build according to good farming practices in combination with environmental protection (interview, 2008). These company's own farms are certified for SQF 1000 by third party namely SGS [SGS: Societe Generale de Surveillance is the international Certification Body]. Hence, standards for traceability are met. In this case, the processing firms participate in multiple value-adding activities and there is no distinction between primary and secondary processing. The reason for setting up their own farm is to gain better control over primary production in

order to guarantee supply quality and traceability of their raw materials (survey, 2008). The companies want to maintain long-term relationships with their customers and thus adapt to the stringent quality and safety standards and regulations in the EU and the US markets.

The second source is supply from affiliated farms. This case is similar to the captive governance form (Gereffi et al., 2005). In this case, the processing firms and farmers are highly coordinated through contractual relationships.

The farmers have a close degree of monitoring and intervention by the processing firm (buyer) and they are dependent on the buyers in term of input and output control. All interviewed companies have organized vertical coordination between companies and farmers. Processing firms establish business relationships with these farmers through providing services, information, and technical know-how concerning quality of fingerlings, feeds, and usage of veterinary drugs. In addition, processing firms also offer free laboratory services for fish disease diagnosis and treatment for affiliated farmers. In addition, the affiliated farmers are getting SQF 1000 course for free and get SQF certificate for the group of farmers. These affiliated farmers apply good farming practices such as proper production methods, and appropriate administration of veterinary drugs to prevent harm to consumers and the environmental (all inputs as feed, fingerlings, and veterinary drugs need to be recorded; inputs have to be clearly identifiable and allowed by NAFIQAD; maximum allowed density of fingerling is 25 fingerlings/m<sup>2</sup>). Moreover, the company's quality assurance team checks the farm at least once a month and has on farm discussion with farmers in term of fish quality control issues. As the companies' affiliated farms are supervised by the processing companies for proper farming practice they achieve better quality than other farms (survey, 2017).

### **5. Quality control and quality assurance of fish which come from fishery association and independent farms**

The third source of Pangasius raw material consists of farmers belonging to a producer organization (fishery association). The governance form that apply in this are similar to the relational governance forms defined by Gereffi, 2005. Processing firms usually make a contract with the fishery association at the beginning of the Pangasius season. The contract specifies the requirements such as weight, color, no diseases, and no antibiotics. This contract is similar to contract 2 for affiliated APPU farmers; but there are differences in technical and financial support, and the selling price. The selling price is negotiated and calculated according to the market price upon purchase and as agreed by both sides. This is relational governance form in Gereffi's concept. In this form, the frequent coordination between buyers and suppliers is necessary to assure the required quality. Through relational governance, the FA members can increase market access through improving technology, market information exchange and enhancing bargaining power with buyers.

The fishery association offers several services to its members. It provides information on how to produce Pangasius and gives advice for disease treatment, financial services, and market information. However, members of a fishery association control quality of their farm by themselves. The fishery association encourage members the implementation of a quality assurance system at the farm level like SQF 1000. However, the members of the fishery association have to pay SQF training costs (\$250 per person) themselves. At the moment, some members of fishery associations follow the standards but they do not pay the certification fee because it is too high. SQF schemes have several requirements that are difficult to comply with by small-scale farmers. Examples of such requirements are the high number of written documents required, the high number of control points and the need for registration of feeds and chemicals used. Fish health management is also to be conducted under the supervision of a veterinarian, which at present would be difficult for most small-scale farmers (interview, 2017).

Others face problems to comply with SQF standards like the waste-water treatment pond and detailed record keeping. These small-scale farmers do not have the motivation to make the necessary investments in production such as a waste-water treatment pond (see chapter 8) due to fluctuation in prices and demand. They need to be assured a price and minimum demand to fulfill these standards. Generally, fishery association members control fish quality better than other independent farmer because they get more training and information on good farming practices (interview, 2017).

The fourth source for Pangasius raw material is independent farmers. This case is similar to the market governance form in Gereffi's concept. Processing firms can not control the quality of inputs (fingerlings, feeds) and usage of drugs on independent farms. Moreover, independent farms are less acquainted with export quality requirements and regulations. The reason for companies to purchase fish from this source is a lack of raw material to supply customers the whole year. Moreover, they need diversity of Pangasius quality to supply to the different market requirements. The business relationship between independent farmers and processing firms is more characterized by informal agreements than by enforceable contracts (survey, 2008). There is no a guarantee that the processing firms will purchase fish from the farmer. Fish farmers normally contact processing firms at the harvest time and through a registration process. At that time, the processor will check the fish quality by taking samples. Prices are negotiated after the results of Pangasius quality checking are known and depend on the market situation. If the color, size, antibiotic residues does not match the requirements of the processor the price will be lower or the fish might even be rejected completely.

#### ***Quality assurance of raw material***

For these raw material sources, quality assurance is conducted at the harvest period by testing fish samples. All processing firms follow a procedure for quality inspection of raw materials prior to processing. Fish samples of each farming pond are taken two or three weeks before harvest. Most processing firms have a laboratory for microbiological

control of samples. When receiving the samples of fish, the quality control department does sensory check, size check and estimates the fat content of the fish (interview, 2017).

Before harvest, the fish is starved for 2 days (according to contract with processor), then using a special harvest group of people. The fishes are transported to processing factories by well boat. Each well boat transports 10-15 tonnes. The transport takes from 1 up to 10 hours, depending on the distance. Fish is weighed at the farm, by counting number of full baskets when loading the well boat. Dead fish is rejected at the factory. The processing factories require documents for each boat load such as declaration of harvesting area, and guarantee letter about antibiotics used. Based on these documents they attach a code to each load in order to trace back to the farm if necessary (interview, 2008). The fish of each farm has separate batch code and the processing firms will process the fish of each farm completely before switching to the next farms. A quality control team is responsible for implementing, maintaining, monitoring and verifying these raw materials practices. The aim of these practices is to make sure that the raw materials received are safe for manufacturing and comply with the required quality levels.

## 6. Quality Assurance System at Processing Firm Level

The fish reaches the factory alive and is slaughtered by cutting the gills. After bleeding in ice water, the fish is filleted by hand. Next the skin is removed with a skinning machine. Afterwards the fillets are trimmed, checked, and classified by size and color. There are two freezing methods - either plate frozen or IQF [Individually Quick Frozen (IQF)]. Although most factories have modern equipment the process is still very labor intensive as 80% is done by hand. After processing the fish is packed and sold in container loads to the markets.

In the fish processing factories, the HACCP system is used to control whether fish safety requirements are met. In order to establish the HACCP system, GMP and SSOP are implemented. A major goal is to avoid any cross contamination of the product. This is accomplished by prescribing an efficient production flow from raw material to finished products, removal of dirty implements and offal, and avoiding temperature increases above 5°C. A quality manager is responsible for implementing, maintaining, monitoring and verifying good manufacturing practices.

Regarding processing quality control, the grading, sizing, weighing and classifying of fish fillets is the most critical hazard points (interview, 2017). At this stage, the fillet will be classified and sent to packaging room to pack for separate farms in order to trace if necessary. The workers stand at stainless steel tables and the Quality Control officer controls the process. Stainless steel vacuum tumblers are positioned around the table for sorting, grading and color classifications to transport the fillets to conveyor belts. The vacuum tumblers mix the fillet with STTP [SSTP is a chemical which used for Pangasius fillet] or other products to keep the moisture in the fillets according to market and customer requirements. This process has to be very strongly

controlled as there are limits in the EU markets for the use of these Phosphates in the fish that have to be followed strictly (interview, 2017).

By now, 100% of the Pangasius processing firms have performed the prerequisite programs as GMP and SSOP for applying HACCP. In order to fulfill the antibiotic testing of NAFIQAD, the processing firms have laboratory which is well equipped for analyses of antibiotics and fish sampling testing is done from each farming pond before harvest of fish is accepted (interview, 2017). In addition, NAFIQAD controls the overall performance of the processing firms through the inspection services. These activities were carried out once a month in term of checking antibiotics residues at random farms in the regional areas where Pangasius purchased by processing firms and fishery products of processing firms. The results showed the degree of fishery products compliance with the EU requirements.

## 7. Conclusion

This paper presented the quality assurance system at the processing firm level. In order to maintain and assure the quality of fish, processing/export firms have applied a quality management procedure that has been approved by NAFIQAD and the EU commission. Generally, the processing firms are relatively well developed. For them the challenge is to develop business relationships with importers based on the relational governance form. An important condition for that is that they develop a convincing quality assurance system with raw material suppliers. In the future (2020) when the EU applies completely the traceability rules to fishery products, the Pangasius processing/export firms have to strictly control the quality of Pangasius not only inside the company, but covering the whole chain for traceability issue. The case study revealed there are about 50% raw materials of companies' own farming and 25% of affiliated companies' farms which are easily traceability to farm level. However, the smallholders are in a more dependent position. The major challenge at the moment is to qualify fish products to be able to sell to high quality markets. In the short run a captive governance form seems to be the only realistic one. In a longer run challenge is to develop business relations based on relational form. The relational governance of Gereffi's concept is the useful form for the smallholders to be inclusion in GVC in order to assure the required quality. This is necessary to establish efficient coordination among smallholders together and between smallholders and chain actors in order to improve their participation into global markets.

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