

Food safety certification, an essential weapon for less developed countries in the Globalized Food Markets

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Abstract. In the globalized food markets, certifications of quality and safety standards have become commercial weapons. Assistance in the implementation and the control of these factors in developing countries proves indispensable in order to enable them to have access to world markets.

The purpose of this paper is to illustrate such an approach through a project implemented in Vietnam in 2005-2006, supported by the European Union within the framework of the *EU-VIETNAM SMALL PROJECTS FACILITY*.

The project "Improvement of shrimp products' quality exported to Europe through building up capacity of shrimp producers, private sector and local authority in Bac Lieu province" aimed at strengthening the skills of Vietnamese managerial staff and researchers in the study of the sector, the establishment of quality and health standards and the development of sector management policies and measures to achieve the established standards.

Keywords: World markets, Developing countries, Food Safety

1. Introduction

In recent years, Vietnam has made efforts to integrate into world economy. At the regional level, Vietnam backs to ASEAN (Association of Southeast Asian countries) community and confirms to full access to AFTA (ASEAN Free Trade Area) and WTO (World Trade Organization) by 2006. During the process of opening the economy and integrating into world community, international trade has become catalyst for the economy take-off. In such context, to be familiar to commercial international standards and regulations is not avoidable. However, in reality, Vietnam has often faced with difficulties, especially with control export products' quality. Regional and international economy integration is one of the most important goals of Vietnam government in the process of transmission to the market economy. In this period, the national budget depends strongly on the foreign currency earning from exportation. Facing to this circumstance, the improvement of exported products quality in Vietnam to enhance the competition capacity in the world market is much needed. In the process of economy transmission, the world economy integration should be encouraged by many different efforts. In which, the understanding of international standards and regulations for agro-fishery processing exported products is necessary, because they are the important exported one of Vietnam gathering nearly 70% of population involving in these activities. Exported shrimp value reached to US\$1 billion yearly.

2. General status of shrimp production in Vietnam

According to leading business institutes Vietnam's national economy grew by 5.6% in 2004.

The economy has been growing in these dimensions for more than a decade now. The driving force behind this development is the seafood industry. Fish and seafood constitute the second most important export product for Vietnam – after rice. More than 3.4 million people earn their livelihoods with seafood production by fishing or aquaculture, or processing plants. Nearly 2.5 million tones of fish, shellfish and crustaceans are caught wild or produced in ponds or floating farms. Just under 500,000 t seafood products worth a total of nearly 2.3 billion dollars were exported in 2003. Shrimps accounted for half of this. Shrimp production has developed rapidly in less than two decades. Current production volume amounts to about 180,000 tons per year (EUROIFISH Magazine, Issue 01/2004). This puts Vietnam among the leading shrimp producers worldwide.

Vietnam exports seafood products to a total of 75 countries among which the USA and Japan are the major buyers.

According to the statistical data of the General Statistical Office, Vietnam, shrimp production has strongly developed since 2000 up to now. In recent years, the water surface used for shrimp production is 600,000 hectares with production of 290,000 tons. The data showed that, the increase of shrimp production was 1.68 times in comparison to area increase. This means that shrimp productivity has significantly improved mainly due to the intensive shrimp production areas.

Shrimp production in Vietnam developed mainly in the coastal areas of Mekong River Delta, where farmers changed their rainfed rice production to shrimp activity. Shrimp production of the Mekong River Delta in 2004 was 230,700 tons accounting for 80% of the nationwide (General Statistical Office, 2004). The biggest provinces of shrimp production are Ca Mau, Bac Lieu, Soc Trang, Ben Tre, Kien Giang and Tra Vinh.

In these provinces, the water surfaces used for shrimp production reached hundred thousand hectares each, mainly single and mixture production forms. The provinces having large shrimp production areas, in 2004, can be listed as Ca Mau (277,900 ha), Bac Lieu (118,000 ha), Soc Trang (51,400 ha), Ben Tre (42,000 ha) and Kien Giang (78,400 ha).

The tiger shrimp variety *Penaeus monodon* raising in Mekong River Delta is accounting more than 90% of shrimp production. Recently the white leg shrimp *Penaeus vannamei* has been developed in some locations in small scale.

Shrimp production in Mekong River Delta is mainly under the improved extensive type. The intensive production type with high density using hatched post-larvae, industrial feed and veterinary control has been quickly developed.

At the end of 2003, Vietnam had a considerable sums of processing plants and there were big investmented in the modernization and new building of processing plants. About 175 of the more than 300 seafood processing plants work to HACCP standards, about 100 of them have been approved for exports to the EU. According to the evaluation of EUROFISH, presently, although there are still a lot of state-owned companies in the seafood sector, there is a definite trend towards private enterprises. Private firms are generally better equipped than the sluggish state companies; they can react faster and more flexibly to changing market situations. At the national level, the central and provincial state-owned enterprises account for 30% of the market share.

The center of the processing industry is in the South of Vietnam where 70% of all companies are based. In Ho-Chi-Minh-City alone there are about 50 seafood companies. The focus of the Vietnamese fish industry is on frozen products.

Presently, Vietnam exports shrimp to 75 countries in the world, in which, Japan, the United States and European Union are the main markets.

In the years 2004 and 2005, shrimp production in Vietnam had decreased due to difficulty of the market. The growth rate of exported shrimp volume declined from 16% in the years 2003-2004 to only 3% in the year 2005.

In 2003, with the effect of the anti-dumping tax applied to Vietnam exported shrimp and the mechanism of custom-bond to be applied from 2005, shrimp exported to the United States decreased strongly. Shrimp businesses of Vietnam changed their market to Japan and European Union. The market share of shrimp exported to Japan increased from 40% in the first half of 2003 to 46% at the same period of 2005. It was also there was an increase from 3.85% to 12.3% to the European market. Meanwhile, the market share of shrimp exported to United States decreased from 43.3% to 21.3% (Shrimp market report, 8/2005, FAO Globefish, 2005).

Besides, shrimp processing businesses in Vietnam looked for other new markets, such as Switzerland, Australia and Canada. In the first half of 2005, shrimp exported to Switzerland, Australia and Canada augmented 25%, 60% and 16% respectively compared to the same period of the year 2004.

3. The project

The EU-Vietnam Small Projects Facility Cooperation aim to support the transformation and the modernization of the Vietnamese economy and of the systems in governorship of Vietnam in order to facilitate the integration of Vietnam in the international economy.

The overall objective of this one year project conducted from May 2005 to April 2006 by both Vietnamese and European partners (Institute of Agricultural Science of South Vietnam and Gembloux Agricultural University, Belgium) was the improvement of Vietnam shrimp products' quality to obtain better international market access.

3.1. Relevance

The conversion from rice to shrimp production has quickly occurred in the coastal area of the Mekong River Delta at the end of the decade 90. In consequences, many rice producers joined in shrimp production without sufficient technical skill, necessary infrastructure and other knowledge related to issues as environmental protection, market information, international standards and quality, safety regulations. These problems would dramatically weaken export capacity of the sector.

As one of the three largest Vietnam's shrimp consumers, market access to European countries is important. At the present, EC regulations on import products' quality pose challenges to small producers in the coastal area. Overcoming the difficulties to satisfying market standards is vital for them. In the context, the project aims at improving shrimp product quality through building up capacity for local people on issues related to production techniques, farm management, commercialization and environmental protection.

3.2. Methodology

3.2.1. Selection of the research site

The first step was the selection of the research site and the identification of the target groups (all the agents of the shrimp chain). Fishery industry, in particular shrimp production is an economic sector strongly developing in Mekong River Delta. Shrimp production concentrates in the coastal provinces as Bac lieu (occupying the biggest area with 115,7ha).

A baseline assessment of the agricultural production system of an important ratio of farmers was conducted from 1995 to1999 at Vinh My A village, Vinh Loi district, Bac Lieu province. This baseline assessment carried out in the framework of the study about competitiveness of the rice subsector before shrimp production seemed essential to evaluate the impacts of conversion. Therefore, this village was selected .

3.2.2. Selection of the target groups

The conversion from rice to shrimp production has posed significant changes to traditional habitude of local people. Many rice farms have to search for experience and production techniques by themselves. Depending on production resources and career experience, shrimp producers have practiced one of three main types of production: extensive, semi-intensive, intensive. Generally, shrimp producers, especially the small farms do not sell their raw shrimp directly to the enterprises but through the small dealers or collectors. The system also includes other agents as local suppliers, who provide chemical products, industrial feeds, veterinary drugs, etc. In the target regions, some enterprises/exporters process fresh shrimp into different frozen products for export. These are the agents who control and are responsible for product's quality in processing stage and commercialization of the products to importing countries.

Those agents might be the potential targets from the project. Besides, provincial and district authorities control the sector through applying and monitoring public regulations on inputs purchases and utilization as well as the use of natural resources for shrimp production.

3.2.3. Research method

Because the project aims to find out feasible solutions that beneficiaries can apply by themselves, participatory methods were chosen. Therefore, the applied methods were mainly based on discussion to target groups on relevant issues.

The methods of implementation were:

- *Participatory Rural Appraisal (PRA)*: applied for the preliminary study on shrimp production and trade at the target village. Involving activities were discussion to interviewees' group, discussion to key informants, getting ideas, evaluations and potential solutions of local community about study's issues.

- *Semiformal interview through open questions*: mainly applied in the direct discussion to people who are responsible for different organizations at different levels: local authorities of the village, district and province; including leaders and staff of administrative or technical organizations as the People Committees, the Farmer Association, Aquaculture, of Resources and Environment, of Sciences and Technologies, Extension Center for Aquaculture.

- *Formal interview through prepared questionnaires*: applied to collect information of each homogenous target group and help to exploit data through statistics.

- *Documental research*: it aims to collect relevant information on concerned issues in national and European levels. In the framework of the project, it was mainly focus on gathering information on trading trade standard food safety standard. Collected data were also used to prepare documents for training and seminar.

3.3. Steps of the project

- *Conduction of a preliminary study in the target village and neighboring locations on shrimp production at farm level*: the study concerns shrimp production status, needs and constrains in relation to shrimp production encountered by farmers including production techniques and commercialization process, sensible problems that should be improved for better products' quality. The farmers will be randomly chosen by each of three strata representative for different types of production: extensive, semi-intensive and intensive.

- *Discussion with inputs' suppliers and processing enterprises/exporters*: the action is to collect information concerning supply chains of inputs as processed feedstuff, chemicals, veterinary drugs and other materials used for shrimp cultivation. For the enterprises, identification and classification by quality for shrimp supplied as raw material input, relevant applying measures to control quality and trade problems were main studied topics.

- *Discussion with local authorities*: to collect information concerning administrative aspects realized by the local authorities i.e. the local regulations concerning shrimp production and export.

- *Compilation of documents* related to techniques, environmental impact of shrimp production, international standards, European standards and regulations on imported shrimp, market access to European countries.

- *Workshop for different entities*

- *Establishment of a shrimp production network pilot in the village*: The network, once established, can be the core to build up a type of shrimp producer/trader/enterprise association at local level as a model for dissemination. The most important action of the project for the network is outlining and applying an appropriate system for quality control that adapts to local condition and at the same time, satisfies EU standards and regulations.

- *Setting up a handbook/practical guidelines on EU standards and regulations and dissemination to relevant organizations at provincial level as well as national level (VASEP, Ministry of Fisheries...).*

4. Statement of the problem: analyze of the shrimp chain

4.1. Organization and activities of shrimp chain

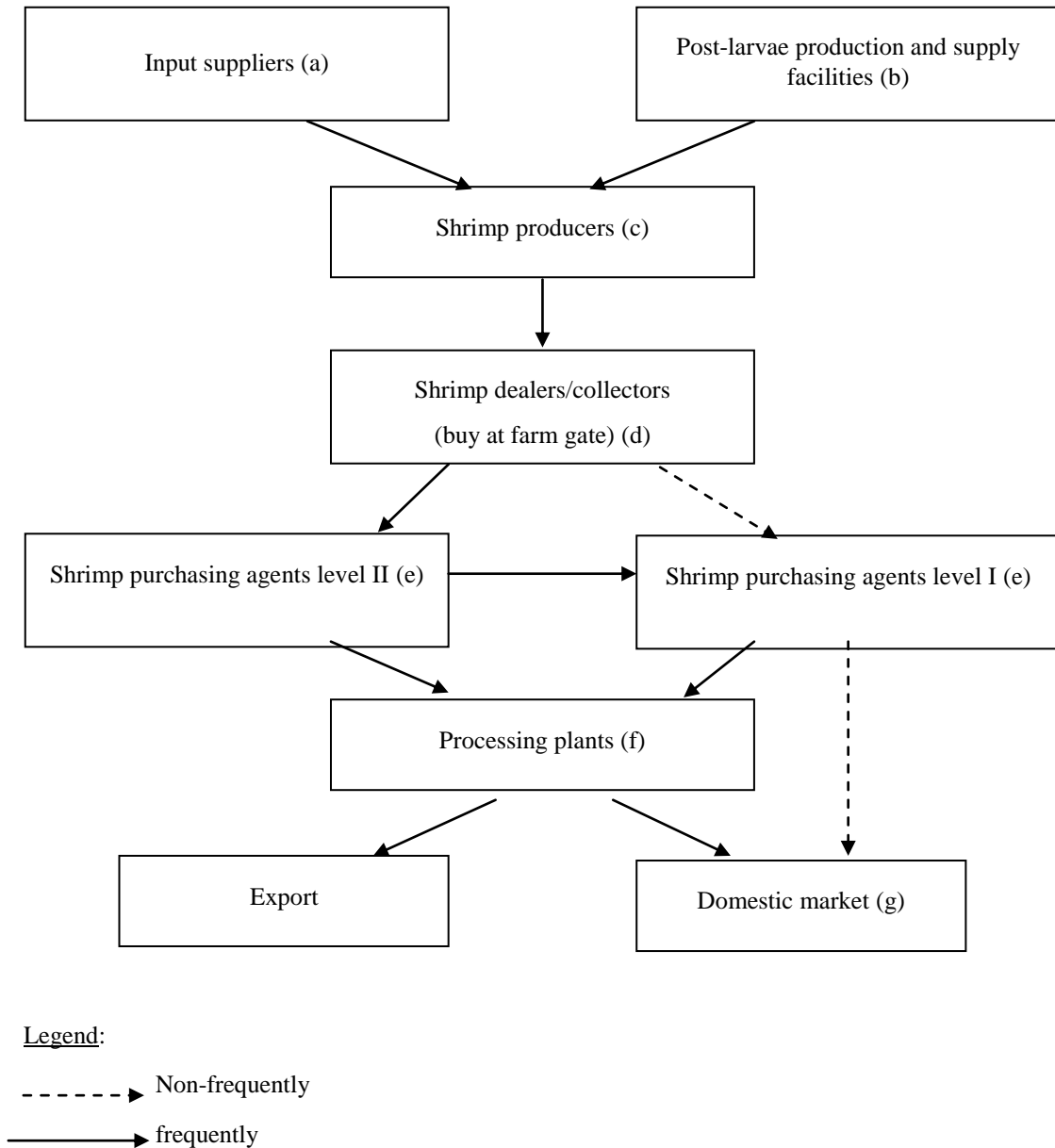


Figure 1. Shrimp marketing channel and relating agents in shrimp chain in Bac Lieu province

a) Input suppliers - Consisting of shrimp input agents level I (distribute directly shrimp input from producing factories or from importing companies to the input agents of lower levels through sale and retail distribution system). The input agents level II have a shop system located at the shrimp production locations, towns with a distance of about 5 km to the shrimp producers. The input agents level II have the role as an important transmissible channel of inputs, services and information to farmers. These agents frequently contact directly farmers supplying marketing information, prices and product varieties; loaning money (under the form of input delay-payment) which will be paid at the end of shrimp crop harvest. Shrimp input varieties are diversified, consisting of veterinary drugs, feeds, disinfectant chemicals for water and environment, post-larvae supply, machines.

b) Post-larvae production facilities - Consisting of post-larvae hatcheries and post-larvae business companies who supply post-larvae directly to farmers through agent system. Actually, there are tens of post-larvae hatcheries located in the coastal areas (Gia Rai, Ganh Dao, Nha Mat). Besides, there are various companies in the Central Coastal Region producing post-larvae and supplying directly to farmers in Bac Lieu (meeting 50% of post-larvae demand in Bac Lieu).

c) Shrimp farmers - Shrimp farmers play a role as the middle agent of the marketing system of shrimp chain. Supplying shrimp inputs for farmers are aquaculture input agents and post-larvae; and consuming shrimp output for farmers are shrimp collectors/dealers or shrimp processing enterprises.

d) Direct shrimp collectors (at farm gate) - They participate freely in shrimp business without legality. Their business activity takes place seasonally and has relation with shrimp collecting agents basing on bilateral confidence. Because raw shrimp is a fresh product, it needs a short time in refrigeration condition from harvesting to processing. Therefore, the direct form of shrimp collecting at farmer households is the common way and responsible by shrimp dealers. Time and price have been negotiated between farmers and dealers. After collecting, shrimps are kept primitively and transported quickly to shrimp collecting agents levels 1 and 2 just after one or two hours.

The direct shrimp collecting network is one of the factors providing information on shrimp price, shrimp kinds and shrimp size that the market needs. Farm-gate price is decided by this group on the base of deducting the transportation cost, loss and profit level to the purchasing price at the collecting agents (level 1 or 2).

e) Raw shrimp collecting agents levels 1 and 2 - Raw shrimp collecting agents are families who have capital potentiality (VND 20-200 million), equipment, transport means, facilities for preliminary processing and groups of root level collectors. Shrimps are bought from dealers, applied preliminary processing, classified, stored and then supplied to processing plant on the day or after one day. For farmers with large shrimp production, shrimp collecting agents often send their staff to buy shrimp directly to farmer's ponds and transport frozen to the collecting agent.

Buying price of raw shrimp at the farm gate is decided basing on the price at the processing plant deducting transportation cost, dealing expense, worker's payment and profit. The agents provide dealers shrimp kinds, shrimp size and price at the collecting time. Besides, a big amount of raw shrimp are supplied to the big markets (for sale), super-markets in Ho Chi Minh city and other provinces in the Mekong Delta.

f/ Processing plants for export - They operate under many forms and names, such as fishery processing company, processing company for export, fishery processing factory, freezing plant etc. Fishery processing business concentrate mainly in Bac Lieu province, in which, there are some foreign joint-venture (eg. NIGICO, with Japan), state-owned enterprises and private companies involving into activities of collecting-processing-supplying for export and domestic markets.

Raw shrimps are mainly supplied by shrimp collecting agents levels 1 and 2. Shrimp are first passed the quality control unit and then classified, preliminary processed, re-processed, final processed, packed, exported or consumed domestically following an strict industrial processing process on the base of sector standard, ISO and EU quality certificate. Depending on the business strategy of the company, the cultured raw shrimp proportion is more or less (generally 50%), the rest is from natural catching and extensive source.

Some companies have initially applied product traceability measure through shrimp batches supplied by collecting agents. The main shrimp exporting markets of these companies are Japan, the United States, EU and other countries in Asia.

g/ Domestic market - Domestic markets are mainly super-markets, big markets, sale and retail locations. A part of cultured shrimp supplied by collecting agents level 1 and 2, and processing plants through sale and retail channel systems to super-markets, big markets and restaurants in Ho Chi Minh city and other cities. The requirement of this market is not very strict on food safety standard, shrimp kind and shrimp size.

In this marketing system, the main shrimp business channels are (1) Farmer - direct collector - shrimp collecting agent - processing plant; (2) Farmer - direct collector - processing plant; (3) Farmer – shrimp collecting agent – processing plant and (4) Farmer – Processing plant. However, according to farmer’s interview results (Chapter 5), the collecting channel 3 (Farmer – shrimp collecting agent – processing plant) is the common occupying more than 80% of farmer’s trading shrimp. More than 90% farmers sell their shrimp at farm gate.

4.2. Identifying problems

Shrimp production in Vietnam is facing with big challenges from outside pressures (lawsuit of shrimp dumping, shrimp price fluctuation in the world market, stricter requirement from importing countries (US, EU, Japan).

In the country, viral diseases have, broken out causing heavy loss, environment pollution and shrimp price fluctuation. These are the factors with negative effects to farmers leading them to fall in loss and in debt.

As the survey and analysis results mentioned in this project; shrimp chain in Bac Lieu province exists many things which should be improved; namely community-based production organization, chemical management in shrimp production to ensure the standards of food safety and hygiene from the field, collecting, processing and exporting stages; brand creation; enhancing the prestige of Vietnam shrimp in the world market.

The local authorities have paid major attention and high evaluation to the shrimp chain and their interests to the importance of community-based production management.

4.3. Analysis of strengths, weakness, opportunities & threats of shrimp chain in Bac lieu province

The survey results showed that, the most important strength of Bac Lieu shrimp chain is the right awareness of the participants on the responsibility to the consumers. The right awareness on the important matters of shrimp production and trading is a basic condition leading to sustainable development of shrimp chain in Bac Lieu province.

The want of production linkage is obviously an advantageous condition for shrimp chain to implement the community-based organization and production management models with the goal of water use and disease control, and product improvement on the view of food safety and hygiene.

Farmer’s awareness on environment and chemicals use has been significantly improved after training.

On the side of input suppliers and raw shrimp collecting agents, most of them highly evaluate the importance of food safety and hygiene for shrimp export. After participating in the training, many enterprises have decided to follow the government’s regulations on food safety hygiene and improved product quality. In particular, the input suppliers have gradually limited maximum the trade of restricted chemicals and guided farmer to use right veterinary drugs and natural origin medicines.

The business facilities have also considered the need of training course organization on food safety and hygiene as well as market standards. Many opinions focused on the need to strengthen information supply, update the list of forbidden and restricted chemicals, and guide concretely the standards of product quality and food safety and hygiene.

On the side of relating government management offices, they all are aware the importance of shrimp chain for the local economy and the need of improvement and sustainable development of the sector. This awareness is also reflected from the opinions about the shrimp trading, satisfying importers' requirements on technical and commercial standards, meeting the regulations on food safety and hygiene for consumers and harmonizing the benefit of producers.

Natural condition and good infrastructure can also be mentioned as strengths for shrimp sector: Bac Lieu is a coastal province having natural hydrological regime, good weather and climate for salinity and brackish water aquaculture, rich in superficial and underground water resources. Bac Lieu has many fishery processing enterprises for export with a processing capacity of one third of shrimp production of the province. Some enterprises meeting the standards on food safety and hygiene have been certified for products export to EU market.

From our evaluation of the weaknesses appears a lack of detail development planning of aquaculture farming areas. Due to spontaneous and quick conversion from rice to shrimp production and lack of interdisciplinary planning it led to an asynchronous development of the sector. The processing capacity for export has not met the production capacity.

The technical infrastructure of the applied research activities for aquaculture production for shrimp farming does not meet the production demand. Material resource and capacity of the professional technical units as aquaculture laboratories, applied research stations have not been upgraded and strengthened enough.

Speedily development of aquaculture, especially shrimp production has exceeded beyond the long term production planning and orientation causing difficulty in the control of the sector development. The management of shrimp pond, food hygiene in production and processing, post-larvae quality and disease control has manifested many weaknesses. There have been many limitations in the control aquaculture chemicals and veterinary drugs. The collaboration between managerial sectors as fishery, natural resources and environment, agriculture and rural development (water supply and discharge system) for united development of the shrimp sector has not been clearly showed. Supply capacity of technical and market information of the government offices for shrimp chain participants is insufficient due to lack of investment fund. Meanwhile, the private sector plays an important role in the market information supplying. Therefore, in many cases, there were contrary information causing difficulties for farmers investment.

Producer's knowledge and existing technologies can not synchronously solve the demands of productivity, quality, food safety and hygiene and economic efficiency: actually, there has not been an existing shrimp culture technology that is able to satisfy simultaneously demand of improving productivity, ensuring economic efficiency, disease prevention and food safety. The post-larvae quality is not ensured and well controlled, the risk of disease incidence is high. Low knowledge level to prevent shrimp disease is the weakness of farmers. Improper and low efficiency use of veterinary medicine can be observed. A part of farmers used veterinary medicine periodically for disease prevention. The above-mentioned improper use of veterinary drug is uneconomic and can lead high risk of residual effect in the products. Uneven understanding and unclear awareness of a part of shrimp farmers on the importance of the effluent water and sediment treatment before discharging to the canal system can lead to the environmental pollution and disease incidence in the commune.

The tendency of shrimp trade and market price in the recent years has been worse. Since the anti-dumping measures applied by the U.S. for shrimp in Vietnam and other countries, the shrimp products exported to that market decreased causing a chain effect in lowering raw shrimp price in Vietnam. Regarding to the EU market, the application of technical barriers, mainly food safety standards, has created heavy pressure on the shrimp quality management in Bac Lieu province.

The present local mechanism of shrimp pricing is not based on the standards of food safety and hygiene. Therefore, farmers who have applied new shrimp farming techniques following strictly the regulations on food safety do not receive actually reasonable price in comparison to others. For this reason, lack of an encouraging pricing mechanism basing on food safety standards is an important limitation in stimulating farmers to apply techniques for safe products.

Although the shrimp sector in Bac Lieu has faced with many difficulties and weakness in management, organization, but it still has good opportunities for a stronger development in the future: the capacity to draw out the detail plan of shrimp production areas basing on the practical experiences of organization

and management in the recent years, the support from central government in the development strategy of Vietnam shrimp development program,, the great development potential of the world shrimp market , especially the new markets as Canada, Australia, Swiss, eastern European and Asian countries, the capacity of processing plants to diversify their products and focus on processing products with high value added.

Nevertheless, Bac Lieu shrimp sector has to face with the following threats: shrimp export activities will face with many difficulties due to the trading and technical barriers applied by importer countries for protecting domestic products and consumer's interests or for the other economic-political interests, the competence in the world market is more and more strongly because of the existence of many shrimp exporting countries, the higher requirements of important markets on the standards of environment, techniques, food safety and labor which can not be met by the existing technologies applied in Vietnam .

5. Establishment of community-based shrimp production model to supply shrimp for EU market

Within the framework of the project SPF/VN06 (101040), a model gathering shrimp farmers in the researched area with the view to upgrade farmer knowledge on food safety and hygiene and environmental pollution has been established. By these, we make farmers understand the positive effects to the production and living environments as well contributing to improve shrimp farmer's income through production cost reducing and reasonable selling price. From this, we can take out the lesson and multiply the model.

5.1. Operation of the model

The first step of the implementation was the identification of matters and target farmer group through the survey and rapid rural appraisal (RRA) of farmer households.

Do Thoi hamlet (Vinh My A village) was selected because of many shrimp households, large and concentrated intensive shrimp production areas, infrastructure suitable to transportation, farmer willingness and dynamics.

The second step was a "Farmer opinion exploratory" and the dissemination of the information: on the base of identified problems, farmers were invited to express their opinions on the model organization in the form of linked farmers in shrimp production. The discussion also helped to share the understanding of the effect level of the problems to farmer groups.

When understanding the objective, farmer group's meeting was organized for voluntary member registration.(step 3) Number of member's households was not limited. However, 15-20 households/group distributed closely by geography is suitable to organization and monitoring.

Farmers in the hamlet were invited to group meeting for finalizing the criteria and objectives of group establishment. After considering and full information approaching on group establishment, farmers voluntarily register member household. Total of 14 households concentrating in Do Thoi hamlet, Vinh My A village registered member households.

An engagement document had been written on the base of criteria and objectives discussed and contributed by all 14 member households. Its main point is the engagement of non-use of forbidden chemicals and veterinary drugs and feed containing forbidden substances.

The step 4 was the drawing out an activity plan based on periodical group meetings, field visits, experience exchanges, technical trainings (for example: pond treatment method, post-larvae selection, proper utilization of feed and veterinary drugs, prevention and treatment of some main diseases, water treatment before and after shrimp raising)

The last step concerned inspection, monitoring and evaluation: diary noting of each member household activities during shrimp production stages, inspection and technical guiding of aquaculture extension workers, group self evaluation .

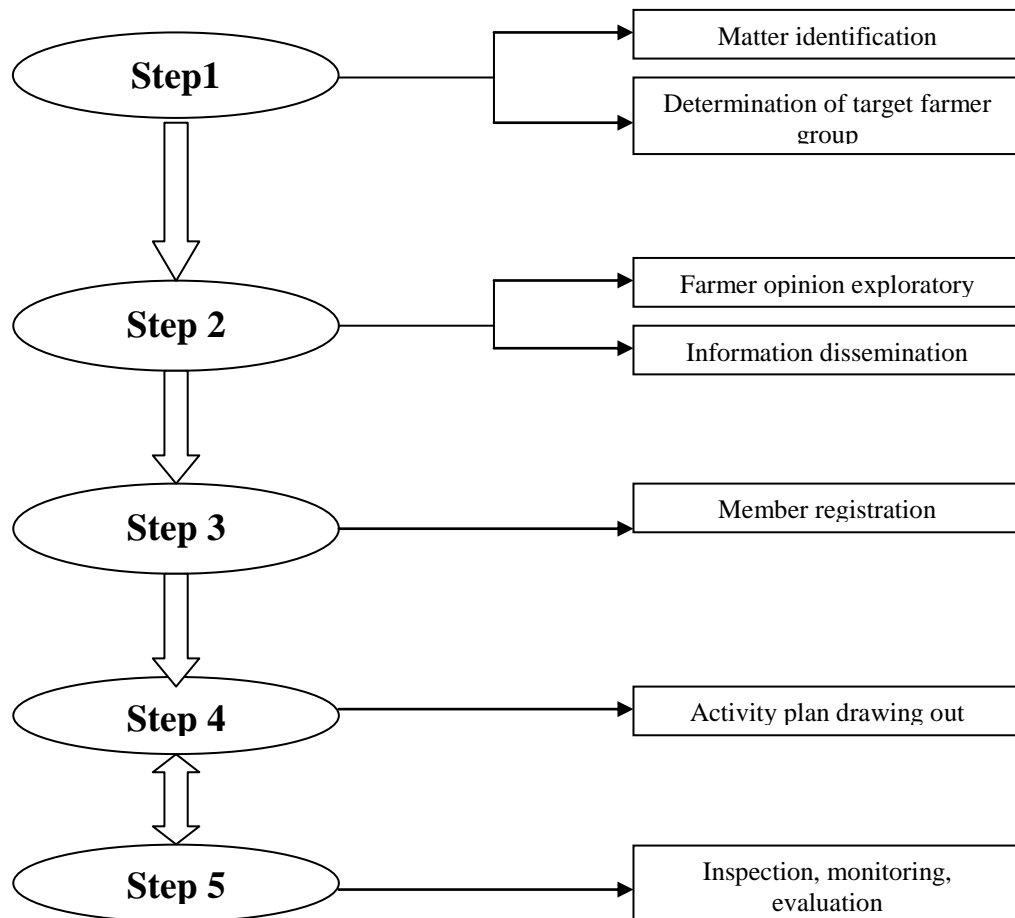


Figure 2. Steps to establish community-based shrimp production applied by Project

5.2. Evaluation of preliminary results

- Farmers have opportunities to contact economic and technical specialists, local leaders and chance to exchange economic and technical information relating to environment.
- Production management through shrimp production diary record creating the documental base for traceability for raw shrimp from households in the model.
- Reducing the risk of water pollution and chemical residual effect in raw shrimp due to proper application of techniques (control of water source, feed, veterinary medicines and chemicals). Treatment of sediment and waste water before discharging to the canals.
- Upgrading farmer awareness on food safety, environment and market.
- Member farmers are the factors through which we can popularize the efficiency of the model contributing to multiply model to adjacent households and communities. By this way, the multiplication capacity of the model is high and rapid.
- Stability of the model depends on the application of detail measures for solving the most important things in shrimp production of the community.

5.3. Lessons learnt from model establishment

Some lessons in the organization and implementation of the community-based shrimp production model to meet the standard of food safety and hygiene can be mentioned:

- Solving a socio-economic problem, especially in the shrimp production, will be more efficient if there is the participation of the community.
- Important role of the farmer community in decision-making;
- The linkage of the entities in the shrimp sector is very necessary provide that the model coming to a fully-workout. In which, the participation of processing plants is needed, in one hand to ensure the output for farmers and in the other hand they get many benefits due to have confident goods source and capacity of traceability.
- There is a big gap between policy issue and policy implementation. Multidisciplinary participation can reduce the gap, in which farmer households play an important role.
- Beside of the traditional methods that are actually applied as theory training for farmer group and single model establishment, the on-farm extension method for community-based farmer groups should also be realized.
- Technical and financial support of the local authority for dissemination of similar community-based model is very important. It may be reasonable to increase the fund for support activities of the extension workers, and organization and management of the community.

6. Policy recommendations

In the framework of a small research and development project, the study results were mainly drawn from one key village and the preliminary evaluation of shrimp production, trade and local government management. Relying on obtained data and information, the research group has suggested some policy recommendations which can be realized in the province scope. The recommendations also consist of the official and unofficial opinions of the local specialists collected by research group during the project implementation.

The policy recommendations are general, not the detail solutions. The establishment of specific policy system and detail solutions should be determined by local policy makers in respect to production status of the province. This report can only suggest a general policy framework for contribution to the policy-making process.

Followings are the recommendations:

Recommendation 1: Improving production planning and local government management

- Production planning should be detailed to each sub-ecological zone. The planning should meet the objective of good aquaculture practice (GAP) for food safety and hygiene and ensure availability of product traceability to each shrimp area.
- Establishment of concrete action program with assignment and closed collaboration between related managerial organizations as aquaculture, agriculture and rural development, water conservation, natural resources and environment and commerce. A coordinating committee for shrimp development in Bac Lieu should be established under the direction of the Provincial People Committee.

Recommendation 2: Strengthening production organization

- Investment should be more strongly realized towards infrastructure improvement and production management to specific shrimp culture area.
- Realization of water supply and discharge management by planned zones.
- Establishment of the linkage between agents in the shrimp chain with suitable measures and with sanctions. For example the processing plants and export companies must have the managerial system ensuring product traceability to the direct raw shrimp suppliers; the shrimp collectors and dealers must prove their capacity to satisfy product traceability to the shrimp farmers; the shrimp farmers must have diary noting the use and suppliers of feeds and veterinary medicines.
- The community-based shrimp production should be disseminated. Three key components of the model are input agents, shrimp farmers and local authorities.
- Establishment of the production standards and guidelines that meet the international standards on food safety and hygiene, for example good aquaculture practices (GAP), best aquaculture practices (BAP). Such standards and guidelines should be appropriate to the production management level as well as farm application of the locations. The community-based shrimp production models will be the places to apply these production standards.
- Establishing the ecological, clean and organic shrimp production areas on the base of the existing improved extensive shrimp production surfaces which occupies nearly 90% of the total shrimp farming areas.

Recommendation 3: Improving management activities for food safety and hygiene

- Decentralization of management to the root level with the view to obtain better control of trade and utilization of forbidden and restricted chemicals, especially at level of input suppliers and shrimp collectors and dealers. Of which, operation of input suppliers should be considered as the core of control.
- Obliging companies to organize the demonstration field on the use of chemicals and veterinary drugs when these are introduced to farmers.
- Strengthening the management and inspection of post-larvae quality produced in the province through the application of strictly managerial measures covering hatcheries to post-larvae purchase.
- Better integrated collaboration for post-larvae quality management between post-larvae producing provinces and shrimp production province. This matter should be directed by the governing ministry.
- Building up capacity for technical managerial organizations as aquaculture extension center and aquaculture resource protection department. These organizations need deep investment to equipment and facilities for shrimp disease testing and quality control of veterinary medicines.
- Submitting to the Ministry to work out the set of standards for exported shrimp quality.
- Submitting to the Ministry to work out and apply the regulations and standards on the residuals of forbidden and restricted chemicals in raw shrimp.

Recommendation 4: Promulgating the policies and regulations of the government, technical and market information

- Augmenting frequency of broadcasting and television programs on standards of food safety and hygiene and suitable management measures.
- Promulgating extensively the government regulations on food safety hygiene, list of forbidden and restricted veterinary drugs and chemicals through communication and training.
- Promulgating the results of community-based shrimp production model with assigned responsibility.

- Providing the independent information of chemicals and veterinary medicines which are circulating in the local market to help farmers using efficiently and reducing bad effects to food safety and hygiene.
- Propagandizing government regulations and standards on chemicals' trading to input suppliers and shrimp collectors and dealers. Applying resolutely the sanction measures in case of violation.
- Submitting to the Ministry to establish the market information system focusing on price information, market standards, supply and demand forecasting and fluctuation of input materials. This information system should be maintained steadily and covered all agents of the shrimp sector.

Recommendation 5: Applying new appropriate technologies to shrimp culture

- Diversifying the production models to reduce the risk of diseases on the improved extensive shrimp farming areas.
- Enhancing the applied researches of new shrimp farming technologies suitable to improved extensive shrimp production areas with the view to improve the productivity.
- Providing the methods to treat waste water and sediment that are appropriate for farmer condition.

Recommendation 6: Enforcing management of supply and discharge water quality

- Applying resolutely measures to farmers and production facilities who discharge waste water and sediment to canals without treatment before.
- Proposing to the Ministry to work out the quality standards on supply and discharge water, and sediment in shrimp production.
- Establishing the periodical testing systems of superficial and underground water quality on the main shrimp farming areas. This measure is to obtain better control water resource. Establishing zoning maps of weather, hydrology and water environment quality to each zone to provide the base for monitoring and forecasting water environment.
- Studying the quality management and treatment of pond's sediment and soil.

7. Conclusions

The proposed project met the SPF programme's objective which is integration into regional and world economy. In a transition economy as Vietnam, the integration process must be accelerated through different efforts. In particularly, help of European experts on international regulations and standards, especially those related to agricultural exports must be taken into account. In the frame of the proposed project, environmental protection, food safety, safety and organic production, protection of consumers' health are main communicated issues.

The action can also satisfy the priorities of SPF programme because it focuses in transferring necessary information and knowledge on international trade, market access, regional economic integration directed to European countries to local people. These themes were supplied to local people under form of training/capacity building.

In the frame of the project implementation, by the activities of information exchange through training courses, workshops and discussions, the beneficiaries have got new awareness on the requirement of importers and understanding of EU regulations and standards concerning shrimp products.

The project can become a model for sustainable development of shrimp production for the target location. From the village level, the model can be applied and disseminated to neighboring locations of the province and other coastal provinces in the Mekong River Delta.

With participatory approach, cooperation with local experts ensured project's success. The replication and extension of the action's outcomes are promisingly feasible. Administrative and technical organizations of the province will be main bodies for realizing the expected dissemination of the project. Therefore, the multi-disciplinary training courses supplied by the project can be used to extend local training scope.

As the result, there was a transfer of organization from university/research institution to local administrative/technical organizations.

One of expected impacts of the project was improvement of local authorities' activities for a sustainable shrimp production. The most important result was to make local authorities better aware of regularization and information update on international standards. Relying on the change of viewpoints, they can improve process of policy-making.

The nature of project activities was communication of EU standards and regulations and how the local shrimp chains can respond to such conditions. Through all activities, especially the trainings and workshops and open discussion to local entities, EU policy on shrimp import is emphasized and clarified. As the results, the project ensures the improvement of the mutual understanding by promoting civil society dialogue and facilitating interactions.

Moreover, with the findings of the project, EU can understand the difficulties in improvement and modernization of shrimp industry in the context of Vietnam, the reality of shrimp production in less developed countries, especially the one related to the use of chemicals in respect of food safety regulations and the traceability of the chain.

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