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Improving Sutchi catfish supply chain in An Giang, Vietnam

Case: focus on small catfish producers

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Abstract

In fact, aquaculture is considered as one of the largest industries in Vietnam, and Sutchi catfish is quite popular around the country. An Giang Province is known as one of Vietnam's largest Sutchi catfish production. However, there are a large amount of small Sutchi catfish producers there are not able to produce and distribute required qualities and quantities of catfishes in terms of their customers' demand as a result of disruptions in supply chain. This leads to a huge loss in profits these small Sutchi catfish producers.

The objectives of this thesis were to identify problems relating to supply chain management and then present solutions to ensure that a well-working supply chain can be established to help small Sutchi catfish producers there to earn more money. To achieve the objectives, all available data was collected from results of qualitative research method from these small Sutchi catfish producers, new articles, studies, research articles, and other authentic sources and then evaluated and further explored.

According to the results of the analyses, a new supply chain, if successfully implemented, is expected to create several benefits to small Sutchi catfish producers there. The improvements will be related to increases in productivity, hygiene safety, utilization of resources and importantly profits.

Finally, this thesis can be served as a literature review for readers who are interested in starting a career in the area of supply chain management of aquaculture industry in Vietnam.

Keywords/tags (subjects)

Miscellaneous (Confidential information)

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1 Introduction

In fact, when performing a business in the aquaculture industry, a company will have to face harsh competition and serve fluctuations in profits as the result of current strict rules and regulations and other external impacts such as bad weather conditions, or outbreak of diseases. Therefore, a well-working supply chain is undeniably seen as the most important key for meeting customer's satisfaction and enhance a company's competitiveness in today's business environment. In order to achieve these missions, it is essential for any company to pay more extra attention to material movement, build strong relationships with suppliers and customers, and improve current logistics activities as well.

The idea to write this thesis came to me simply because I am keen on starting a career on the area of aquaculture industry in Vietnam. Additionally, I started to become interested in this topic after my summer's holiday in An Giang, Vietnam, and the selection of studying Sutchi catfish would be due to my curiosity.

1.1 Research Aim and Focus

An Giang province is located in the west of the Mekong Delta, which plays an important role in Vietnam's aquaculture industry. This province has greatest potential for Sutchi catfish production, which has been significantly developed in recent years and has been considered as one of the biggest sutchi catfish producers in Vietnam. However, over 80 percent of catfish producers there are classified as small ones and they cannot distribute required quantities and qualities of sutchi catfishes in term of their customers' needs as the result of disruptions in supply chains, the sutchi catfish industry in this province therefore is still seen as instability.

This thesis's objectives are aimed to provide readers both essential knowledges and useful remarks relating to aspects of supply chain integration, and supply chain management, and to attest the importance of how an aquaculture supply chain are established to support small Sutchi catfish's producers' productivities.

The author focuses on solving these following questions:

- How is sutchi catfish supply chain operated currently in An Giang province?
- What are existing problems which are causing disruptions in sutchi catfish supply chain there?
- How is sutchi catfish supply chain there improved?

With forthcoming provided information, the author expects that this thesis is considered as the most useful source for readers, who are interested in supply chain management field, and as well as small catfish fisheries, who are appealed to creating an optimal catfish supply chain or reconstructing the existing one for better productivity in pursuit of increasing more profits.

The thesis is organized into six chapters. The first chapters provide a brief introduction along with all specific objectives. In second chapters, theory reviews in consonance with the thesis objectives are presented. The third chapter describe main features of the study area. The fourth chapter summarizes major findings of the thesis. The fifth chapter presents solutions to specific objectives. The final chapter is about conclusion.

1.2 Research Methods

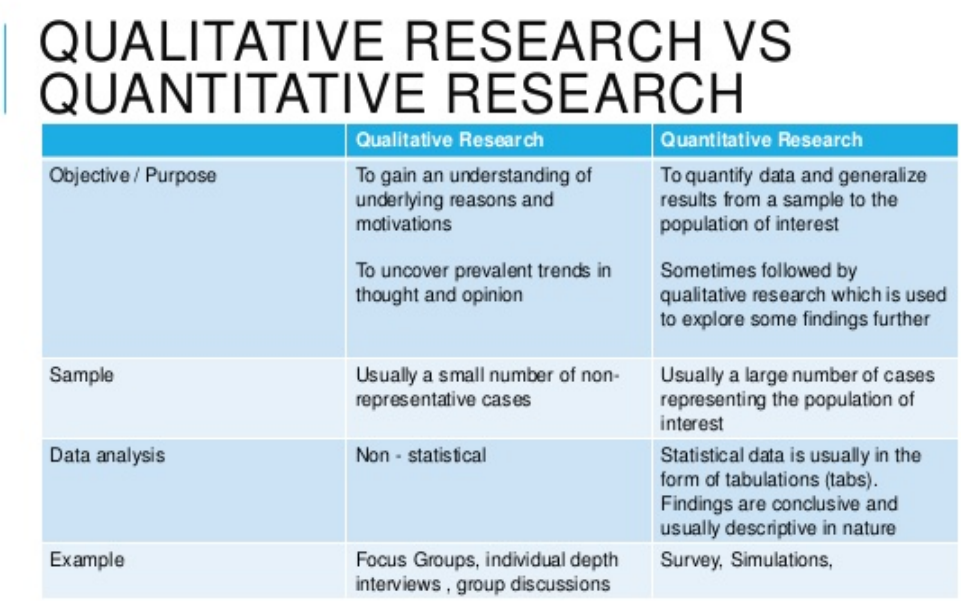
1.2.1 Choosing a research method

There are in fact two research methods utilized to handle research process during a thesis work, which are quantitative and qualitative methods.

The quantitative research method is used in situations in which significant statistic groups are required to collect a large number of respondents analyzed to figure out common patterns of participants. Therefore, this kind of research method is known as the best way to evaluate common processes.

The qualitative research method usually applies to small focused groups, and thereby generating deep and narrative sample description. In this case, this method is undeniably appropriate for narrow focused tasks aiming to specifying a certain industry or a field of business.

In figure 1, the author compares two research methods in terms of characteristics



	Qualitative Research	Quantitative Research
Objective / Purpose	To gain an understanding of underlying reasons and motivations To uncover prevalent trends in thought and opinion	To quantify data and generalize results from a sample to the population of interest Sometimes followed by qualitative research which is used to explore some findings further
Sample	Usually a small number of non-representative cases	Usually a large number of cases representing the population of interest
Data analysis	Non - statistical	Statistical data is usually in the form of tabulations (tabs). Findings are conclusive and usually descriptive in nature
Example	Focus Groups, individual depth interviews , group discussions	Survey, Simulations,

Figure 1 Qualitative research and Quantitative research comparison table (optinmonster.com)

In case of Sutchi catfish supply chain in An Giang, the research is considered to be quite narrow specified and necessarily requires fish producers who are currently working in the Sutchi catfish industry and are facing disruptions in supply chain. As a consequence, the qualitative research method is utilized in this thesis process.

1.2.2 Research method approaches

In this part, the author presents necessary technics when using qualitative research method. For every method, there will be guidelines in pursuit of using it, and detailed information can be found in the research and analysis section.

Interviewing is considered as the most valid qualitative method based on caring out interviews to find out appropriate connectivity among answers of different participants. The author expects that from 5 to 20 small interviews with catfish farmers are seen as sufficient database for further analysis.

Journal and diary is another qualitative method which keep handwritten and digital journals, documents and diaries relating to potential interviews

So, the author explores the aspect of supply chain, supply chain integration and supply chain management by studying academic documents, while existing problems relating to sutchi catfish supply chain in An Giang are explained with in-depth analyses primarily based on collected available data.

In this thesis, both theoretical hypotheses and collected data from realistic cases are presented and analyzed for creating solutions to the improvement of efficiency of Sutchi catfish supply chain, conclusion and further discussions as well.

The author collects data by means of observations, such as arranging small interviews with small sutchi catfish producers, reading previous publications on the same topic, watching videos, and studying legal documents.

The research process can be described in the figure 2:

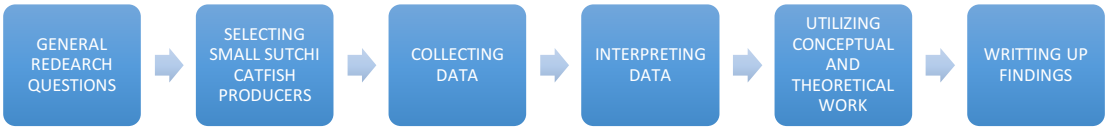


Figure 2 The research process

1.3 Restriction of Research

This thesis was primarily based on available data collected from samples of small Sutchi catfish producers by carrying on surveys. Due to the fact that many of these

catfish producers who gave information from their own memory and experiences, all collected data would be certainly subjected to result in bias. The study area is only limited to An Giang province, hence research findings cannot be applicable to other areas with different demographic characteristics. However, the research finding of this thesis may be appropriate for several situations which are similar to this study area, and readers are recommended to take more extra care while utilizing the results.

This thesis has concentrated only on Sutchi catfishes in An Giang, and therefore it cannot concentrate on all marine fish species in Vietnam.

2 Theoretical review

2.1 Defining a supply chain

In general, a supply chain is considered as a system of processes which is required to ensure customers' requests and satisfaction. Handfield& Nichols 2002,8 stated that the supply chain encompasses all organizations and activities associated with the flow and transformation of goods from raw materials, through to the end user, as well as the associated information and monetary flow. Today's supply chain includes typical facilities such as warehouses, distribution centers, retailers, resellers, wholesalers, factories.

The figure 3 shows how supply chain activities are operated from receiving raw materials to delivering final products to end consumers.

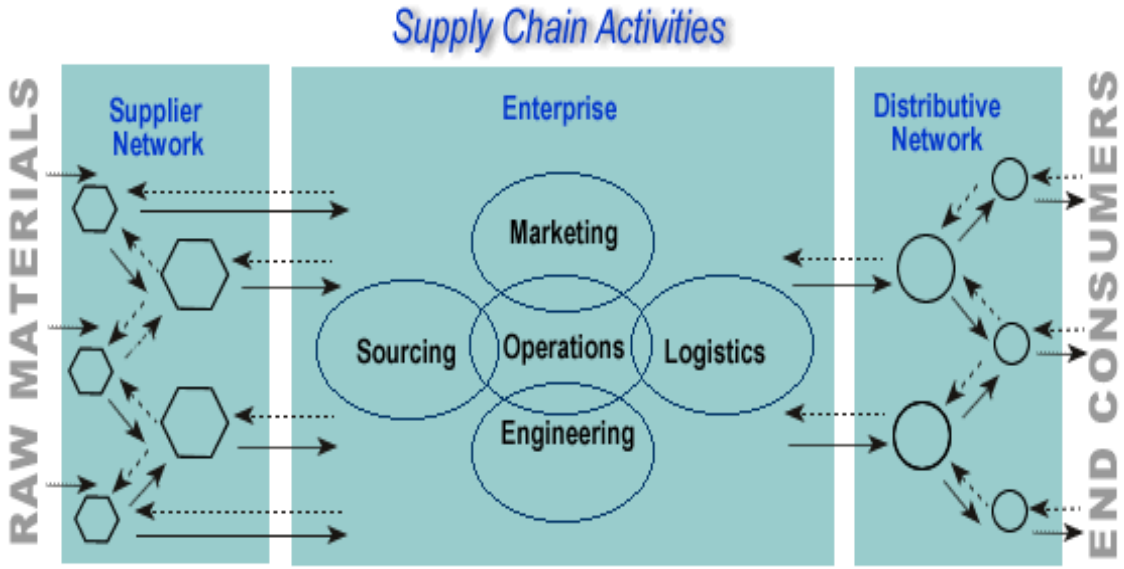


Figure 3 Supply chain activities

(supplychainmanagement.in)

2.2 Supply chain management concept

2.2.1 Defining supply chain management

In this subchapter, the author will discuss the concept of supply chain management with definitions commonly used. As was mentioned, different views on the definition of supply chain management are presented through several independent people and organizations.

According to Lowe (2002,236) in 'Dictionary of transport and Logistics' stated that supply chain management is the organization of the overall business processes to enable the profitable transformation of raw materials or products into finished goods and their timely distribution to meet customer demand. It means that processes in a company are organized by supply chain management in pursuit of manufacturing and distributing products cost-effectively. It is a basic explanation and widely agreed by many people.

According to definition given by the influential US-based Council of Supply Chain Management Professionals (CSCMP), supply chain management encompasses the

planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party services providers, and customers. This definition draws a full picture of supply chain management. It stresses that relations and integrated business processes between participating companies play important roles because the efficiency and improvement of all participating companies are improved and also acknowledges an important role of logistics as one of the core functions contained within supply chain management (Mentzer 2001:20).

In today's highly competitive markets, supply chain management is widely recognized as an essential part of business strategies for companies. With a well-working supply chain management system, operating process is optimized, phases of production and delivery time are reduced in pursuit of assisting a company to adapt to market changes and importantly achieving long-term competitive advantages.

2.2.2 Common structure of supply chain management

In figure 4, there is a clear explanation of the common structure of supply chain management, which consists of processes connecting to each other and extending across organizational boundaries.

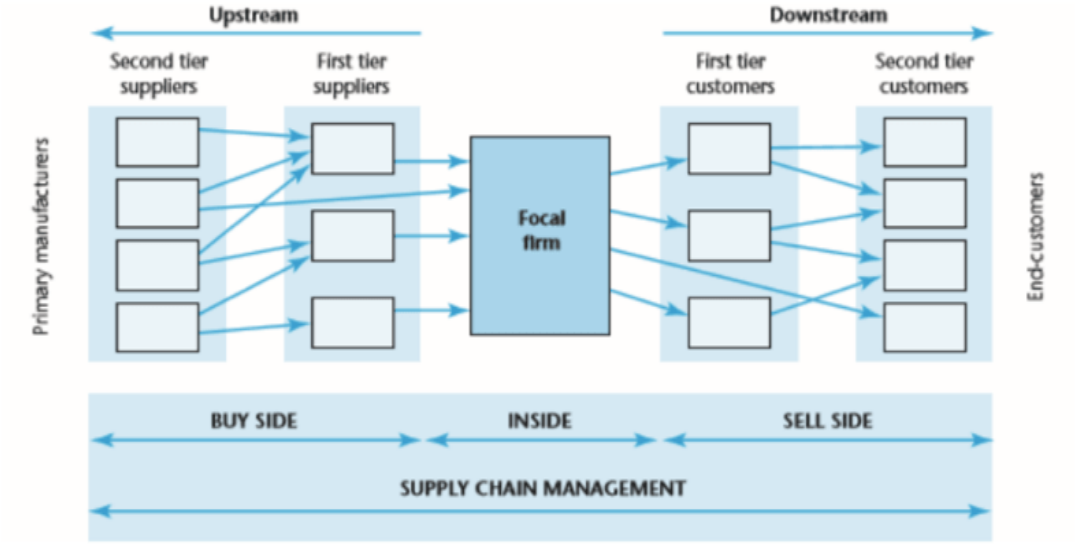


Figure 4 Supply chain management structure

(Harrison &Hoek 2008,9)

According to Harrison& Hoek, processes moving materials inwards are called upstream, processes moving materials outwards are called downstream.

On the buy side, tier suppliers are responsible for upstream activities. Accordingly, first tier suppliers are ones who sending materials directly to the focal firm, second tier suppliers deliver materials to first tier suppliers and so on back to original sources.

On the sells side, downstream activities are taken place in terms of types of tier customers. To be specific, first tier customers are ones who buy products directly from local firm, second tier customers are purchasing these products from first tier customers, and so on to final customers.

2.2.3 Keys elements of supply chain management

A successful and efficient supply chain management system certain is considered in terms of several key elements which are communication, collaboration, optimization, integration, flexibility, and risk management as well

Communication undeniably plays acritical role in supply chain management. A good communication system among participating members of a supply chain will solve problems relating to communication with other employees from different departments such as suppliers, and then develop more ideas in order to enhance the efficiency of operating processes.

Collaboration is known as another significant element of a successful supply chain management system. Utilizing collaborative approaches will help members to work together on planning strategies to implement them into operations. According to Botta-Genoulaz stated that organizations can increase their reactivity to the competitive market through collaboration.

Optimization takes responsibility for controlling the movements of three main of a supply chain including materials, money and information respectively. Well managing these movement steps demonstrate that a company is having an efficient supply chain

Integration in supply chain management is defined as an important large-scale business strategy aiming to bring participating members into a closer working relationship with each other in a supply chain in order to achieve good production time, enhance response time and reduce operating costs and wastes as much as possible. Farooqui 2010,8 stated that in case if a supply chain is not integrated, properly managed and streamlined, significant resources are wasted.

Flexibility in supply chain management refers to appropriate reactivity to unprecedented challenges from current markets such as demand fluctuations, capacity loss or material resource changes.

Risk management in supply chain management refers to effective solutions to external and internal challenges which any company surely faces. Manners-Bell 2014,1 stressed that there are many ways to increase efficiency of a supply chain, but supply chains are vulnerable and without risk management they easily can failure.

2.2.4 Push and Pull models

Push model is seen as a traditional supply chain model and has be utilized by many companies for several decades. Push model depends on forecasting current customer demands in order to distribute as many products as possible to the market. Therefore, this kind of model is seen to be supply driven. The main benefit of Push model is to manufacture optimal level of products in terms of long term forecasting. The drawback of push model in supply chain management is to create high inventories, and then lead to increased operating costs relating to warehousing and distribution as the result of speculative nature of push model.

Pull model otherwise depends on real customer orders, which helps in producing required amounts of products and therefore saving resources. However, a company

may face loss of opportunity costs in some situation in which there are excess demands from customers compared to the current capacity of this company.

The figure 5 shows how Push-based Model and Pull-based Model operate

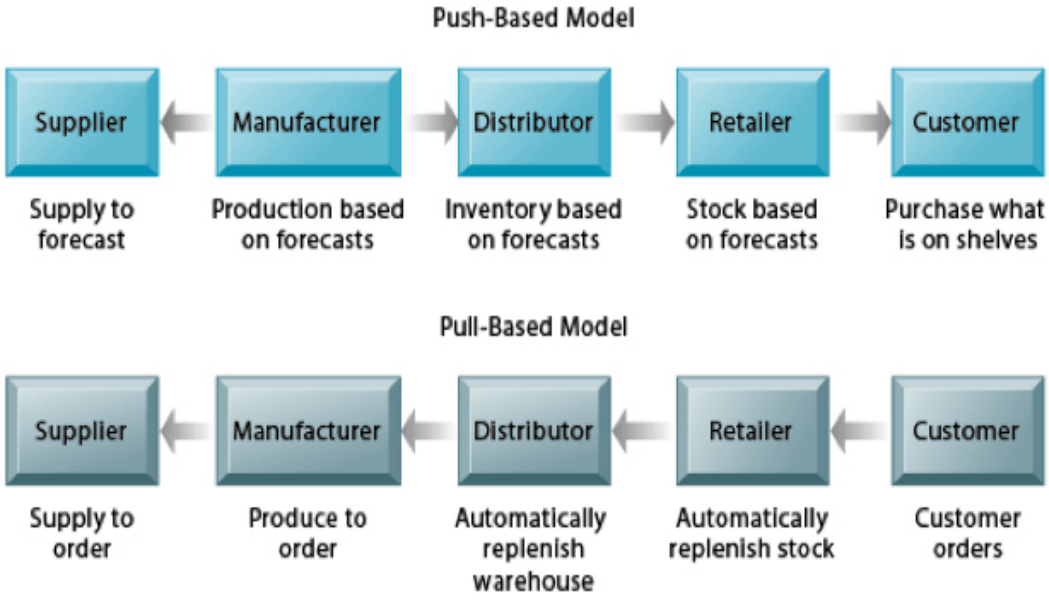


Figure 5 Push-versus Pull-based supply chain models

(pagnias.fe.up.pt)

2.3 Logistics activities in supply chain management

Logistics plays an essential part in a supply chain management system, which includes all activities occurring within the boundaries of a company. According to MIT center for transportation and Logistics, logistics involves 'managing the flow of items, information, cash, and ideas through the strategic addition of place, period, and pattern value'. To be specific, Logistics is responsible for two functions including managing the movement of raw materials and components from source of supply to manufacturing plants and the movement of finished goods from manufacturing plants to warehouses, retailers and final customers as well.

Logistics activities consist of warehousing, inventory control, outbound transportation, materials handling, packaging, inbound transportation, data processing, order administration

Transportation refers to transport scheduling, route planning, transport cost management and importantly documentation such as bills of lading or transportation invoices.

Warehousing is seen as an integral part of every logistics system in supply chain management, which stores products such as raw materials, parts, or finished goods, and provides essential information for controlling the conditions and dispositions of stored products. There are different types of warehousing in terms of the customers a company is serving. A retail distribution center delivering products to retail stores can be considered as a warehouse. However, a company should determine its inventory characteristics, labor costs, and throughput and service requirements when choosing a type of warehouses.

Distribution is another function of logistics in supply chain management and takes responsibility for distributing finished products to retailers, wholesalers and customers as well.

Packaging in logistics refers to a coordinated system of preparing goods for safe, secure, efficient, and effective handling, transport, distribution, storage, retailing, consumption and recovery, reuse and disposal combined with maximizing consumer value, sales and hence profit (Saghir,2002). Packages should be designed in proper ways to ensure aquaculture products stored in required conditions, these products therefore are safe to eat and remain fresh from factories to markets and to final customers.

2.4 Strategies to increase efficiency of supply chain management

In this chapter, the author present information about how the most common strategies many companies have been implementing can enhance the efficiency of a supply chain. Reader are expected to become familiar with common concepts of such strategies.

2.4.1 Supply chain optimization

Supply chain optimization refers to selected processes and tools in pursuit of remaining the efficiency of manufacturing and distributions processes of a supply chain. This strategy usually focuses on generating optimal locations of inventory within a supply chain and decreasing costs relating to manufacturing, transportation and distribution.

2.4.2 Supply chain integration

Even though a supply chain includes different organizations with different roles, their common objective is to satisfy their final customers. Therefore, it is necessary for all activities in a supply chain to be integrated in pursuit of reaching this objective.

Supply chain integration is defined as an important large-scale business strategy aiming to bring participating members into a closer working relationship with each other in a supply chain in order to achieve good production time, enhance response time and reduce operating costs and wastes as much as possible.

When working in a supply chain, these participating members are usually interconnected under three main flows which are finance flow, information flow and material flow respectively.

The materials flow goes from first suppliers through the entire supply chain to end customers.

The information flow goes from the demands of end customers. A demand chain is created based on sharing demand information across the supply chain.

The financial flow goes from end customers to raw material suppliers.

The figure 6 shows how different organizations integrate in a supply chain

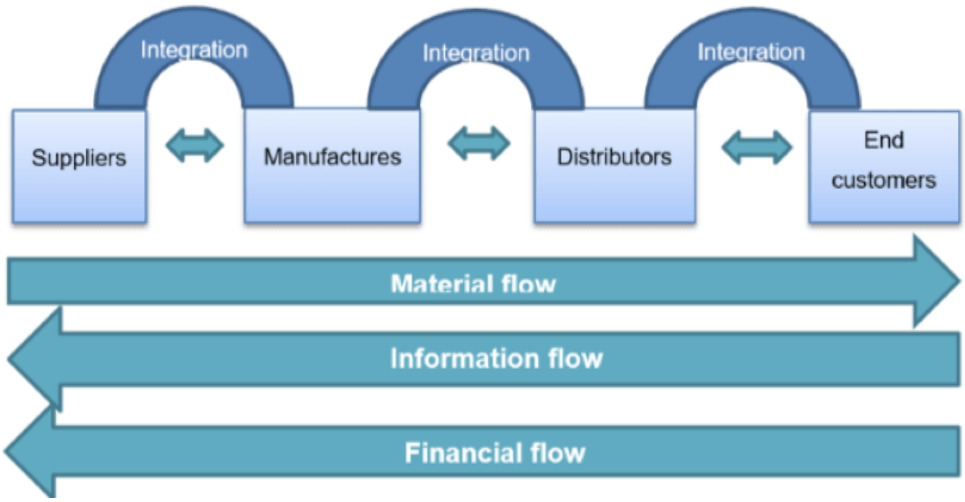


Figure 6 Integration supply chain model

(LU,2011,104)

There are two main types of supply chain integration which are vertical integration and horizontal integration.

Vertical integration is a business strategy aiming to expand business operation in various parts of a supply chain, and a company therefore will be mainly responsible for controlling over several production and distribution steps. Vertical integration strategy is carried out in two main ways including backward integration and forward integration. With backward integration strategy, a manufacture will take care of all upstream activities. With forward integration, a manufacture will take care of all downstream activities.

The figure 7 shows how vertical integration operates

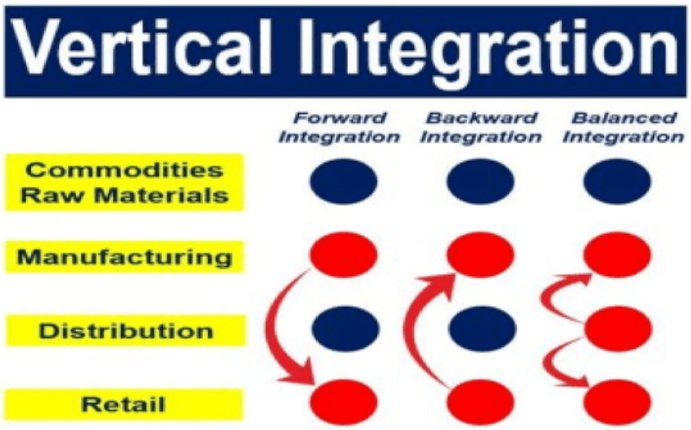


Figure 7 Vertical Integration model

(marketbusinessnews.com)

Horizontal integration is a business strategy focusing on increasing a process's size at the same part of a supply chain by caring out internal expansion such as reinvesting current operating profits or external expansion such as merger or acquisition.

The figure 8 shows how horizontal integration operates

Figure 8 Horizontal integration

(marketbusinessnews.com)

Below lists several major befits of utilizing supply chain integration strategies

First of all, supply chain integration creates a close alignment and coordination between participating members, which therefore increases the efficiency of these members in a supply chain. If there is any break in a supply chain, disruption of the system may occur and then end up a domino like effect.

Secondly, supply chain integration helps in ensuring the quality of flow in a supply chain. To be specific, information flow can be shared and opened by every participating member, material flow can be moved faster.

Thirdly, integrated supply chain will certainly lead to reduced costs such as transactional costs among subsidiaries, partners and retailers. Having a centralized and integrated supply chain will create balance activities for every participating member,

which means that a manufacturer is able to reduce the amount of stocks by just-in-time manufacturing.

Fourthly, with an integrated supply chain, a company will know how to prioritize, utilize and focus on assets which can improve their products, and minimize wastes.

Finally, an integrated supply chain will ensure shorter delivery time, hence customer satisfaction can be achieved.

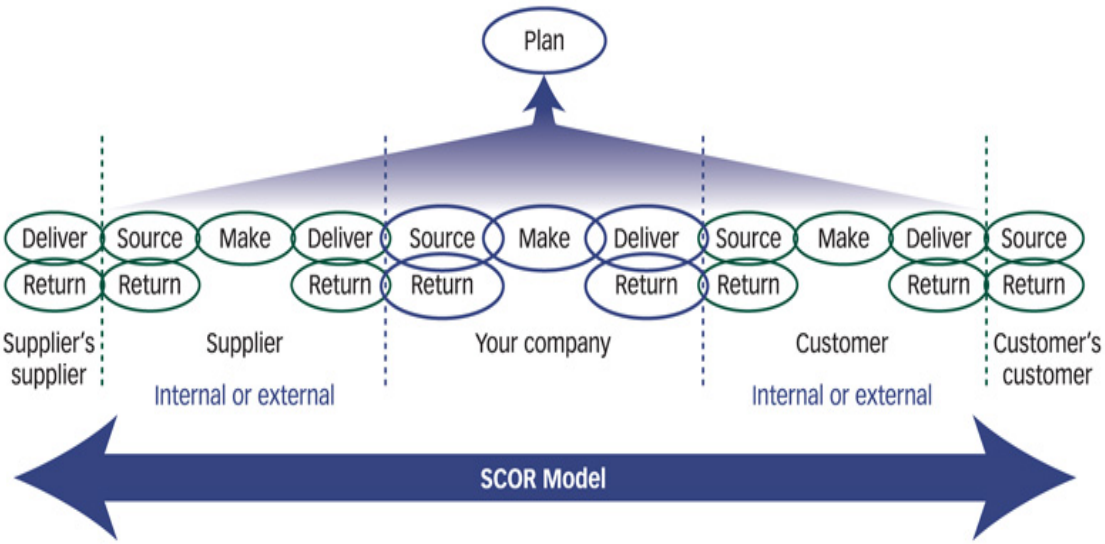
2.4.3 SCOR Model

Supply chain operations reference (SCOR) model is well-known as the most detailed performance metrics.

According to definition given by the SCOR model, supply chain is defined in terms of five management processes which are plan, source, make, deliver and return respectively.

The figure 9 made by Peter Bolstorff presents these five processes.

[FIGURE 1] THE SCOR FRAMEWORK



[SOURCE: SUPPLY-CHAIN COUNCIL INC. COPYRIGHT 2006. USED WITH PERMISSION.]

Figure 9 The SCOR model to improve supply chain performance

(Peter Bolstorff. 2008)

Plan process

SCOR Overview 2006:7 defined that plan includes ‘processes that balance aggregate demand and supply to develop a course of action which best meets sourcing, production and deliver requirements’. This definition stressed that plans are developed, communicated and integrated across the entire supply chain in pursuit of balancing resources in terms of requirements.

These plans include purchasing, production, delivery and distribution, return scheduling plans

Source process

This process refers to upstream activities. According to the definition of SCOR Overview 2006:7, processes that procure goods and services to meet planned and actual demand.

Make process

This process ensures required activities needed to transform product to a finished state to meet planned or actual demands (SCOR Overview 2006:7)

Deliver process

This process refers downstream activities needed to provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management (SCOR Overview 2006:7)

Return process

This process associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer service (SCOR Overview 2006:7)

By a scorecard provided by the SCOR model, companies can utilize to set up and control their supply chain management goals, and therefore companies are likely to estimate how a current supply chain impacts on financial performances and how well participating processes are operating across the entire supply chain.

2.4.4 Lean supply chain management

Lean supply chain management aims to reduce overall expenses by focus on lowering amounts of returned goods and amounts of defective goods to zero and keeping every good sold.

The figure 10 shows how lean supply chain implementation processes are operating.

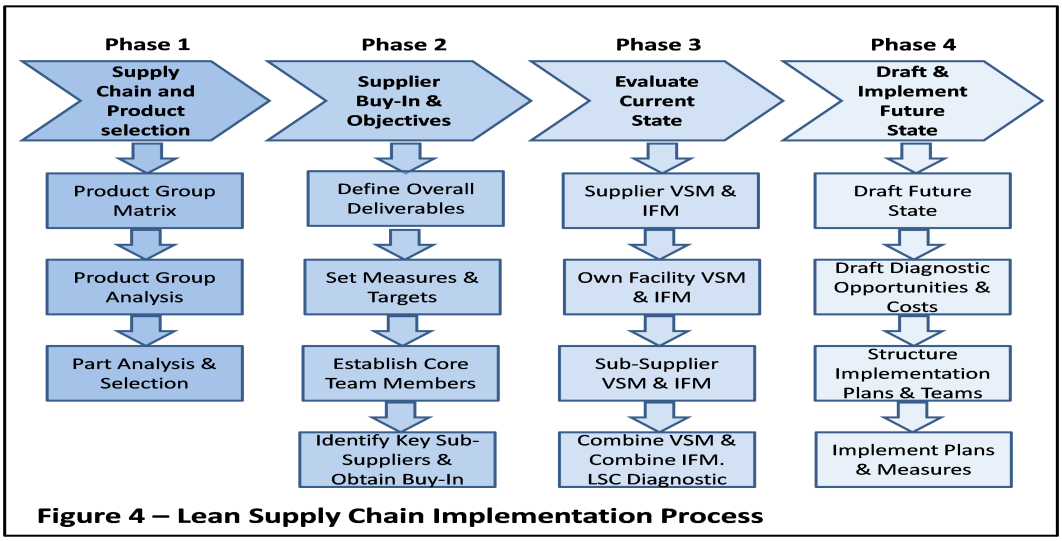


Figure 10 Lean supply chain implementation process

(opexsociety.org)

2.4.5 Green supply chain management

Nowadays, more companies focus on developing green supply chain management to reap the advantages of business and sustainability combined.

According to the global supply chain group, at the core of green supply chain management is the principle of reducing waste by increasing efficiencies. Effective management of resources and suppliers, can reduce production costs, promote recycling and also, the reuse of raw materials.

A paper titled ‘green supply chain management, environmental collaboration and sustainability performance’ gave a clear picture of green supply chain and stated that green supply chain management aims to minimize or eliminate wastage’s including

hazardous chemical, emissions, energy and solid waste along supply chain such as product design, material resourcing and selection, manufacturing process, delivery of final product and end-of-life management of the product.

The figure 11 clearly describes a basic green supply chain management model

Figure 11 Green supply chain management model

(greenhome.com)

Building a green supply chain management system requires companies to apply current environmental criteria along with the context of decision-making of the traditional supply chain management.

Green supply chain management undeniably brings many benefits. Firstly, a company can enhance its brand image and brand reputation in its customers' mind if this company utilizes technologically advanced and environmentally friendly to manufacture products. Secondly, adopting green supply chain management system may prevent a company from being prosecuted for anti-environmental and unethical practices.

2.5 Current challenges of supply chain management

Due to the complexity of system, supply chain management always incurs many challenges required to be solved to ensure a success and efficient supply chain.

In this subchapter, the author lists some major external and internal challenges of supply chain management.

2.5.1 Current external challenges

Natural disasters

Natural disasters cause huge impacts on supply chain performance. Natural disasters include storms, tornados, hurricanes, geo-physical events such as tsunami, droughts, heat waves and floods as well. A good example of such natural disasters is hurricane Maria which happened in Puerto Rico on September 20, 2017. This disaster destroyed medical manufactures there and caused disruptions in medical IVs supply chain on national scale. At that time, hospitals were forced to spend a lot of money on using alternative and searching new foreign suppliers.

Economic risks

Economic risks lead to product and labor shortages. There are many examples of economic risks such as financial insolvency, loss of patent rights, the poor performance of sub-suppliers, trade or tariff disagreements and so on.

Crime and Piracy

Cargo crime, piracy, and thefts from trucks and warehouse are deemed as the most significant challenges in a supply chain management system. Many researches and news reported that billions of dollars of cargo goods are stolen and then sold to the black market at cheaper prices every year. According to data collected by Manners-Bell 2014, 210-212 presented that theft from trucks and warehouses is rising around the world, about fifth of drivers were attacked in a five-year period. This kind of crime results in loss in profit and tax revenues for companies.

2.5.2 Current internal challenges

Choice of Partners

Choosing unreliable partners who do not create stable cooperation and desired results will certainly lead to some challenges such as longer lead time, disruption in manufacturing processes and so on. For example, if a company selects wrong suppliers providing low quality resources, it cannot manufacture products meeting customers' needs. Having low quality products, the company will have to pay too much for packaging, transportation services, and importantly develop problems with contract scope. That all will result in financial losses sinking the company.

Lack of coordination

The lack of coordination is considered as one of common challenges which any company is facing. There are two defined reasons for this challenge, which is either the conflicts in objectives among stages of a supply chain or delayed information movements.

The Bullwhip Effect

The bullwhip effect refers to a situation in which the variability of the orders received by the supplier can be greater than the demand variability (Janusz K.Grabara, Marta Starostka-Patyk). Through different stages of a supply chain, poor communication and disorganization between each supply chain link and order batching are determined as main reasons for this phenomenon. Farooqui 2010,82 stated that the bullwhip effect can result into inefficient production, excessive inventory, poor customer service and lost sales.

The figure 12 describes the bullwhip effect on the smoothness of supply chain processes.

Figure 12 The bullwhip effect model (aalhysterforklifts.com.au)

Strategic Challenges

In fact, implementing any supply chain management strategy normally creates challenges such as lower availability of logistical resources, infrastructural constrains, and so forth. For an example, it is important for a company operating its own business in a global market to select right suppliers in terms of quality, reliability, financial and desirable qualities. Even though the company has already selected an oversea supplier providing raw materials with high qualities, it has to face with the risk of exchange rates which increases transportation costs when purchasing raw resources.

3 General overview of Sutchi catfish supply chain in An giang, Vietnam

3.1 Overview of An Giang Province and Sutchi catfish industry

An Giang is a province located in the Mekong Delta region, the southwestern part of Vietnam, which shares borders with Cambodia, Dong Thap province, Kien Giang province and Can Tho city. The province is endowed with many small rivers and canals, fresh water resources and the climate there is featured by typically tropical with two main seasons which are rainy season (from May to November) and dry season (from December to April in the following year) with average temperature. These conditions create great potentials for this province to develop aquaculture industry, especially Sutchi catfish one, which has created a good reputation in MRD and Vietnam in general.

The figure 13 and figure 14 shows the map of An Giang Province, Vietnam.

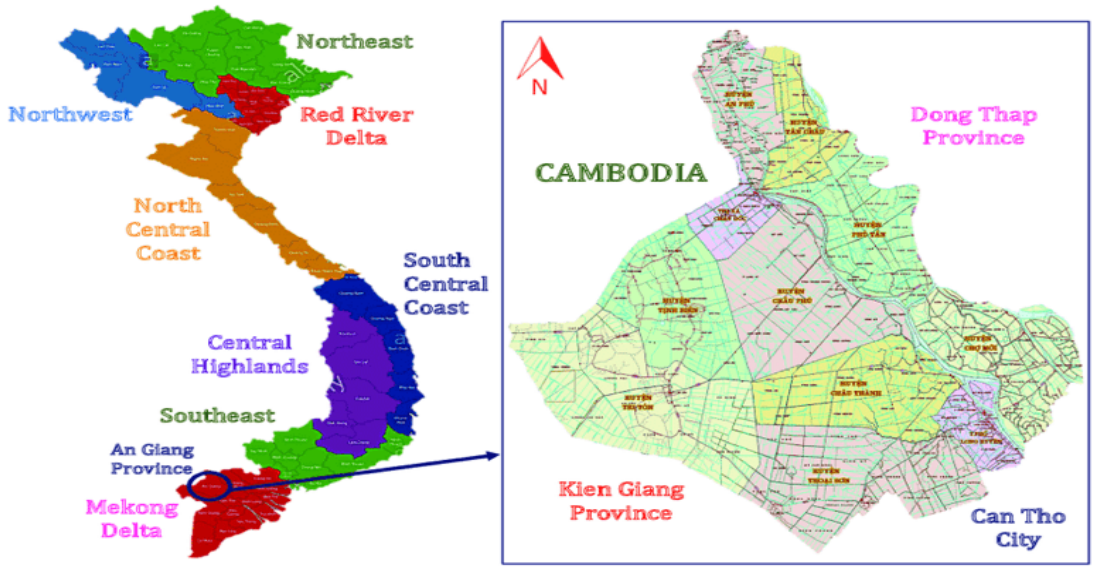


Figure 13 Map of An Giang province

(Vietnamtravels.vn)

Figure 14 Map of An Giang Province

(Vietnamtravels.vn)

The table 1 show major geographical information of An Giang Province

AN GIANG PROVINCE	
Region	Mekong Delta
Capital	Long Xuyen
Area	3536,7 km2
Total Current population	2151000
Density	608/km2
Ethicities	Kinh, Khmer, Cham, Chinese
Calling code	076
Websites	www.angiang.gov.vn

Table 1 An Giang Province

An Giang nowadays is considered as the largest Sutchi catfish producer in Vietnam. This Province has reached nearly 1200 hectares of Sutchi catfish aquaculture, which is equivalent 20% of total Sutchi catfish farming area in the country.

In recent years, An Giang has focused on export market. According to Mr. Phan Van Ninh, chairman of An Giang Fishery Association, the catfish industry is the major export products of provinces, which contributes 17% on quality and 16% on export value respectively. Especially in 2011, the export turnover of sutchi catfish contributed to 32% of the province's total export turnover. Sutchi catfish products are reached to most of the largest markets in the world such as United States, EU countries and China's markets.

3.2 Sutchi catfish supply chain in An Giang Province

Based on current researches and interviews with small Sutchi catfish producers, there are eight key sectors existing in the sutchi catfish supply chain including input suppliers, sutchi catfish producers, intermediaries, processors, traders, export agents, domestic markets and foreign markets.

In the figure 15, the process of sutchi catfish supply chain in An Giang province is clearly explained

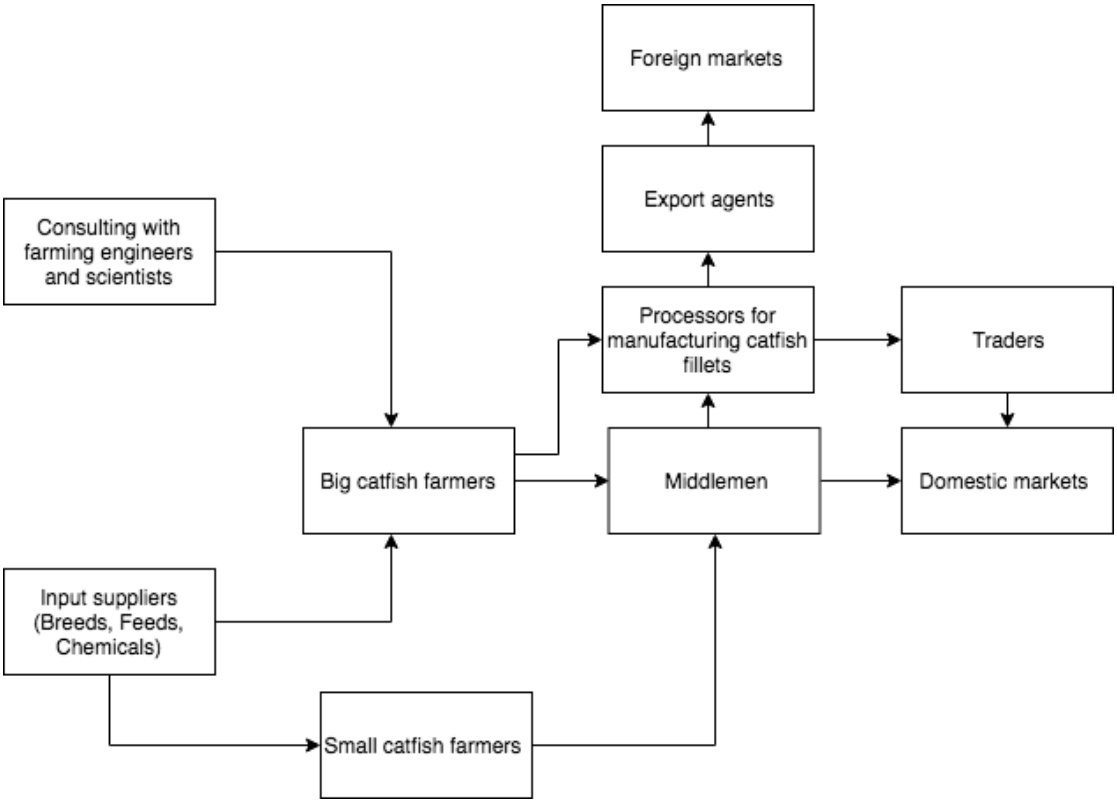


Figure 15 current catfish supply chain in An Giang Province, Vietnam

3.2.1 input suppliers

There are three main input materials for catfish farming including breeds, feed and chemicals. There are nearly 1000 catfish hatchery producers currently operating and contributing to approximately 50-60 million good quality juvenile catfishes. Nearly 80 percent of these catfish nurseries there are classified as small producers.

In terms of the supply of feed and chemicals, suppliers are able to meet catfish farmers' demands. However, the spread of low quality feed throughout the market have increased recent years due to improper local government control.

3.2.2 Sutchi catfish producers

Sutchi catfish farmers there are mainly individuals and households, and divided into two groups which are described clearly in the table 2

Catfish farmers	large scale	small scale
Seasonal amount of produced catfishes	20 %	80 %
Fish farming area	>50 ponds	<10 ponds
Capital (money and other assets)	sufficient	insufficient
Technical know-how	high	low
Fish farming Skills	Quite sufficient	low
Supply chain relationships	processors	Middlemen

Table 2 Main characteristics of Catfish farmers

An ideal area of a pond there is nearly 15m*15m, which can be used to stock approximately 1500 juvenile catfishes.

In An Giang province, the majority of sutchi catfish producers are classified as small scale ones and account for 80% of sutchi catfish producers. These small-scale ones face a lot of challenges such as small pond areas for farming, limited capitals and technical know-how and especially farming skills.

3.2.3 Middlemen

Middlemen plays a crucial role in the fish distribution channel to ensure a smooth flow of fish products from fish producers to consumers at the right time and right place. Middlemen normally maintain contact with buyers, negotiate prices, provide inventory and storage, arrange delivery transportation, and provide credit or collection.

In An Giang province, farmers are not able to sell their own products directly to consumers, most of sutchi catfish outputs are bought by middlemen who then sell these

fish products to processors and domestic markets. There are two types of middlemen which are first-level middlemen and second-level middlemen

First-level middlemen refer to small collectors who negotiate with small farmers to buy fish products with cheap prices.

Second-level middlemen refer to traders buying fish products from small collectors and then taking advantage of having large connections with markets and processors to resell these fish products to these processors and domestic markets with higher prices and therefore earn profits. In this case, traders are likely to earn more profits than small collectors.

Figure 16 shows intermediate stages in which small sutchi catfish farmers and processors are building close relationships

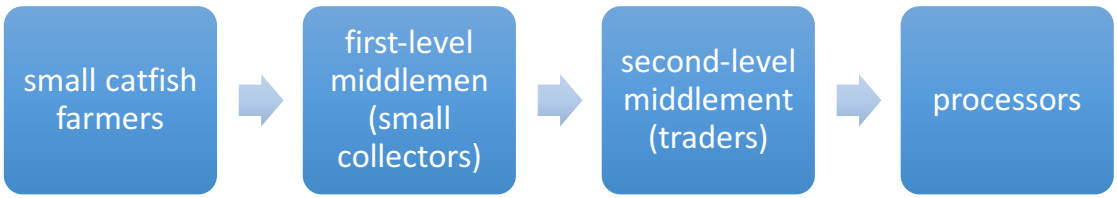


Figure 16 intermediate stages

There are three common methods of sale which are used between middlemen and small catfish farmers in An Giang province. The method of sale can be auction, contract sale or first-come-first-served basis. Terms of sale and payment will be negotiated between middlemen and small catfish farmers. Middlemen normally pay farmers with cash promptly and fully, they also give cash in advance to maintain goodwill with farmers.

3.2.4 Processors

Processors engage in various activities such as storing, freezing, labelling, changing catfishes into different market forms (salted dried fishes, fish meals and so on)

In An Giang province, Processors cannot establish relationships with small-scale catfish farmers but large-scale farmers. It means that 80 percent of small-scale catfish farmers are not likely to sell their own products directly to processors with higher prices to increase profits. In addition, these processors also engage in relationships with first-level middlemen to acquire enough raw catfish products for processing.

3.2.5 Traders (Wholesale traders and retail traders)

Beside reselling catfish products to processors, traders also distribute these catfish products to wholesale markets and sell them in fairly large quantities to retailers there. Every trader normally has more than 40 retailers.

In Vietnam, there are three types of retail outlets consisting of traditional retail shops, road side vendors and modern retail markets. Retailers will purchase fishes from traders in wholesale markets in early morning with required quantities and then resell these products to end customers.

Therefore, catfish products usually are transferred into two levels of trading including trading in wholesale markets and trading in smaller markets before reaching to end customers. End customers can be persons who buy catfishes for household consumption, or institutional buyers who buy catfishes for consumption in schools, hospitals, restaurants and so on.

In this case, sutchi catfish farmers and retailers earn less income when comparing with middlemen earning the highest income. Prices of these catfish products changes and become expensive when passing through trade channels by the time they reach to end consumers.

3.3 Logistics activities in Sutchi catfish supply chain

3.3.1 Procurement phase

The number of catch catfishes will be depended on farming fishing seasons, middlemen’s quota, market situations. Then, these catfishes are measured, weighted and

sorted into ice covered storage bins with identifiers to ensure full traceability. The middlemen pick up the catfishes and deliver them to wholesale markets and processors' factories by small trucks.

3.3.2 Distribution in processors' factories phase

These catfishes are checked in terms of standard qualities, good quality catfishes are headed, filleted and skinned. Cleaned catfish fillets are immersed to iced water and then are frozen and packed before distributing to supermarkets around the country.

Distribution in domestic markets phase

About nearly 60 percent of catfish products is consumed locally and mostly sold in urban markets. Therefore, catfishes are transported for sale to urban fish markets.

Traders are responsible for distributing sutchi catfishes by refrigerated trucks to domestic wholesale markets. Wholesale markets in Vietnam are divided into two categories which are first hand wholesale markets and second hand wholesale markets respectively. First hand wholesale markets sell locally produced fishes, otherwise second hand markets sell fishes imported from other regions or overseas. For consumption in Ho Chi Minh city, sutchi catfishes are delivered to Binh Dien market, which is the biggest second hand wholesaler market and main distribution center. However, these sutchi catfishes are not kept in good condition due to poor performance of cooling systems and storing facilities there. In fact, abusive and fluctuating temperature results in the growth of spoilage organism and pathogens, which directly reduces the qualities of catfishes and causes health problems to consumers. The veterinary authorities play undeniably important roles on constantly monitoring the qualities of fishes.

Figure 17 shows the seafood area in Binh Dien wholesale market in Ho Chi Minh city.

Figure 17 seafood area in Binh Dien Wholesaler market

4 Qualitative research and results

This chapter showcases all findings collected from data and analyzing them. These results and theoretical review chapter will be utilized for the 'ideas for improving the efficiency of sutchi supply chain' chapter.

A total number of 12 respondents are used for the research, the author obtains data from caring out a small interview form with small fish producers. The personal interview form focuses on problems and challenges faced by these small sutchi catfish farmers from supply chain aspects.

4.1 Problems in Sutchi catfish production in An Giang Province

By caring out interview forms with small catfish farmers and using public references, problems in sutchi catfish production in An Giang province are depicted, and divided into socio-economic problems and bio-physical problems.

Socio-economic problems

- High capital intensive

In fact, fish farming requires a huge capital for preparing ponds or taking lease of ponds. However, the majority of small catfish farmers there are not able to receive money from the government due to limited available funds. In this case, some of these small catfish farmers have to borrow money from private financial companies with high interest rate, which make their catfish farming less profitable.

- Poor technical know-how

  Most of the small catfish farmers are not equipped with enough farming knowledge about composite fish farming, intensive carp culture, fresh prawn culture and so on. So, they are not likely to yield production.

- High cost of inputs

  The costs of inputs like fingerling and fish meals have increased quickly in recent years, which prevents these farmers from making profits. According to many catfish farmers, catfish feeds are considered as the highest production costs simply because they normally constitute up from 40 percent to 50 percent of total production costs incurred. In addition, these farmers also have faced with high costs relating purchasing imported seeds which are not locally available. However, the fish seed market is not appropriately controlled by local authorities causing the spread of very poor-quality seeds to the market and then high mortality rate of fish seeds. This results in fairly heavy loss for these small catfish farmers.

- Poor mass media exposure

  Unfortunately, most of these small catfish farmers are illiterate, and therefore they are not able to utilize print media such as farm publication, newspapers, television and son on. As the result, there is a lack of farming technical awareness among these small catfish farmers. For an example, due to lacking necessary knowledge about nutritional requirements and feeding of catfishes, farmers often feed their fishes with right qualities at the right time. In fact, catfishes do not eat when they get sick or when there is any sudden change in temperature because of weather.

- High exploitation by middlemen

  Local middlemen usually take advantage of the fact that fishes are deem as perishable commodities to buy farmers' catfishes at nearly half rate. Hence, the total profit margin of these small catfish farmers goes down.

- Other unexpected social problems

  Many of these small catfish farmers reported that they sometimes faced social problems such as pouching or poising in ponds, which reduce their own productivity and profitability.

- Poor investment plan

  There are several small catfish farmers assuming that one has to have larger ponds to become a successfully commercial catfish farmer. Hence, they borrow a huge amount of money from their own relatives or apply for a mortgage to build many ponds at once constraining their own cash flows. Due to of this, it may take many of them a while to start production or they only start production in one or two ponds.

Bio-physical problems

- Limited pond sizes

  Because owning small ponds and taking ponds on lease, small catfish farmers earn less money compared with big catfish farmers.

- Unscientific stocking density

  Due to limited technical know-how, these catfish farmers chose unscientific stocking density and species composition, which product catfishes which might not meet the requirement of a marketable fish size. In fact, the excessive stocking densities may product catfishes below standard marketable size, otherwise the low stocking densities will allow catfishes grow faster which reaching a larger size. This leads to higher operating costs and reduction in revenues for catfish farmers.

- Poor water quality

  In order to prevent catfishes from getting sick, catfish farmers often use medicines like antibiotics and vaccines, however the overuse of these medicines

and the accumulation of fish waste and uneaten fish food certainly degrade the quality of surrounding water generating negative impacts on catfishes' welfare.

- Climate changes

  An Giang province has faced climate changes and the rise of sea level causing threats for catfish farming in recent years. Some climate changes such as hot weather and drought in dry seasons, and the increasing level of salinity intrusion can kill small catfishes and prevent catfishes from growing up, and therefore small catfish farmers also have found difficulty in improving the efficiency of their own catfish farming.

- Other bio-physical problems

  Other bio-physical problems including incidence of disease out-break, unprofessional pond management are also reasons leading to low productivity and profitability of these small catfish farmers. For example, farmed catfishes are easily caught with diseases because of being raised on unnatural diets and small enclosures. According to many of these interviewed catfish farmers, sea lice is the most common disease. These sea lice are found to attach themselves on outside skins of catfishes and then feed on catfishes' blood and skins. As a result, these sea lice can cause erosion of skins, constant bleeding and open wounds undeniably increasing higher rates of other infection for adult catfishes and kill small juvenile ones.

4.2 Problems in relationships of Sutchi catfish supply chain

In An Giang province, most of processing factories have to purchase raw catfishes mainly due to not owing own catfish farming ponds. Unfortunately, these processing factories only buy catfishes from big catfish farmers or middlemen even though small catfish farmers account for more than 80 percent of annual manufactured raw catfishes. The defined reasons are payment terms and geographical barriers. To be specific, the majority of small catfish farmers there are not willing to sell their catfishes

to processing factories due to delays in payment. It is also quite difficult for processing factories to collaborate with small catfish farmers because most of them are located in remote areas and do not provide packaging, storage and transportation services.

After purchasing raw catfishes from small farmers there, middlemen take responsibilities for all upstream activities which include packaging, storage, transportation and so on. in fact, temperature is deemed as the most important factor affecting the quality and the safety of perishable products such as raw catfishes. Any abusive or fluctuating temperature can lead to the rapid growth of spoilage microorganisms and other pathogens, therefore raw catfishes are necessarily required to store and delivered at melting ice temperature. Due to lacking necessary fish storage and preservation system, many middlemen store raw catfishes in inadequate cooling boxes causing spoilage. In this case, in order to avoid economic losses and earn more profits as well, some of these middlemen pump chemical impurities into raw catfishes in pursuit of gaining more weights and maintaining their freshness before reselling them to processors. As a result, the qualities of raw catfishes cannot meet demands, and processors stop buying these fishes from some of these middlemen. Because of this, there are fewer middlemen buying raw catfishes from small catfish farmers. These farmers therefore find difficult to find new buyers while catfishes are ready for sale. Meanwhile, these catfishes stop growing and still feeding. In this case, the longer catfishes stay in ponds, the smaller profit margin small catfish farmers can gain. In some cases, small catfish farmers are forced to sell to new buyers their raw products with cheapest prices.

In addition, nowadays there is a general tendency among consumers about consuming healthier food with lower fat and rich in fibers and vitamins, therefore the demand for high quality catfishes has been increasing steadily. Unfortunately, a large number of small catfish farmers there are not likely to product raw catfishes meeting high demands' customers. As a result, these farmers rarely sell all fishes.

5 Ideas for improving the efficiency of Sutchi catfish supply chain

According to previous description of focal problems and other existing problems, this chapter is expected to suggest ideas in pursuit of improving the efficient of Sutchi catfish supply chain for small catfish farmers in An Giang, Vietnam.

For solving socio-economic problems

Small catfish farmers should be advised to learn how to product home-made fish feeds from locally available materials with the help of local extension officers. Another cheaper and effective feeds such as biogas slurry should also be introduced for feeding catfishes.

Local authorities can establish local wholesale markets in which small catfish farmers meet and then sell to processors and middlemen their fish. The fish price list will be introduced and supervised by local officers. Having local wholesale markets hence will limit the negative influence of middlemen in the supply chain, and small catfish farmers can earn more profits.

For solving bio-physical problems

Small catfish farmers should be trained to understand deeply some common fish farming facts and problems and address these typical problems through home fish farming solutions. For example, these catfish farmers can know how to improve the water quality if they understand about dissolved oxygen presenting in water of ponds or any presence of acid.

Before starting their own businesses, small catfish farmers there also are recommended to consult with highly qualified soil engineers and scientists to select appropriate fish stocking densities in terms of the sites, sizes and depths of their own ponds.

For solving problems in relationships of catfish supply chain

One of the most effective solutions is to implement supply chain integration strategy. For an example, processors are encouraged to expand their own business operations by implementing vertical integration. It means that these processors are able to control some upstream activities such as raw catfish production phases, packaging, storage and distribution services. In this case, these processors can corporate well with small catfish farmers and teach them how to utilize modern farming know-how, basic hygiene, fish handling, preservation and set up efficient feeding strategies in order to help these small catfish farmers to enhance the productivity of raw catfish production.

Processors can consider about building a logistics center near small catfish farmers to treat purchased freshly catfishes before reselling them to domestic markets. A logistics center should include space for receiving purchased catfishes, treatment rooms for cleaning, sorting, and packing catfishes, cold rooms and freezers for storing catfishes, and a system of drainage cleaning in which quarantine conditions are utilized to ensure hygienic and importantly eliminate any form of contamination.

Moreover, national governments and local authorities should impose new legislation and regulations in the area of fish quality and safety. For example, there should be a strict ban on behaviors threating catfish safety and qualities such as using mixture injection or forbidden chemicals in fish farming, processing or storing. Penalties should be introduced to these wrong behaviors.

Middlemen buying raw catfishes from small catfish farmers and traders buying raw catfishes from theses middlemen are necessarily required to drive standardized refrigerated trucks for transporting catfishes to markets in capital and other regions to avoid spoilage of these catfishes.

In the figure 18, A new supply chain are suggested for small catfish farmers in An Giand Province, Vietnam.

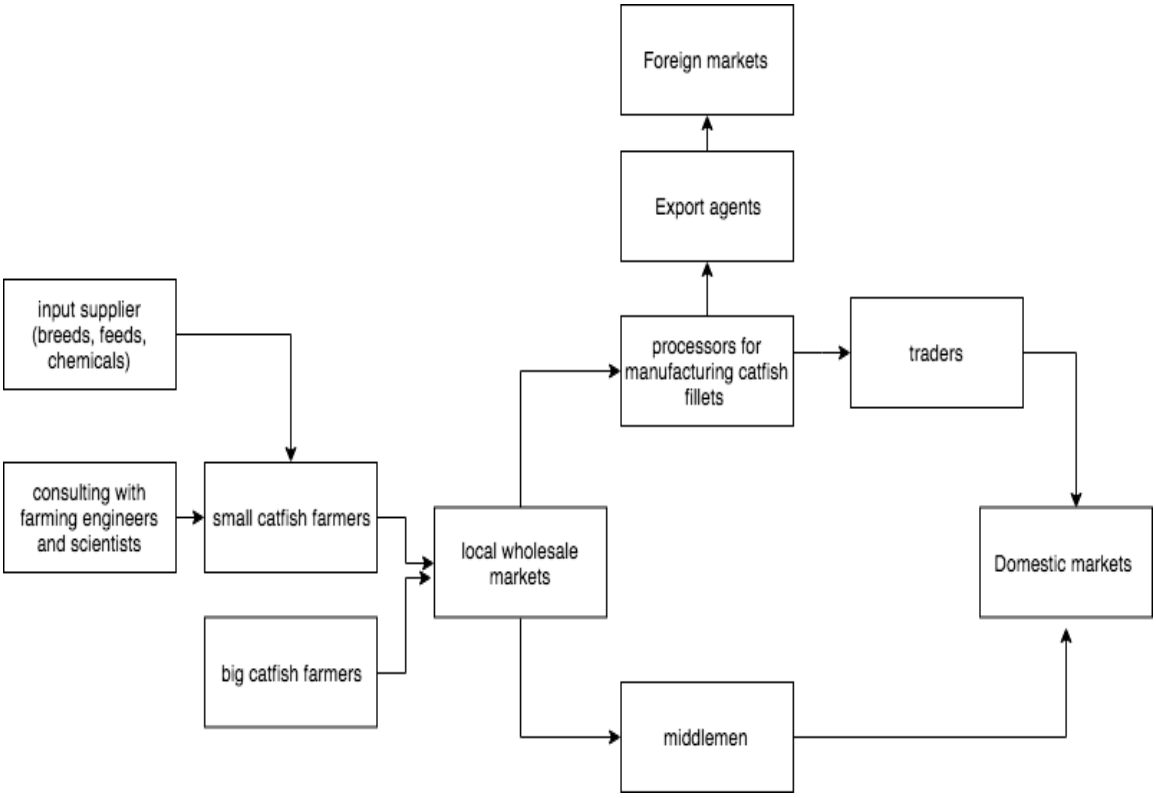


Figure 18 new model of supply chain for small catfish farmers

6 Conclusion

The focus of this study is on improving the livelihood of small catfish farmers in An Giang Province by identifying current challenges and establishing an efficient catfish supply chain.

The current situation there are very challenging with exsting socio-economic problems, bio-physical problems ans problems relating to a current catfish supply chain among small catfish farmers, middlemen and processors. If these problems are solved, sutchi catfish supply chain for small farmers will certainly be more efficient. This will result in sufficient catfish supply for domestics markets, high qualities of catfish products. In this situation, small catfish farmers can yield higher income and therefore their own livehoods can be improved gradually.

Considering the fact that it is impossible to solve all the problems at the same time, it is importantly to select some solutions aiming at helping small catfish farmers to

increase their revenues and profits. the idea of implementing supply chain integration strategies is undeniable necessary for solving the existing problems of inefficient catfish supply chain. Another approach is to build local whosale markets in pursuit of reducing the exploitation of middlemen.

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Appendices

Appendix 1 Interview form in English version

JAMK UNIVERSITY OF APPLIED SCIENCES

jamk.fi

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM

Độc lập – Tự do – Hạnh phúc

SOCIALIST REPUBLIC OF VIETNAM Independent – Freedom – Happiness

INTERVIEW FORM

TO:……

FROM: Nguyen Thanh Loc- thesis student from JAMK University

This survey is conducted as a part of completing bachelor's thesis in Logistics Engineering. This is questionnaire survey about problems in terms of Sutchi catfish supply chain in An Giang, Vietnam which small producers there are striving. This survey is done to identify these problems and suggest some solutions for establishing well-working supply chain.

I would appreciate if you would take a few minutes to respond to the questions below. All answers will be held in strict confident. Therefore, no one will able to identify you and your answers, and no one can know whether or not you participated in this survey

1. What kind of breeds' qualities you require from breeds' suppliers? Are you satisfied with their qualities and selling costs? Why?

2. What kind of chemicals' qualities you require from chemical's suppliers? Are you satisfied with their qualities and selling costs? Why?

3. What kind of feed's qualities you require from feed's suppliers? Are you satisfied with their qualities and selling costs? Why?
4. What kind of external problems (like water source, diseases) you are facing which negatively affects your Sutchi catfish productivity?
5. What kind of challenges relating to supply chain relationships you are facing which negatively affects your revenues and profits?

Signed:

Date:

Thank you for your corporation and have a nice day!

Appendix 2 INTERVIEWEE'S RECORDS

INTERVIEWEE 1

Answer 1 affordable prices and high quality. Yes

Answer 2 cheap. yes

Answer 3 high in nutrition, cheap. No because it is quite expensive

Answer 4 hot temperature during dry seasons, diseases outbreak

Answer 5 selling to middlemen fish cheap prices.

INTERVIEWEE 2

Answer 1 high quality. Yes

Answer 2 cheap. yes

Answer 3 cheap. No because it is quite expensive

Answer 4 poor water quality, sea lice

Answer 5 lack of collaboration with processors due to locations, selling raw catfishes with fairly cheap prices

INTERVIEWEE 3

Answer 1 cheap, highly available, high quality. Yes

Answer 2 cheap and high quality. yes

Answer 3 cheap, highly available, high quality. No because it is expensive

Answer 4 climate changes such as drought, floods, common diseases, poor farming know-how

Answer 5 customers worry about the quality of catfishes, the exploitation of middle-men

INTERVIEWEE 4

Answer 1 cheap, high quality. Yes

Answer 2 cheap. yes

Answer 3 cheap, high quality, ability to grow catfishes faster. No because it is expensive and not always available

Answer 4 common fish diseases, poor water quality, sudden changes of temperature

Answer 5 the exploitation of middlemen

INTERVIEWEE 5

Answer 1 cheap and high quality. Yes

Answer 2 cheap and high quality. yes

Answer 3 cheap and high quality. No because it is expensive

Answer 4 climate changes

Answer 5 middlemen purchase catfishes with cheapest prices, limited business interaction with processors

INTERVIEWEE 6

Answer 1 cheap. Yes

Answer 2 cheap. yes

Answer 3 cheap. No because it is expensive

Answer 4 diseases, unprofessional farming know-how

Answer 5 the exploitation of middlemen, limited business interaction with processors

INTERVIEWEE 7

Answer 1 cheap, high quality, highly available. Yes

Answer 2 cheap. yes

Answer 3 cheap, high in nutrition, highly available. No because it is expensive

Answer 4 climate changes such as drought, poor water quality

Answer 5 the exploitation of middlemen

INTERVIEWEE 8

Answer 1 cheap and high quality. Yes

Answer 2 cheap. yes

Answer 3 cheap and high quality. No because it is expensive

Answer 4 diseases, unprofessional farming know-how, hot temperature during dry seasons

Answer 5 limited business interaction with processors

INTERVIEWEE 9

Answer 1 cheap. Yes

Answer 2 cheap. yes

Answer 3 cheap. No because it is quite expensive

Answer 4 , poor water quality, diseases, unprofessional farming know-how, common fish diseases such as sea lice

Answer 5 limited business interaction with processors

INTERVIEWEE 10

Answer 1 cheap. Yes

Answer 2 cheap. yes

Answer 3 cheap. No because it is expensive

Answer 4 climate changes such as drought, poor water quality, diseases, unprofessional farming know-how, common fish diseases such as sea lice

Answer 5 limited business interaction with processors, the exploitation of middlemen

INTERVIEWEE 11

Answer 1 cheap and high quality. Yes

Answer 2 cheap. yes

Answer 3 cheap and high quality. No because it is quite expensive

Answer 4 climate changes such as drought, poor water quality, diseases, unprofessional farming know-how, common fish diseases such as sea lice

Answer 5 limited business interaction with processors, the exploitation of middlemen

INTERVIEWEE 12

Answer 1 cheap. Yes

Answer 2 cheap. Yes

Answer 3 cheap. No because it is expensive.

Answer 4 climate changes such as drought, poor water quality, diseases, unprofessional farming know-how, common fish diseases such as sea lice

Answer 5 limited business interaction with processors, the exploitation of middlemen