

STRUCTURAL BUILDING AND ANALYSIS OF THE MARKET OF FISHERIES SUPPLY CHAIN: THE CASE OF RED SNAPPER (*SCIAENOPS OCELLATU*) IN NAM TRUNG BO

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The study of the supply chain in Vietnam has been quite common for the last 10 years; most of the studies are related to the products which are traditional or have established a foothold in the market, such as coffee, tea, milk, beef, poultry and seafood products such as shrimp, squid, catfish and tuna harvested from the sea. The studies build a supply chain for a new product or a product which has not been widely known or found that may be challenging for research and application. Red snapper is a new product. Thus, the study results are expected to create a complete and comprehensive look at building and analyzing of red snapper supply chain in Nam Trung Bo. The study recommends some solutions relating to the context of new product consumption.

Keywords: Red Snapper, Market Structure, Supply Chain, Nam Trung Bo.

1. Introduction

Supply chain plays an important role as supply chain operation affects all actors in the chain. In other words, the health of enterprises or industry depends on the periodicity of the supply chain, from the purchase of raw materials, semi-finished products, inventory management to product distribution to consumers. Therefore, the identification of the factors in the supply chain and building the linkage among factors will decide the sustainable development of enterprises and industry. However, this is a challenge, especially for enterprises in Vietnam, which respond slowly in the context of globalization to achieve the goal of creating a competitive advantage with sustainability for aquaculture products in the domestic market and international market. This study accesses the theory of value chain to build the supply chain of the red snapper in Nam Trung Bo - Vietnam.

2. Data source and research method

2.1. Data source

The data used in this article was collected by interviewing directly the components of the chain. The research project was done in 2018 with data

collected within 03 years: 2015, 2016 and 2017. The sample number: 3 producers and breeder suppliers; 40 farmers; 5 Traders; 1 Export fisheries processing company (EFPC); 5 wholesalers; and 5 retailers. The study was done in Nam Trung Bo (Nghe An, Phu Yen, Khanh Hoa, Vung Tau and Kien Giang).

2.2. Research method

2.2.1. Value chain theory

Value chain is a series of necessary activities to turn a product (service) from the concept, through different stages of production to distribution to the final consumer and discarding it after use. A value chain exists when all the actors participating in the supply chain are operating to generate the maximum value across the chain (Kaplinsky & Morris, 2001). The study was an integrated approach to the theory of global value chain by Gereffi (1994; 1999), and Korzeniewicz Gereffi (1994), Kaplinsky and Morris (2001) and the methodology of value chain promotion by GTZ (2007). The methodology of value chain promotion by GTZ (2007) states that we should implement the following steps to build and analyse the chain: choose the chain to build/analyse; chain mapping; analyse the strategy of chain upgrading;

analyse the links in the chain; administration and services; and analyse the knowledge of the impact of management. The theory of global value chain by Gereffi (1994; 1999), Gereffi and Korzeniewicz (1994), Kaplinsky and Morris (2001) suggests that we implement the following contents to build and analyse the chain: profile systematic mapping (identifying actors; evaluate the characteristics of the actors, product flow in the chain, etc.); Research the role of the upgrading in the chain (quality improvement and product design to obtain higher values, and emphasize the role of management from policy perspective. From accessing integrately with the analytical framework as mentioned, the process of building the supply chain of red snapper in Nam Trung Bo consists of 04 steps: 1) identify the main actors participating in the supply chain (producer and breeder supplier, farmer, trader, export fisheries processing company, distributors (wholesaler and retailer); 2) establish supply chain diagram, including: determine the characteristics and functions of each actor respectively; determine the product flows between actors along the chain; 3) upgrade the supply chain; and 4) the practical solutions for developing efficiently, sustainably and enhancing the competitiveness of the product chain.

2.2.2. General model (Figure 1)

3. Results and discussion

3.1. Market structure of red snapper supply chain

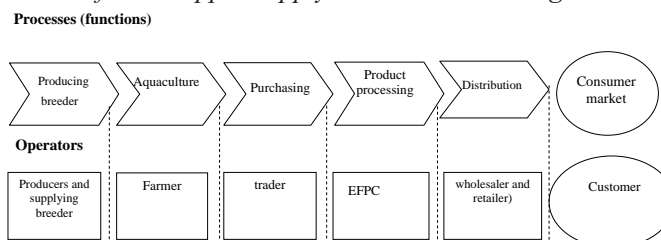
The actors of red snapper supply chain in Nam Trung Bo include key actors: the producers and suppliers of breeder, farmers, traders, export fisheries processing companies, wholesalers, and retailers. This structure of the supply chain (Figure 2) shows that this is a complex supply chain including many actors, each participating in the supply chain as an important link and perform special operations (producer and supplier of breeder, farmer, trader, export fisheries processing company, wholesaler, retailer), but they have a close relationship. If farmer is chosen to become the central actor in the chain, the product line is based on the material moving through farmer. Red snapper supply chain in Nam Trung Bo is divided into two sides, including: upstream and downstream.

3.2. Analysis of market structure of red snapper supply chain

(1) The upstream of red snapper supply chain reflects the relationship between actors participating in the supply chain and provides the input for farmers, including: producers and breeder's suppliers.

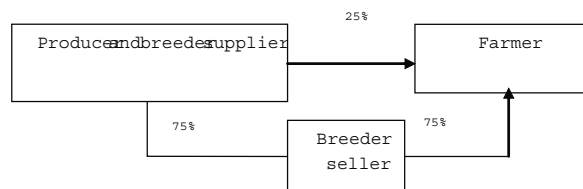
Production and supply sources of breeder for farmers who breed the commercial red snapper in Nam Trung Bo are supplied by private producers and suppliers directly and indirectly. They have brand and reputation, such as the Institute of Aquaculture, Nha Trang - Nha Trang University; Center for Applied Science and Technology, both production facilities primarily supply to provinces such as Phu Yen, Nha Trang, Vung Tau and Kien Giang. For Aquaculture Institute of Nghe An provides breeder to farmers primarily for Nghe An province and the provinces from Nghe An to the

Figure 1: The process/basic functions of red snapper supply chain in Nam Trung Bo



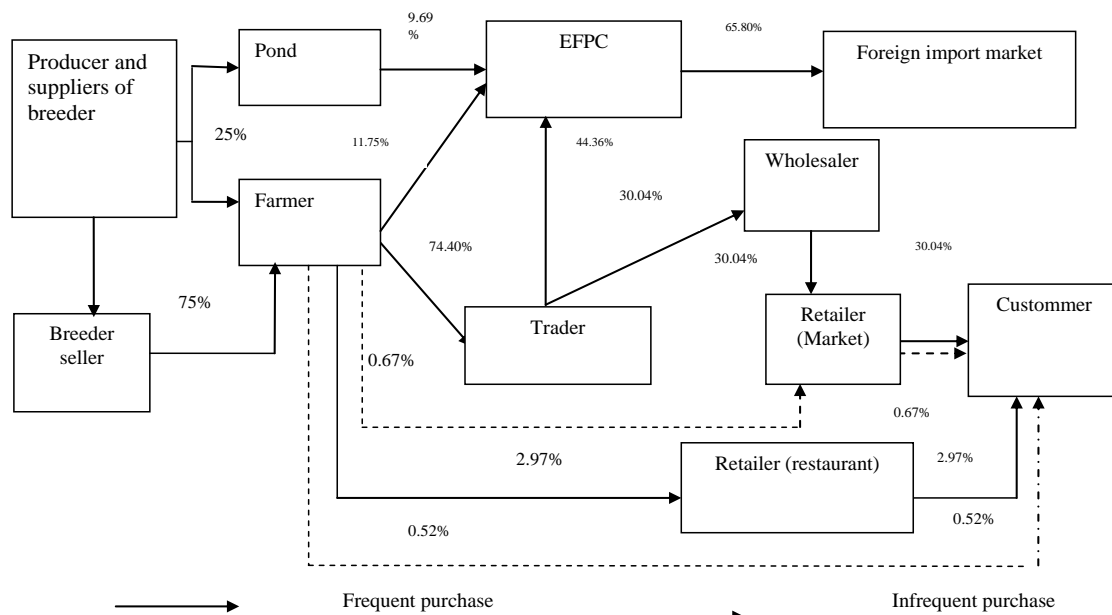
Source: GTZ (2007) and Author's description

North. The breeder production facility sold directly to farmers account for about 25% of the total number of breeders produced in a 3 - year average from 2015 to 2017. The rest of it makes up about 75% provided by the seller of breeder through camp store or store breeders inside and outside the province who have production facilities and supply red snapper (Figure 3).



(Source: Author's synthesis and calculation, 2018)

Figure 3: Red snapper supply chain in the upstream



(Source: Author's synthesis and calculation, 2018)

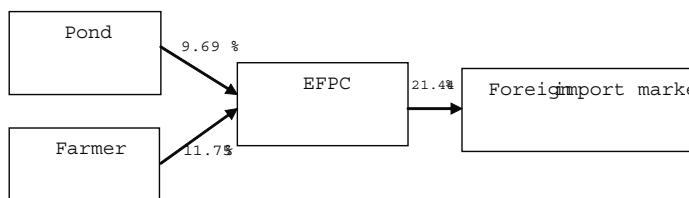
Figure 2: Structure of red snapper supply chain in Nam Trung Bo

(2) The downstream of red snapper supply chain (Figure 2) reflects the relationship among the actors involved in this chain supply. And red snapper is produced and distributed to the market through 03 main channels such as Channel 1: From farms to EFPC, then EFPC provides to importers in foreign markets. Channel 2: from farmers to traders, and then distributed regularly through two branches: 2a) sell to EFPC then the EFPC provides red snappers to export to foreign market; 2b) sell to the domestic consumer market via wholesalers. Finally, Channel 3: From farmers to retailers (restaurants and markets) and consumers.

Red snapper bought directly from farmers (export channels)

Red snappers are manufactured and distributed through several stages, from farmers to EFPC to the foreign import market. This distribution channel EFPC will hold fish purchased directly at farmers which account for about 21,44%, while the company provides itself about 9.69%. The average time to harvest the commercial red snapper from farmers is 8.21 months and the average fish weight gains about 1.04kg/head. Then the fish is stored and transported

by special vehicles to the company as raw materials in processing of red snapper for export (Figure 4).

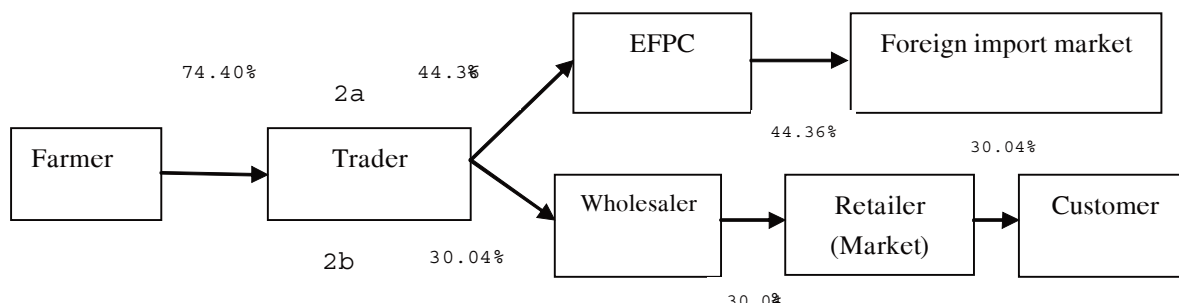


(Source: Author's synthesis and calculation, 2018)

Figure 4: Production and distribution of red snapper for foreign import market

Red snapper consumed via export and domestic consumption channel

Consumption activities of red snapper through export (symbol 2a) and domestic consumption (symbol 2b): on the first channel (2a), traders buy red snapper from farmers at the point of collection - the farming area not far way, then stored frozen and transported by car to the company with output accounting for about 44.36% of the total procurement from farmers and quality assessment. Products which meet the sensory quality will be purchased by company. On the contrary, the failing products will be returned immediately. After the material's quality



(Source: Author's synthesis and calculation, 2018)

Figure 5: Production and distribution of red snapper foreign and domestic markets

has been tested and assessed, this material will be incorporated into treatment immediately rather than transported to material warehousing. This is a special point of fisheries, which avoids reducing the quality of the product, except in the case in the main season with cheap prices and company has plans to reserve raw materials for future orders, the new raw materials have to be in the warehouse after freezing. For the domestic channel (2b), red snapper output purchased from farmers remains approximately 30.04% of traders, based on this output traders redistribute to the wholesalers. Wholesalers will come as a point gathering of traders to buy red snapper, then redistribute to retailers in the market for sale to the local market.

Red snapper consumed through domestic consumption channel

Red snappers are distributed directly from farmers to retailers (market), retailers (restaurants) and customers by buying and selling frequently and infrequently, and account for a small percentage of total production output of commercial red snapper, particularly farmers selling directly to restaurant accounting for only 2.92%. Although accounting for a small percentage, it is a source of stable and regular consumption. Between retailers (market) and farmers, the activities of buying and selling occur irregularly and unstably and making up only a very small proportion - 0.119% of the total red snapper production output. Because

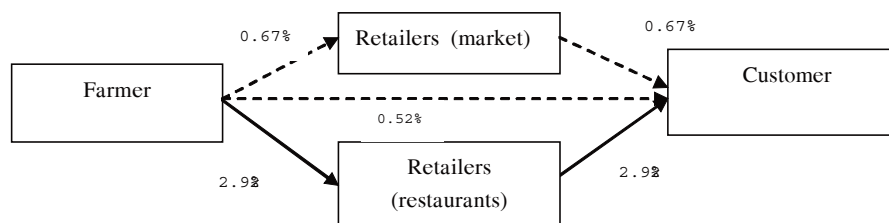
retailers (market) in this distribution channels are mostly farmers's cousins, they only buy when they have free time and vice versa. Customers in this branch also buy it as a gift for donation. (Figure 6).

Thus, red snapper supply chain in Nam Trung Bo, the material product line goes through all actors in supply chain and each actor takes responsibility for implementing the necessary related activities to transform this material product line as well as increase the value to meet the requirements of consumers on the basis of intensive activity of each actor participating. Similarly, the activities related range from the first actor to the final actor when they join in the red snapper supply chain.

4. Some solutions

4.1. For actors in the supply chain

(1) For the producers and breeder suppliers: Production and supply sources of breeder play a role of paramount importance for aquaculture in general and red snapper farming activities in particular. As the first step in the operation of red snapper farming in supply chain, it is able to influence all the rest of the chain. Therefore, the production facilities and supply should manage the quality of fingerling such as testing, monitoring the entire production process



(Source: Author's synthesis and calculation, 2018)

Figure 6: Production and distribution of red snapper domestic market

and supply breeders to ensure the best quality and it is also consistent with climate conditions of each region, as well as every form of aquaculture to achieve the highest output.

(2) For farmers:

Enhance productivity and efficiency of breeding red snapper: in Red snapper supply chain, the center actor selected is farmer. This is the only actor in the supply chain to create commercial red snapper to meet consumers' demand in the domestic and foreign market. In addition to some other actors, productivity and efficiency of breeding red snapper is a major factor, impacting directly the profits that farmers achieved. So to improve the profitability of farms, some important measures need to be performed including the following:

In terms of breeder, aquaculture in general and red snapper breeding in particular: It is very important to select good breeder. If farmers select good breeder, the survival and growth rate of the fish will be higher and better. Therefore, the fish must be purchased at the hatchery, fish seller is reputable and has a clear origin, and the fish must be inspected by the authorities. Farmers must constantly raise the level of technical fish expertise, actively participating fully in training, technical guidance by local fishery development centers and organizations. Farmers should promote the application of fish in wide range of Vietgap standard to meet the requirements on food safety of consumers in the domestic and foreign market as well as meet the retrieval of the origin farmed products.

In terms of food of fisheries, farmers buy food to ensure quality with clear source of origin. Red snapper are different from some other aquatic products as *trachinotus blochii*, *barramundi*, etc. Farmers mainly use fresh fish food for red snapper. So that red snapper could enjoy good growth and development, farmers need to consider and carefully select fresh fish food sources for red snapper.

On the use of aquatic veterinary medicine, red snapper is a new aquaculture species in Vietnam that has strong growth, development, and high survival rate. Therefore, according to the results of the investigation within 3 years (2015, 2016 and 2017), most farmers use fresh water to shower when the fish are sick, thus farmers should not use antibiotics.

However, in the long period when the fish have sensitive farming waters discovered to contain disease, farmers must also proactively invite experts, aquaculture officers and breeder production facilities, to identify the disease and prompt treatment.

Food safety requires farmers to better manage breeder sources, prepare kinds of preventive medicine and treatment for red snapper. So food source especially fresh fish food to feed red snapper must ensure the quality and clear origin, no use of antibiotics, and aquaculture activities do not affect the environment around the farming area.

In short, to improve productivity and efficiency of breeding red snapper, combining synchronous solutions is essential for farmers.

(3) For the export fisheries processing company

Red snapper supply of raw materials for the company comes from farmers and traders. To maintain the supply of stable material red snapper, companies must actively seek geographical supply of raw materials red snapper; to do this, companies must actively integrate vertically signing the product sales contracts with farmers and traders on the basis of the content of prices, regulation of quality, support capital and willing to share profits with farmers.

At present, the export of processed products of red snapper is mainly limited to processing frozen processed products. Companies do not have premium noodle cans. So in the future, for the creation of added value and ratios of profit margin on the cost total and the added cost total, EFPC need to invest more in modern technology and machinery. Various products are processed from raw red snapper to participate in many overseas markets as well as improving competitiveness with other EFPC or EFPC of red snapper export will appear in the coming years.

Regarding export markets of red snapper at present, processed red snapper is only exported to a single market which is the American market. Solutions for EFPC to actively expand the scale of the domestic market as well as overseas markets, actively participating in the global supply chain, the company needs to actively build product brand and invest in building domestic retail system such as supermarkets, convenience stores as well as in other countries wishing to import red snapper.

Towards food safety, so that the processed red snapper could be consumed in the domestic market or exported to foreign markets, especially the difficult markets such as the American, EU, besides the above mentioned, food safety is very important. Thus, the entire processing of the EFPC must comply with strict regulations from the equipment in the technological lines to working costume of workers, from raw material to packing, and loading into trucks or ships for export.

In short, to maintain and expand the consumer market from the processing operations and export of red snapper, the EFPC need to implement these solutions simultaneously.

(4) *For traders:* in the red snapper supply chain, farmer is the central actor that creates red commercial snapper products. Traders are the biggest buyers of red snapper in this supply chain. In addition to EFPC, traders also have influence on pricing decisions and cooperate with production depending on the branch (2a and 2b) of red snapper products snapper for export and domestic market. To have a stable supply, traders need to increase cooperation with the farmers through binding regulations as a product consumption contract for both parties in terms of price, quantity, quality, size, and harvest time for the two sides performed well under the contract signed. About the product output, especially wholesalers, traders are still not proactive in identifying the quantity providing exactly. A majority of them just rely on their experience. To solve this situation, it requires Traders and wholesalers to cooperate actively and support each other in the process of preservation, storage, sale and purchase and other agreements based on contracts signed and the binding duties between the two parties. Food safety hygiene requires traders after purchasing red snapper to preserve and transport to ensure red snapper is always fresh with absolutely no use of prohibited chemical for preservation.

(5) *For wholesalers:* Supply chain research results for red snapper products shows that wholesalers have no relationship with farmers, their purchasing red snapper depends entirely on traders. Their trading activities and the retailers also based on their conjunctural experience. Therefore, it is also difficult for wholesalers and traders when they have

too many goods in one period, but much fewer in others. To overcome this drawback, wholesalers should actively participate in the training on market research, especially on the supply - demand forecast to grasp an exact figure on the supply - demand. Moreover, it must determine purchase contract between two parties to implement jointly and bring the best benefits for both parties. For food safety issues, the wholesalers after purchasing from the traders must have method to remain the freshness and cleanness of fish, not to use any chemicals to preserve the fish.

(6) *For retailers:* 100% source of red snapper products are supplied for retailers by the wholesalers. In particular, retailers (market) as actors in the supply chain, they are in direct contact with customers, so they had to grasp and understand the taste of consumers. In fact, retailers are under pressure of product consumption. Therefore, when demand of consumers increases, demand for fish products from retailers to wholesalers also increases. On the contrary, when consumers reduce demand, both of them decrease. To resolve the dominant and dependent relationship between wholesalers and retailers, it demands trading activities between the two parties be done based on the product consumption contract, a responsibility of agreements such as price, quantity, size, quality, etc. between the two parties to ensure the stable supply of input and output, on the other hand, to ensure benefits for both sides as well as the supply chain for this product. The problem of food safety for red snapper consumed in the market among retailers and consumers is particularly important because the quality of the fish will affect consumers directly, then it will impact indirectly profits that retailers get. Therefore, the essential solution here is the retailer purchasing fish for sale; items such as barrels, buckets, pots for fish must ensure hygienic standards and absolutely no use of banned chemicals to preserve fish both before and during consumption for consumers.

4.2. For state agencies, departments and agencies

(1) *Planning breeding areas towards sustainable development, ensuring the supply chain stability, quality and efficiency:* in fact, for most of the red snapper breeding areas in localities, in the provinces which are investigated and surveyed, the majority

are formed and developed spontaneously, unfocusedly, causing difficulties in the management of state sector on handling environmental pollution, disease after red snapper breeding operations in Vietnam. The red snapper are a new breeding product which brings more potential to all the actors participating in the supply chain or the entire aquaculture products, to develop efficient, sustainable and improving competitiveness, so the planning farming areas is very important. Therefore, to plan breeding areas in the direction of sustainable development, ensuring a stable supply chain, quality and efficiency, the planning work in the provinces of the Vietnam, especially in Nam Trung Bo need to attend to some key and important issues: The locality must base on strategy, planning joint development of aquaculture of the country until 2030 with a vision to 2040 as well as the society and economy development strategy, and the aquaculture sector in each locality to avoid extending the water surface area of breeding uncontrollably; Planning breeding in each province must be attached to the development of aquaculture in the province as well as the provinces have aquaculture products, with particularly emphasized actors providing inputs to finished products distributed to consumers through processing and distribution; And finally, ensuring the ecological environment.

(2) *Strengthen publicity, guidance, inspection and supervision to ensure quality and safety of food:* in fact, for many years the management of state agencies for aquatic industry in general and red snapper in particular still has been limited and inadequate including merely environment warnings and especially the management of quality and food safety. In addition, there is a lack of good coordination among functional departments to handle these errors in each link of the supply chain in each local. To promote the role of state management agencies for red snapper products in the supply chain of fishery products exported as well as sold in the domestic market, they need to implement and strengthen publicity, guide and enhance awareness work for actors in red snapper supply chain on food safety before, during and after harvest, and to ensure traceability. It also needs to develop financial institutions to strictly handle violations of the agent.

(3) *Increased support brand building and expanding consumer market from State agencies:* The consumer market for red snapper always play a crucial role to the sustainable development of the sector. Therefore, the expansion of markets and the scale of the market both at home and abroad is crucial. Besides, the efforts of all the actors of supply chain, the state agencies need to support the actors in supply chain, specifically for EFPC, in addition to support in - depth research on the domestic market as processing products satisfying the tastes of consumers and foreign markets, the state agencies should have evaluations on the ability of red snapper branding building in Vietnam. On that basis, the proposed mechanisms and appropriate policies should be implemented to support EFPC's brand promotion activities.

(4) *Financial support policy for improving supply chain products of red snapper:* Strengthening the financial support on the basis of the inspection, environmental monitoring, breeder quality, breeding products, market research and timely information of the situation leading to flexible prices of inputs and outputs. To do this, it is imperative to have a policy to allocate funds from the supporting budget to the actors participating in supply chain with various forms such as bank loans with preferential interest rates, policies to reschedule on those actors at risk in bad situations. This solution will remove difficulties in part to the chain actors and also provides an opportunity to actors wanting to expand breeding area.

5. Conclusion

Results of building and structural analysis of market supply chain of red snapper in Nam Trung Bo shows that commercial red snapper to consumers through many intermediate actors, including trader, EFPC, wholesaler, retailer (restaurant and market), foreign importer are promoting the role, their position in the process of creating value of red snapper to final consumers. Market structure of red snapper supply chain in Nam Trung Bo shows that the regulation and domination role in the domestic and over-sea market remains with EFPC, but in general the whole supply chain for new products are under high pressure of demand cause of the strong bargaining power of importers as well as restrictions on information and approach to consumer markets.

Therefore, the competitiveness of red snapper supply chain in Nam Trung Bo is still low compared to the global supply chain of fisheries products.

References:

1. GTZ (2007), *Handbook value chain - the methodology of value chain promotion* - first edition.
2. Decision 1445/QĐ-TTg, 08/16/2013, Approving the master plan for fisheries development.
3. Gereffi G. (1994), *The Organization of buyer - driven global commodity chains: How US retailers shape overseas production networks*, In: Gereffi, G. and Korzeniewicz, M. (eds), *Commodity Chains and Global Capitalism*, Praeger, London.
4. Gereffi G. (1999), *A commodity chains framework for analysing global industries*, In: Institute of Development Studies, 1999, Background Notes for Workshop on Spreading the Gains from Globalisation.
5. Gereffi G. and Korzeniewicz M. (1994), *Commodity Chains and Global Capitalism*, Praeger, London, *Kaplinsky and Morris (2001)*, *A handbook for Value Chain Research*.

6. Kaplinsky R. and Morris M. (2001), *A handbook for Value Chain research*, International Development Research Centre (IDRC), Ottawa, Canada, 2001.

Summary

Các nghiên cứu về chuỗi cung ứng tại Việt Nam trong khoảng 10 năm trở lại đây khá phổ biến, hầu hết các nghiên cứu liên quan đến các sản phẩm mang tính truyền thống hoặc đã xác lập chỗ đứng trên thị trường như cà phê, chè, sữa, thịt bò, thịt gia cầm và sản phẩm thủy sản như tôm, mực, cá tra, cá ba sa và cá ngừ khai thác từ biển. Các nghiên cứu xây dựng chuỗi cung ứng cho một sản phẩm mới hoặc sản phẩm chưa được biết đến rộng rãi là chưa tìm thấy, vì vậy mang tính thách thức đối với giới nghiên cứu và ứng dụng, cá hồng Mỹ là một sản phẩm như thế. Do đó, kết quả nghiên cứu được kỳ vọng tạo ra một cái nhìn đầy đủ, toàn diện hơn về xây dựng và phân tích chuỗi cung ứng sản phẩm cá hồng Mỹ tại khu vực Nam Trung Bộ, nhằm đề ra những giải pháp liên quan đến bối cảnh tiêu dùng sản phẩm mới.

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