International Journal of Engineering Research and Technology. ISSN 0974-3154, Volume 13, Number 12 (2020), pp. 4712-4719

Value Chain Analysis of Preserved Fish

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Abstract

The objective of this research was to study and analyze linkages of added value and loss activities within the value chain of preserved fish throughout the whole supply chain. There was a group of sample representatives of business owners who involved with preserved fish in central Thailand. Questionnaires are used as a tool to collect data for analyzing the linkages of productive activities throughout the value chain, added value and loss activities from upstream to downstream suppliers. The research found that the value chain of preserved fish was formed from a group of fish farmers, retailers, traders, of preserved fish producers, local markets, the online marketplace, and consumers. There are various production activities that generate added value and loss from good quality raw materials procurement and low costs, purchasing planning, processing raw material transformation, quality inspection, packaging, temperature control during transportation, working standards established storage, marketing and sales, and management. Procedures that build added value for preserved fish processers were dressing and butchery, soaking in water and washing uncooked rice, salting, flavoring, filling, packaging, labeling, and delivery. This should set a higher potential in market competition. The activity which made the most added value proportion was flavoring and a group of producers who had made the most added value proportion throughout the value chain was a group of hotel owners as they were able to access a group of high-income customers who demanded good quality unique products. The outcome products produced gains in value in high quantities.

Keywords: Value Chain Analysis, Preserved Fish, Supply Chain

1. INTRODUCTION

Nowadays preserved fish production patterns have been derived from local wisdom which is a notion of what is produced for living. With a unique style and uncomplicated operation, it can increase productivity to a higher rate with differentiated types that enter into the domestic market as a main product for consumers and, moreover, greatly increase incomes in return to fish farmers because of consumer satisfaction, flavor, storage time, prices, and safety. This has opened an opportunity for preserved fish producers in a good way to promote their businesses throughout the whole supply chain. There are essential linkages and processing steps from raw materials procurement, raw material grading, production, quality inspection, storage, and delivery. Including marketing promotional activities and product transfer. So producers will capture the importance of added value in various procedures. Value chain study plays a key path in upgrading producers' the potential through all of the raw materials procurement, inventory stock management, costs and loss reduction in processing, upgrading competitiveness and supporting sustainable business growth. For this reason the researchers, therefore, have focused valued on development and improvement within the preserved fish processing cooperative using value chain analysis in order to reduce losses and non-added value away from the added value process of preserved fish which is a guideline to gain a competitive advantage and build cooperation linkages in departments from raw material suppliers, producers, distributors and customers, loss elimination and upgrades in develop on added value products getting an advantage over other competitors in both the domestic and overseas. It can increase income, reduce costs and improve competitive potential.

2. OBJECTIVE

The objective of this research was to study and analyze the linkages of added value and loss added within the value chain of preserved fish from upstream to downstream in order to find problems and be able to develop a proper pattern within processing.

3. METHODOLOGY

This research is described as an action research by studying the value chain every step of preserved fish processing in order to identify problems, obstacles in production, and the links of processing within the value chain of preserved fish from upstream to downstream with the aim of developing production processes to save costs from losses and focus on adding value to the product. There are three main studies of research methods: the value chain evaluation, supply chain of preserved fish and value chain analysis details as follows:

3.1 Value Chain Evaluation

Value chain evaluation is a guideline to help analyze and improve production activities and services and to assist producers in separating added value from losses for producers [4] by giving importance to procedures within value chain of business units from raw material supplies, production process and logistics in order to improve potential capability to participate effectively in a competitive business. In addition to the current economies, competitiveness within the market place

including cooperation guidelines in internal business units within the same supply chain related to marketing, production technology, distribution, research and development, distribution channels, raw material suppliers, producers, distributors, customers [2]. Product value can be measured from a group of consumers who are willing to buy a product for consumption.

Emphasizing the importance of technology adapting to production systems and competition in both in production and economic dimensions as it is the basis within the production process that value added can be evaluated from a number of customers who are willing to buy product that have a higher price than production costs. It can create a competitive advantage and differentiate over its rivals and has higher benefits to producers.

This breaks down and helps increase value on products within an organization into 2 sections namely Primary and Support as shown in Fig. 1. Primary activities are involved within raw materials transformation, product features, distribution channels, and delivery which can be divided into 5 activities consisting of inbound logistics delivery of raw material procurement, storage, and raw material distribution. Operations that is an activity related to the control of the production process. Outbound logistics involves storage, and product distribution. Marketing and sales are responsible for distribution and encourages customers. Service activities are to increase value and satisfaction after sales.

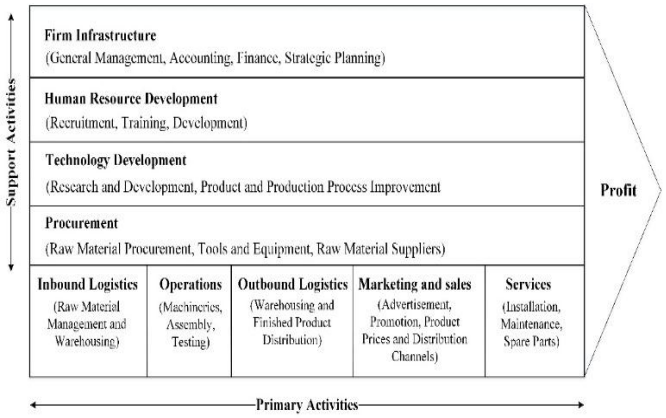

Fig. 1. Value chain of the products [4].

Support activities are responsible for supporting and promoting primary activities to activate linkage connection. Support activities break down into 4 categories. First, Procurement involves the process of procuring raw material, tools and equipment in order to support the Primary activity to stay activate continuously. Second, Technology development that is an activity on the development and improvement of machinery and production processes in order to increase work efficiency. Third, Human resource management are related to needs analysis, recruitment, evaluation, training and assigning jobs to match employ skill sets and Finally, Firm infrastructure involves data management support producers and decision making such as accounting systems, financial systems, and organizational administration systems. Also information technology to support inter linkage in every procedure within the supply chain in order to increase value and create business advantages including strategic planning, decision making, and production control assigning authorized personal to positions in every operational step to achieve capacity.

3.2 Supply Chain Study of Preserved Fish

A supply chain is the link between producers, personal, technology, production, information, and raw materials in relationships between producers and related personal working together. Responding to customer' needs [1] from procurement, processing, storage, information technology, and product distribution carried out from upstream to downstream in order to increase value to the product and continuously manage margins. Participation between producers and related personal with coordination and information exchange between each other continuously monitoring market fluctuations and productivity capability personal who are involved with in the supply chain are able to access data and to help prevent any damages that could happen during production. This allows the entire production process to balance sustainability without relying on market demand forecasting in local markets. Leading both production and management to better plan systems that can reduce unnecessary costs and excessive product resulting. Lower production costs throughout the cycle including expanding various distribution sources to continuously increase product sales as shown in Fig. 2.

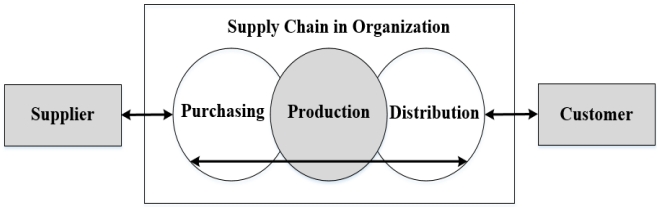

Fig. 2. Internal supply chain relationships [1].

Supply chain management of preserved fish has brought the idea of relationship and links in production together in both direct and indirect procedures that have effected production costs throughout the cycle which starts with fish farming up to delivery, as a result, the operation throughout the whole supply chain has reduced costs, increased profits and is responding to customers' needs better. Considering the benefits in long-term cooperation, in order to be able to balance customers' demand with productivity capability, development and improvement of production processes increasing efficiency and driving business throughout the whole supply chain as shown in Fig. 3.

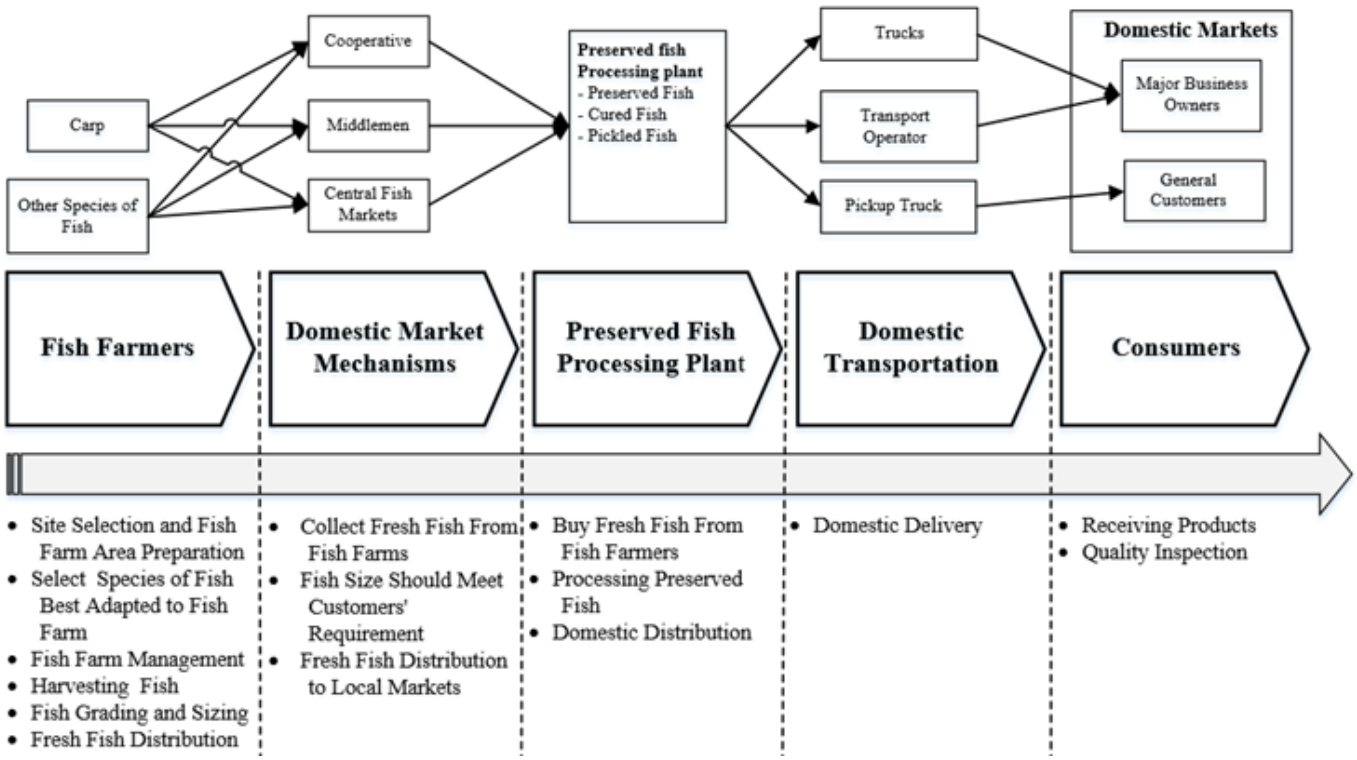

Fig. 3. The structure of the supply chain of preserved fish domestically.

However relationship patterns and development improvements within the supply chain of preserved fish reducing production costs, and increase value to the product from farmers to consumers, fish farming preparation, water system management, fish species selection, feeding, fish farming management and harvesting. After that fresh fish are selected and distribute to customers, traders, and retailers such as cooperatives, and middlemen, central markets where fresh fish are transferred for distribution and processing. Fresh fish transferred to fish processing plants to generate value within different types of preserved fish are sold to consumers and tourists. Many procedures in processing increase the value of the raw material as processing development, waste reduction, costs reduction and quality development and inventory control. Transport operators provide delivery services from processing plants to groups of customers minimizing redundancy cost's and building cooperation between transporters and customers. Meanwhile consumers have purchased preserved fish via the internet marketplace. It makes it much easier for both product purchase and parcel collection through a nationwide parcel service system that reduces the cost and increases the variety of products available.

Present day business owners have to be capable of dealing with economic changes that could happen at any time. Upgrading production effectiveness and internal links in the supply chain from planning, raw material procurement, production, delivery, returning goods, and other supports that are involved with the product. External factors that influence development effectiveness in the supply chain consist of risk management, problem solving techniques, project management discipline, and other techniques that are involved with preserved fish etc. reducing production costs.

3.3 The Study of Value Chain Analysis of Preserved Fish

The research conducted an analysis on the value chain of preserved fish from upstream to downstream in order to find problems, reduce losses and to determine a way to improve production effectiveness. This has led to a simulation design of the value chain development of preserved fish that research steps of methods as follow:

i. Study and collect elementary data on every step of processing preserved fish.
ii. Analyze internal links on every process within preserved fish production throughout the whole supply chain.
iii. Analyze all-added value and losses within the value chain of preserved fish by using 7 types of waste as an analytical tool which is an engineering tool applied to the Pareto chart (Montgomery, 2005) to screen problems in order of importance.
iv. Study causes of problems by using the 7 types of waste as an analytical tool as well as fish-bone diagrams that can be applied to find the cause of problems.
v. Determine a development and improvement format of the production process that has problems which process losses in order to apply within development losses within the production process.
vi. Design a pattern simulation of the production process by improving development throughout the whole value chain of preserved fish.
vii. Close out the research and share results to the public.

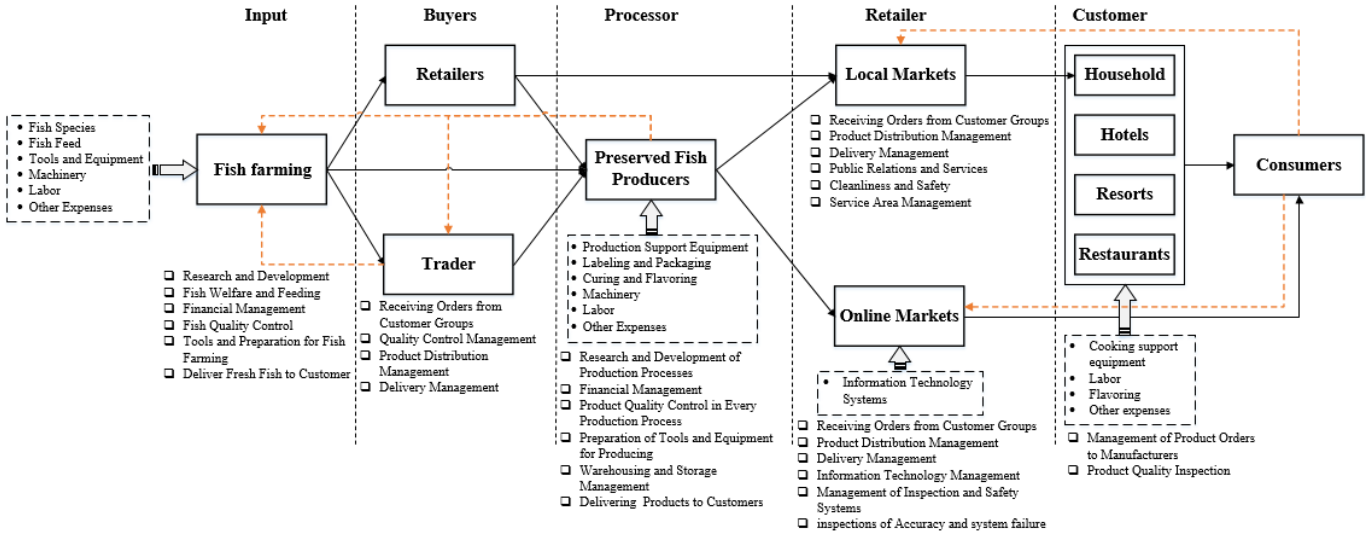

Fig. 4. Internal links in the value chain of preserved fish

4. RESULTS

From the study of the internal links within the supply chain of preserved fish, the researchers performed data collection from a group of gain and losses which started with raw material suppliers, traders, producers, retailers to consumers. The results are as follow:

4.1 Analysis Results of Internal Links

Activities as much as they can in order to increase competitive capability for business owners both primary and support from inbound logistics, outbound logistics, marketing and sales, services, firm infrastructure, human resource management and procurement which every process in the supply chain has a relationship with internal links in the value chain of preserved fish as shown in Fig. 4.

From Fig.4. it's obviously seen that internal links in the supply chain of preserved fish is found that fish local farmers, retailers, traders, preserved fish producers, markets, the online marketplace, and consumers. As you can see every group involved in the added value process wastes reduction in the process with the following:

- Fish farmers are responsible for raising fresh fish and transforming the finished product. Fish farmers put emphasis on raising fresh fish at the lowest cost using different varieties of productivity which is important. Research and development are responsible for fish welfare, finance management, fish quality control, tools and equipment support for fish farmers and the delivery of fresh fish to various groups of customers etc. Those mentioned have an effect on costs and income from fish farming including selecting sizes that fits the farming area of raising until they are ready to be harvested and distributed to the market mechanism accordingly.
- Retailers perform as a center of fresh fish collection from fish farmers to the delivery of preserved fish producers in domestic and main raw materials of preserved fish processing. The remaining fresh fish from the preserved fish producers which failed the quality inspection will be distributed to local markets such as households, hotels, resorts and restaurant etc. In order to increase incomes for retailers by carrying out that receipt purchase order customers, product quality management, distribution and delivery.
- Traders as a center to supply, collection, and delivery of fresh fish from farms to preserved fish producers in order to be used as a main raw material for preserved fish processing not keeping fresh fish unless it is necessary. Traders might collect fresh fish from different fish farms and transfer them to processing plants as soon as possible. A main procedure is carried out in the development of fresh fish distribution centers to minimize operating costs, warehousing management to control excess of raw surplus to requirements, an appropriate and fast delivery model to reduce storage time, using modern technology to support the operation, and exchanging technology information via electronic media.
- Preserved fish producers are responsible for producing and transforming fresh fish to be preserved fish and raw materials are purchased from a group of traders, retailers, and farmers. Fish processing is operated by scaling, gutting, washing, salting, drying, soaking in salt-water, flavoring (crushed garlic and cooked rice), filling in containers, leaving to ferment for 2-4 days (depending on the level of sourness required).Then the delivery of the product to customers accordingly. Preserved fish producers have scattered all over the country and have clustered in Central and the East of the country. Resulting in upgrading costs reduction such as research and development on processing and finance management, quality control, tools and equipment preparation, storage and inventory stock and efficient delivery management.
- Local markets act as collection centers that are

responsive to consumers' needs, traders, and producers through exchange process buying and selling products and services information sharing without contacting any particular market that increases profit in both directly and indirectly. The main activities that are conducted within local market are receipt purchase order from customers, distribution strategy, delivery models, public relations, cleanliness and safety management and appropriate area service management. The online marketplace performs as a collection center for goods and services on websites including any activities relating to the online marketplace consumers are unable to handle actual products and must use electronic devices. Reaching goal achievements such as product presentation, after sales services, public relations, price reduction, customer relationship, customer services, new product presentation, receipt purchase order, customers alerts when delivery the status changes. This type of market pattern in the present day, consumers get used to and are able to supply themselves within a short time. The main activities conducted in the online marketplace are receipt purchase orders, delivery and distribution management, information management and systematic inspections, failures and safety etc.

- Consumers consist of household, hotels, resorts and restaurants that act as both buyers and consumers receiving product offers/persuasions becoming a product user include forming groups to protect customer benefits when issues occur, consumer exploitation, and problems with consumption. The main activities that are conducted for customers are studies and survey's product information, purchase order in both online and face-to-face, self-pickup, product inspection, returning low-quality product and waste management etc. Including receiving and sharing customer information protection within related departments. This is to in able product choice that suits the needs of customers.

In summary, value chain management of preserved fish is an activity that links transformation from fresh fish to preserved fish from raw material procurement, production, packaging, delivery, marketing and product distribution including processing development, storage, information management and value chain management. Activities that relate to the use of resources in production are investment, labor, raw material, tools and equipment, buildings, and land. Going through processing until becoming a finished product and the delivery of products to groups of consumers. Waste management produced from processing which is connected continuously. It can cause an increase in value of the product throughout the whole supply chain; as a result, prices are highly increased by cooperation between departments. This makes the flow of product, information throughout the whole supply chain.

4.2 Identifying Activities and Product Value Added

The results of primary and support procedures analyzing product activities added value throughout the whole supply chain by analyzing added value and losses. Processing activities that are linked to the value chain of preserved fish are (fresh fish) procurement from farmers and traders, size and weight inspection, dressing and butchery, washing for 4-5 times and soaking in the water washing uncooked rice for 15-20 minutes then drying for 15-20 minutes, salting for 15-20 minutes, and flavoring for 3-4 hours to allow seasonings to be absorbed into the fishes flesh, filling containers and preserving for 2-3 days until sourness meets standards suitable for human consumption. When the preserved fish is ready, it is transferred for packaging and labeling to increase sale-ability and creditability. Business owners transport the product to the market place (as shown in Fig. 5). Preserved fish maintains the flavor for a longer time. It is stored at a temperature between 8-10 Celsius degrees, it is preserved for 3-4 weeks but if it is stored at room a temperature of (30 Celsius degree) it's preserved for 2-3 days.

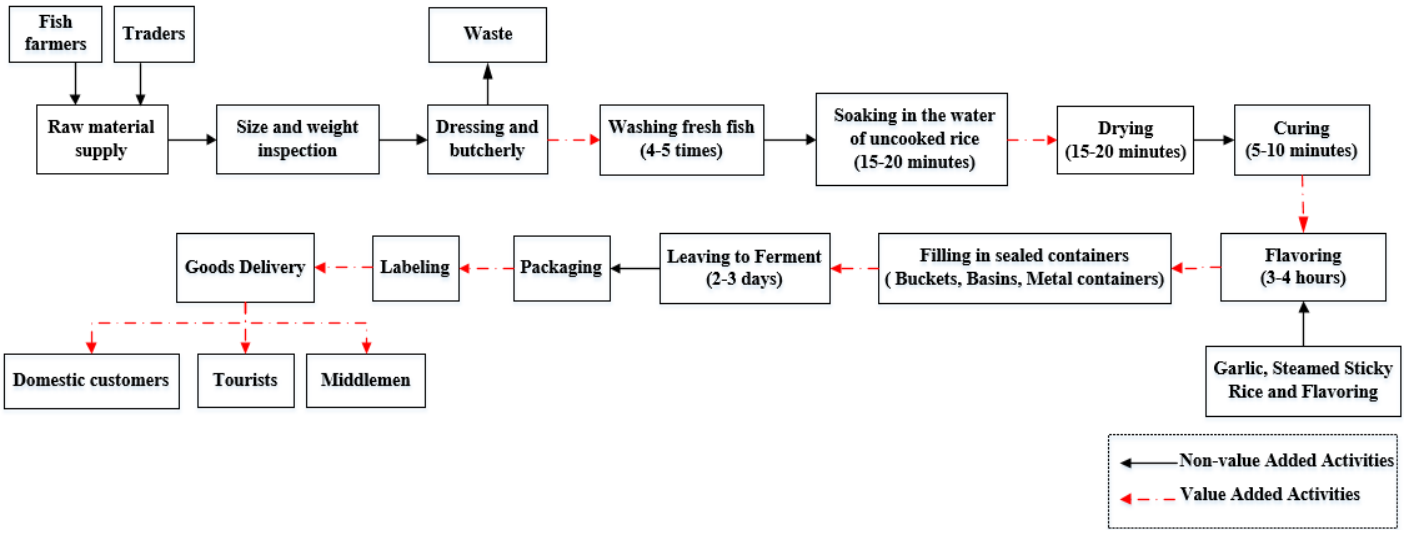

Fig. 5. Preserved Fish Processing

Table 1. Value-Added Activity within Preserved Fish throughout the Whole Supply Chain

Activity no.	Activities	Added-value (percentage)	Added Value form	Details
1	Raw material procurement (fresh)	No	No	Buying directly raw material from fish farmers instead of using middlemen getting a better quality of raw material with lower prices.
2	Size and weight inspection	No	No	Inspect size and weight on raw material based on the standards compliance.
3	Cutting and butcherly	17.74	Raw material transformation	Remove scales, gutting, cutting, scoring fresh fish in order to absorb the salt quicker.
4	Washing for 4-5 times	No	No	Wash repeatedly 4-5 times in order to reduce fishy odors.
5	Soaking in the water from washing uncooked rice	8.06	Raw material transformation	Soaking in the water from washing uncooked rice for 15-20 minutes to get a firm texture.
6	Drying for 15-20 minutes	No	No	Drying after the soaking stage for 15-20 minutes to avoid softening of the fish.
7	Salting	14.52	Raw material transformation	Apply salt to fresh fish in order to absorb salt and preserved for longer.
8	Flavoring for 3-4 hours	32.26	Raw material transformation	Mix garlic, sugar, steamed sticky rice and flavored powder with fresh fish to improve flavor until it meets preserved fish standards.
9	Filling in sealed containers (buckets, basin, metal container)	6.45	Building creditability	Fill in plastic bag and put in metal containers, coated basins or plastic buckets in order to wait for fermentation stage.
10	Fermentation for 2-3 days	No	No	Ferment and preserve fresh fish to improve flavor until saltiness meets preserved fish standards.
11	Packaging	8.06	Building attractiveness and creditability	Transferring to the packaging stage to prevent contamination and building attractiveness and creditability to the product.
12	Labeling	4.84	Building standout appearance and creditability	Put label on the fished product to build a standout appearance and creditability.
13	Goods delivery	8.06	Increasing safety and services	Improved customer satisfaction by delivery and product service procurement for customer's convenience.

From Fig. 5., Shows that there are various internal process steps in preserved fish processing they are added value and non-added value. The research found that there are 8 -added value activities in the production process which consist of dressing and butchery, soaking in water uncooked rice, salting, flavoring, filling sealed containers, packaging, labeling and delivery as those activities are able to make changes in the size, shape, and properties in raw material including enhancing product appearance, safety, and creditability to meet customer's needs. Losses in raw material procurement, size and weight inspection, washing, drying, leaving to ferment these activities do not make any changes to size, shape, the value of the product is not increased but is needed for waste reduction and improving product quality. Business owners have to improve the production process by reducing these activities to a minimum so costs and production time are decreased. Business owners achieve higher profits, improve the standard of the production process and are able to strengthen groups of preserved fish producers in their areas. Adding-value to the product must be through new design creation, inspection, and continuous improvement to make products meet customer's needs. As a result preserved fish process development makes the product increase creditability, good quality, safety and industrial standards approval added value details can be seen through the whole process from procurement, quality inspection to delivery to groups of customers as shown in Table 1.

From Table 1, Shows that processing can add to the value to the product at 14.15 percent of all costs. Preserved fish can be sold after processed at 120 baht/kg with production costs at 105.13 baht/kg. Flavoring increases the highest added value at 32.26 percent. It is the main procedure that changes the properties in fresh fish to satisfy groups of customers. With flavoring methods a unique property increases and improves the taste to meet standards. Dressing and butchery adds value at 17.74 percent and salting adds-value at 14.52 percent respectively. The current price of fresh fish is 58 baht/kg or 55.17 percent of all costs from the upstream that has not been processed to add value so selling at a lower price compared with processed products.

However there are many forms in the value chain improvement of preserved fish to add value and increase competitiveness that includes certifying the product with government agencies support, production costs reduction, and raw material procurement with agricultural mechanism promotions under

advance commitment contracts between business owners and farmers. To expand on the variety of products with business owners' cooperation to strengthen the preserved fish industry sustainability. Also use of modern technology in development of the production process and research will improve product quality and competitive effectiveness higher.

4.3 Analysis Result of Value Chain of Preserved Fish throughout the Whole Supply Chain

Analysis results in the value chain of preserved fish studied from groups of gains and losses throughout the whole supply chain from farmers to consumers. Each group has different added value proportion in transforming raw material into the finished product, packaging styles, product distribution methods and management including waste management within production process and analysis of production technology advantages and communication. It makes business owners who are in the supply chain of preserved fish have different added value proportions. From the study results and data collection, added value proportion of preserved fish throughout the whole supply chain is analyzed as shown in Table 2.

From Table 2, the analysis results of the value chain of preserved fish throughout the value chain shows that the group of producers who had the highest added value for preserved fish were hotels. The transformation of raw material is processed with differentiated types of product and uniqueness at 33.29 percent of added value proportion overall (340.71 ± 33.96 baht /kg). Next are the groups of resorts and restaurants have added value from the preserved fish process and services at 25.47 percent (292.86 ± 22.15 baht/kg) and 16.94 percent (240.71±19.24 baht/kg) respectively. Because groups of customers who use services of businesses, resorts, and restaurants are groups of high-income who demanded good quality, variety of products, good taste, attractive packaging, uniqueness and neatness. This make business owner can increase the highest value of product from preserved fish process (as shown in Fig.6.). The flow of money is circulated increasingly in local business and country by the average of 1,282.50 ± 521.92 baht per kilogram.

Table 2. Value Added on Preserved Fish throughout the Whole Supply Chain

Group no.	Group of Producers	Product value Average (bath/kg)	Added Value Average (baht/kg)	Added Value Proportion Overall (%)	Added Value Proportion (Farmers-Online Sellers)(%)
1	Farmers (Fish farming)	50.00 ± 6.45	0.00 ± 0.00	0.00	0.00
2	Retailers	68.57 ± 3.78	18.57 ± 6.27	3.04	10.04
3	Traders/gatherers	61.43 ± 2.44	11.43 ± 4.76	1.87	7.62
4	Preserved fish producers	121.43 ± 21.16	71.43 ± 21.74	11.68	34.82
5	Local sellers (local market)	137.14 ± 25.80	15.71 ± 13.67	2.57	21.90
6	Online sellers (Online marketplace)	152.86 ± 30.26	31.43 ± 16.00	5.14	25.63
7	Hotels	340.71 ± 33.96	203.57 ± 45.98	33.29	-
8	Resorts	292.86 ± 22.15	155.71 ± 40.25	25.47	-
9	Food restaurants	240.71 ± 19.24	103.57 ± 36.25	16.94	-
Grand total		1,282.50 ± 521.92	535.00 ± 226.90	100.00	100.00

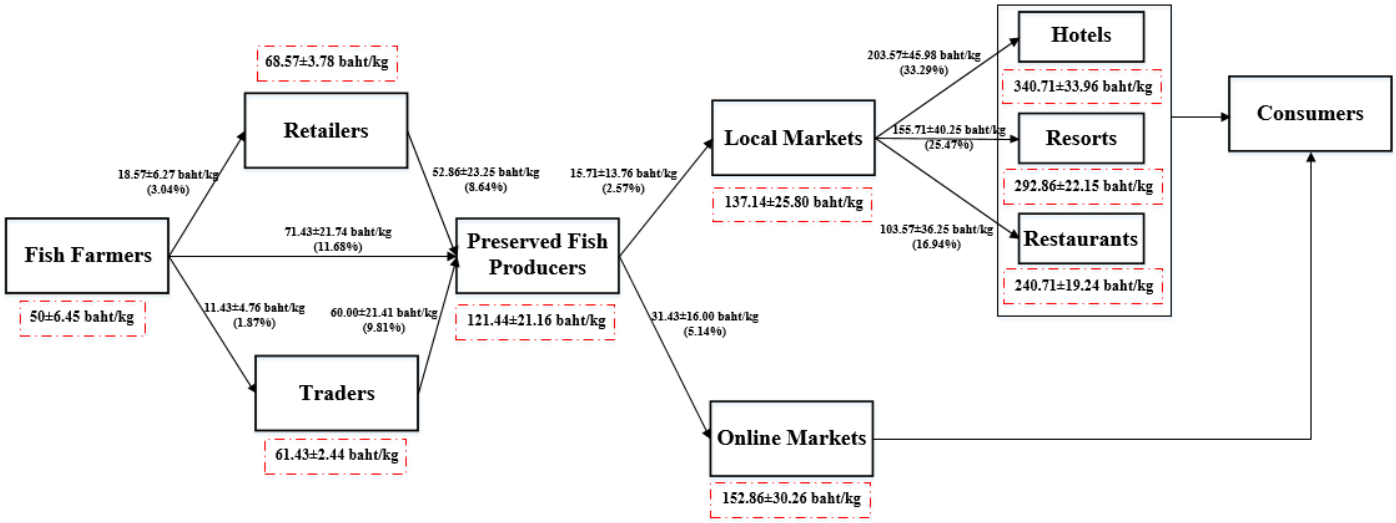

Fig. 6. The Value Chain of Preserved Fish throughout the Whole Supply Chain

However when value chain analysis that has the activity relation under supply chain of preserved fish from farmers to distributor is conducted and found that groups of producers that have made the most value added proportion from raw material transformation and tilapia to preserved fish are preserved fish producers by 34.82 percentage as they have many activities to increase added value such as raw material procurement, product transformation, attractive packaging design, and loss activities. These have increased added value proportionally higher than other producers within the same supply chain. Next are online sales at 25.63 percent and local sellers (local market) at 21.90 percent respectively. This will effect sustainably on both economic and industrial growth.

5. RESULTS AND EXPLANATION

From the results of the value chain studies that have effect on product value and the successfulness of preserved fish producers throughout the supply chain was found that every group of producers have linked continuously on both added value and non- added value activities and resources for production such as investment, labor, raw materials, tools, building, and land etc. Start from fish farmers, retailers, traders, preserved fish producers, local markets, the online marketplace, and consumers. Each group's involved with added value product; production capacity acceleration reduces waste within the production process. Procedures that involve increasing product value and upgrading productivity effectiveness and waste reduction within processing starts with purchasing good quality raw material with the lowest price, purchasing planning, fish farm preparation, raw material transformation, quality inspection, packaging, temperature control during transportation, working standards storage, marketing and sales management. Producers have focused on the importance of added value procedures, but non-added value procedures are eliminated from production. The reason is to increase the competitive advantage of producers. Moreover, it is found that added value procedures within processing consist of dressing and butchery, soaking in the water washing uncooked rice, salting, flavoring, filling in containers, packaging, labeling, and delivery. Due to changes of size, shape, and properties of raw material, added value and non-value added activities are needed to be carried out in order to make good quality of products delivered as scheduled raw material procurement, size and weight inspection, washing, drying and leaving to ferment. Raw material transformation and freshness make the most product value is flavoring, dressing and butchery, and salting respectively as individual producers have a unique style for fresh fish transformation. A group of producers has the most added-value- proportion of preserved fish throughout the whole supply chain is a group of customers who own hotel businesses, resorts and restaurant respectively that have quite high-income and demand good quality, uniqueness, and neatness. This has resulted in producers being enabled to increase product value to the market in high quantities and also keep funds flowing in the economy both locally and nationally.

6. SUGGESTIONS

From the study of the value chain production development of preserved fish distribution, and management in order to reduce cost and improve productivity effectiveness for business owners, value chain analysis results of preserved fish can be applied as a guideline to improve and develop production patterns and value chain management with other products that have the same or similar subject to reduce loss activity, increase productivity effectiveness and focus on product value. This will bring good results for business owners to raise their competitive potential to a higher level. Including the cultivation concepts of the value chain management, integrity and internal organization cooperation to increase awareness and the importance of production development with the highest effectiveness and sustainability.

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