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Analysis of Supply Chain Pattern and Added Value of Processed Catfish (*Clarias* sp) Agroindustry in Hangtuah Village, Perhentian Raja Sub District, Kampar Regency, Riau Province

Analisis Pola Rantai Pasok dan Nilai Tambah pada Agroindustri Olahan Ikan Lele (Clarias sp) di Desa Hangtuah, Kecamatan Perhentian Raja, Kabupaten Kampar, Provinsi Riau

Yunita Feronika Br. Silaban[1], Hendrik[1*], Clara Yolandika[1]
[1]Department of Fisheries Socio-Economic, Faculty of Fisheries and Marine,
Universitas Riau, Pekanbaru 28293 Indonesia
**email: hendrik@lecturer.unri.ac.id*

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Abstract

Hangtuah Village is known as "Kampung Lele"; one of the business actors who run the catfish processing business is the Mina Sejahtera Group. This research was conducted in October 2023 in Hangtuah Village, Perhentian Raja District, Kampar Regency, Riau Province. This research aims to identify the supply chain pattern for catfish crackers and analyze the added value of catfish crackers in the Mina Sejahtera Group. The research method uses a survey method, and data is analyzed qualitatively and quantitatively. The research results show that the supply chain actors consist of partner farmers as suppliers of raw materials for catfish, the Mina Sejahtera Group as business actors and processors of catfish crackers, and consumers as buyers. Supply chain flows include product flows, financial flows, and information flows. The condition of the supply chain for catfish crackers in Hangtuah Village is based on the Food Supply Chain Network (FSCN) approach, which is seen from the supply chain targets, supply chain structure, supply chain entities, supply chain management, supply chain resources, and supply chain business processes that have been integrated with Good. The added value of processing catfish crackers is IDR 11.600/kg with a value-added ratio of 45,3%. The average profit given in the catfish processing process is IDR 5.600/kg or 48,2% of the product's added value, meaning that every kilogram of fresh catfish raw material processed can provide a profit of IDR 5,600/kg in added value.

Keywords: Catfish, Processing, Supply Chain Patterns, Added Value

Abstrak

Desa Hangtuah dikenal dengan julukannya yaitu “Kampung Lele”, salah satu pelaku usaha yang menjalankan usaha pengolahan ikan lele adalah Kelompok Mina Sejahtera. Penelitian ini dilaksanakan pada bulan Oktober 2023 di Desa Hangtuah, Kecamatan Perhentian Raja, Kabupaten Kampar, Provinsi Riau. Tujuan dari penelitian ini adalah untuk mengidentifikasi pola rantai pasok kerupuk ikan lele dan menganalisis nilai tambah kerupuk ikan lele di Kelompok Mina Sejahtera. Metode penelitian menggunakan metode survei, data dianalisis secara kualitatif dan kuantitatif. Hasil penelitian menunjukkan bahwa pelaku rantai pasok terdiri dari pembudidaya mitra sebagai pemasok bahan baku ikan lele, Kelompok Mina Sejahtera sebagai pelaku usaha dan pengolah kerupuk ikan lele serta konsumen sebagai pembeli. Aliran rantai pasok meliputi aliran barang,

aliran keuangan, dan aliran informasi. Kondisi rantai pasok kerupuk ikan lele di Desa Hangtuah berdasarkan pendekatan Food Supply Chain Network (FSCN) yang dilihat dari sasaran rantai pasok, struktur rantai pasok, entitas rantai pasok, manajemen rantai pasok, sumber daya rantai pasok, dan proses bisnis rantai pasok yang telah terintegrasi dengan baik. Nilai tambah pengolahan kerupuk ikan lele sebesar Rp11.600/kg dengan rasio nilai tambah sebesar 45,3%. Rata-rata keuntungan yang diberikan dalam proses pengolahan ikan lele sebesar Rp5.600/kg atau sebesar 48,2% dari nilai tambah produk, artinya setiap satu kilogram bahan baku ikan lele segar yang diolah mampu memberikan keuntungan sebesar Rp5.600/kg dari nilai tambahnya.

Kata kunci: Ikan Lele, Pengolahan, Pola Rantai Pasok, Nilai Tambah

1. Introduction

Kampar Regency is one of the districts in Riau Province with an area of 11,289.28 km^2 and has enormous potential in the fisheries business sector. This potential can be seen from the freshwater fish production in Kampar Regency in 2022, reaching 65,167.83 tons (BPS, 2023). This situation makes Kampar Regency one of the centers for freshwater fisheries cultivation in Riau Province.

Based on BPS (2023), five sub-districts in Kampar Regency produce the highest number of catfish cultivation produced by cultivating communities, including Kuok, Perhentian Raja, Salo, Tapung, and Bangkinang sub-districts. The sub-district that occupies the second-highest production volume is the Perhentian Raja Sub-district, with a total production of 2,567.00 tons in 2022. This shows that the Perhentian Raja Sub-district is one of the sub-districts that is a center for developing catfish cultivation.

One village with the potential for fisheries cultivation in the Perhentian Raja District is Hangtuah Village. The Mina Sejahtera Group is a business actor involved in processing and marketing activities for processed catfish production in Hangtuah Village. This business actor is the main center for processed catfish production. Processed catfish products in this area are catfish crackers, catfish nuggets, and catfish meatballs, the raw materials obtained from catfish farming in Hangtuah Village. However, only catfish crackers are currently being sold because the demand is always there compared to other products. The target market for catfish cracker products in the Mina Sejahtera Group is primarily local markets and only a tiny portion of out-of-town markets such as Medan, Bandung, Padang, Jambi, and Pasir Pangaraian.

The development of catfish cracker products has quite good prospects in the future. Therefore, efforts are needed to increase the production and quality of catfish crackers. One effort can be made through supply chain pattern analysis. Activities carried out by cultivators, the Mina Sejahtera Group, and consumers are called supply chain actors. This activity gives rise to a supply chain pattern in which there is a supply chain flow, which includes (1) product flow, (2) financial flow and (3) information flow. These activities involve distributing, processing, regulating prices, and communicating.

The impact of the Mina Sejahtera Group's supply chain activities is adding value to catfish cracker products. Value addition and product changes are due to processing processes in the supply chain that are carried out to meet consumer demand. The factors underlying the Hangtuah Village community in processing catfish (*Clarias* sp) are: 1) the selling price of catfish is relatively low; 2) as an additional job opportunity for the cultivator's wife; and 3) the demands of consumer tastes in society. So, catfish farmers innovate by increasing added value by processing catfish crackers. This research aims to identify the supply chain pattern of catfish crackers and analyze the added value of catfish crackers in the Mina Sejahtera Group.

2. Material and Method

2.1. Time and Place

This research was carried out in October 2023 in Mina Sejahtera Group in Hangtuah Village, Perhentian Raja District, Kampar Regency, Riau Province.

2.2. Methods

The selection of research locations was carried out deliberately (purposive sampling) based on consideration of the conditions of the research area, which is one of the catfish (*Clarias* sp) processing businesses. This research uses qualitative and quantitative methods to process primary and secondary data. Qualitative data is needed to analyze supply chain patterns, and quantitative data is required to explore added value. Qualitative data was analyzed descriptively according to the Food Supply Chain Networking (FSCN) framework from Lambert & Cooper, modified by Vorst (2006), which can be seen in Figure 1. Using the Hayami method, a

quantitative analysis was conducted to determine the added value obtained from processing catfish into catfish crackers. According to Hayami et al. (1987), added value is the increase in the value of a commodity due to the treatment given to the commodity in question. Quantitative data is collected and processed using the Microsoft Office Excel program, which will be displayed in tabulated form so that it can be explained descriptively.

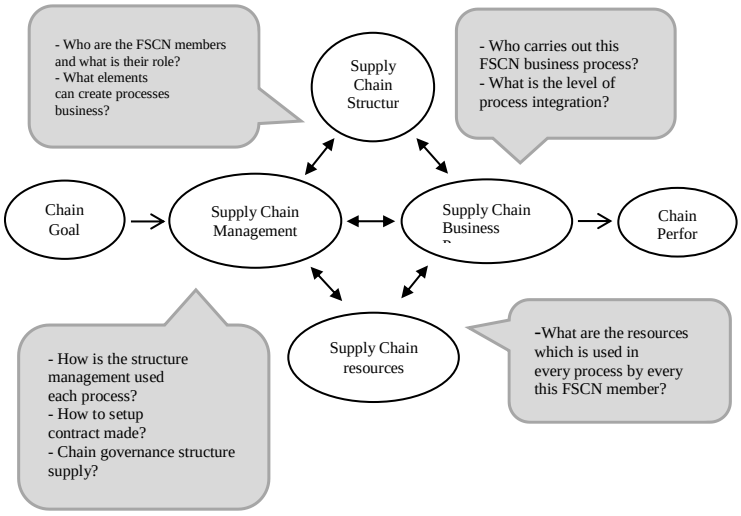

Figure 1. Supply chain descriptive analysis framework (Vorst, 2006)

3. Result and Discussion

3.1. Supply Chain Goals

Target market. Market targets can be seen from market segmentation efforts, integrated quality, and chain optimization. As determined by business actors, the market segmentation for catfish crackers is primarily local markets and a small portion of out-of-town markets such as Medan, Bandung, Padang, Jambi, and Pasir Pangaraian.

Development goals. The development target to be achieved in the catfish cracker supply chain in the Mina Sejahtera Group is strengthening the supply chain by implementing sustainable partnerships. Partnership cooperation or other coordination involving partner cultivators, the Mina Sejahtera Group, and consumers are directed at improving products' quality, quantity, and continuity and developing and improving infrastructure.

3.2. Supply Chain Structure

Primary members of the supply chain. The primary members in the catfish cracker supply chain are farmers who supply fresh catfish, then the Mina Sejahtera Group, which is part of the catfish cracker processing process, and buyers as consumers. The coordination between members must be aware that the supply chain's strength depends on the strength of all aspects within it.

Flow patterns in the supply chain. According to Yolandika et al. (2017), three types of flows must be managed in a supply chain. Firstly, the flow of goods flows from upstream to downstream. Secondly, financial flows flow from downstream to upstream, and the third flow pattern is the flow of information in this flow, starting from upstream to downstream or vice versa. Therefore, the supply chain model for processed catfish consists of cultivators (suppliers), the Mina Sejahtera Group (business actors), and consumers. Figure 2 shows the flow pattern in the catfish cracker supply chain.

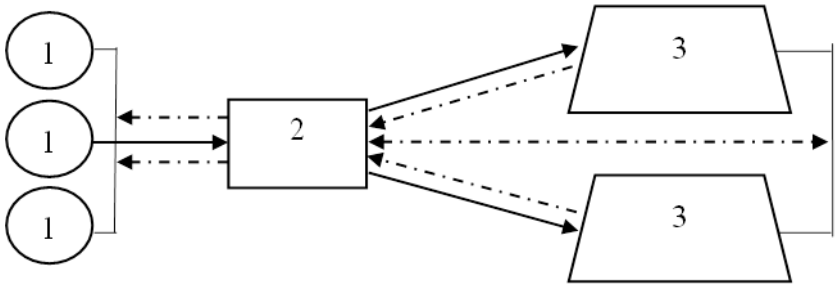

Figure 2. Supply chain flow pattern for catfish crackers (Yolandika et al., 2017)
Description: 1: Partner cultivator; 2: Mina Sejahtera Group; 3: Consumer

Financial flows in the catfish cracker supply chain occur from consumers to the Mina Sejahtera Group to partner farmers. Local consumers will pay in cash because they come directly to the processing place to buy

catfish crackers. In contrast, out-of-town consumers will pay via transfer, with the condition that they make an upfront payment to the business actor one week before the catfish crackers are delivered. Then, the cultivator will receive payment from the Mina Sejahtera Group according to the quantity of orders supplied on the day in question. The Mina Sejahtera Group's payments to cultivators are made in cash after the cultivator supplies catfish to the business actor, where the business actor is directly responsible for paying the sales price of the catfish that has been supplied promptly to the cultivator.

3.3. Supply Chain Management

Management structure. The Mina Sejahtera Group buys the catfish harvest from partner cultivators, and the cultivators sort the catfish and transport and send the catfish to the Mina Sejahtera Group. The organizational structure of the Mina Sejahtera Group already has a particular field that handles marketing problems so that marketing problems can be managed well. Apart from that, the Mina Sejahtera Group also has a specific sector in procuring raw materials for catfish specifically, so the procurement process is running well. Good planning and strategy are needed to support supply chain activities, resulting in supply chain optimization.

Partnership. Partnership cooperation is a cooperation between two or more parties to benefit each other. Partnership selection is one of the factors that supports supply chain success. The selection of partners in the catfish cracker supply chain includes the choice of partner cultivators and consumer selection.

Contractual agreement. The contractual agreement used by the Mina Sejahtera Group with partner cultivators, namely Partner cultivators, are obliged to supply catfish following the standards determined by the Mina Sejahtera Group business actors. Meanwhile, the agreement between partner cultivators and the Mina Sejahtera Group is that the Mina Sejahtera Group is obliged to pay for catfish supplied by partner cultivators and sorted according to the price agreed upon by both parties. The Mina Sejahtera Group's cooperation agreement with consumers is in the form of an agreement regarding payment and product quality according to orders.

Transaction system. The price business actors give to partner cultivators is IDR 20,000/kg. Once received by the business actor, the cleaning and packaging processes will continue according to the number of consumer orders. The price of catfish crackers and fresh catfish is different. For catfish cracker products, the price is higher than that of fresh catfish, where catfish crackers are IDR 12,000/package. If 80 packages are produced weekly, the total revenue reaches IDR 960,000, and fresh catfish Rp. 20,000/kg. Business actors determine the purchasing price for catfish crackers based on the amount of catfish available and the market price. After selecting the selling price, new business actors can provide prices to partner cultivators. Payment for the cultivator's production results is made in cash on the day the catfish are delivered to the Mina Sejahtera Group processing site after sorting. Payment is made by consumers a week before the catfish crackers are sent.

3.4. Supply Chain Resources

Supply chain resources are everything used to produce and deliver products to customers (resource transformation). Supply chain resources consist of physical resources, human resources, technology, and capital. A review of resources belonging to supply chain actors is carried out to determine potentials that can support supply chain development efforts.

Physical resources. The physical resources owned by cultivators are land for cultivating catfish in tarpaulin ponds. The physical resources owned by business actors are transportation tools that support the efficiency of delivering goods and tools or facilities used in the catfish processing process. Physical resources that need attention are permits from government agencies or the consumers involved. Support from the government is related to product marketing through facilitating halal certification, which is expected to help business actors market their products independently and obtain maximum profits. Halal certification on catfish cracker product labels will build consumer trust in business actors.

Technology resources. The technological resources applied have followed existing technological developments for cultivators, business actors, and consumers. One way mobile phone communication media can be used is to channel information quickly to streamline the supply chain for catfish cracker products.

Human Resources. Human resources used in Processing catfish crackers in the Mina Sejahtera Group involves around ten workers. His work includes fish cleaning, processing, marketing, and being a leader who leads and coordinates the group. The human resources used in the marketing sector are two pre- to post-order handling workers and eight workers in the production process (fish cleaning, processing packaging).

Capital resources. The capital used by partner cultivators generally uses their capital, which means they do not borrow capital from other parties. The business capital of the Mina Sejahtera Group is also its business capital, which is obtained from sales of catfish cracker products. Operational costs in the Mina Sejahtera Group, both in the production process and in the delivery (marketing) section, are the total responsibility of the business actor. The supply chain actors have agreed upon this; if there is a loss, the business actor will fully bear it. This is in line with research by Solekhah & Tasya (2018). The supply chain for paprika commodities in Pasirlangu Cisarua Village, West Bandung Regency, has four aspects contained in the supply chain resources, including

physical resources, technological resources, human resources, and capital resources, which are the same as the Mina Sejahtera Group business actors.

3.5. Supply Chain Business Process

Supply chain business process relationships. The processed catfish supply chain has only three cycles: procurement, processing, and adding orders. The manufacturing cycle is contained in this supply chain because it involves business actors who act as direct processors as supply chain members (Mina Sejahtera Group). Partner cultivators only carry out sorting, but the Mina Sejahtera Group carries out processing, packaging, and sales/marketing. Business actors carry out the procurement cycle to consumers to respond to consumer requests. Consumers and business actors carry out the replenishment cycle by increasing the number of orders from the actual number of orders in anticipation of additional orders from consumers or if there is damage to the product. The addition cycle is included in the push process. So, the consumer order cycle is carried out by consumers by ordering directly from the Mina Sejahtera Group business actors.

Distribution pattern. The product supplied in this supply chain is catfish crackers. Catfish that has been processed is the final product the final consumer receives. The quality of catfish crackers distributed to local markets and markets outside the city is of the best quality. The product flow starts from the cultivator supplying catfish that meets the standards set by the business actor, weighing 100 kg per month. The fish is still fresh, does not smell bad, and has a blackish color. Next, the fish are washed using clean water and then separated according to weight to be put into the tarpaulin pool provided by the Mina Sejahtera Group to stock fresh catfish as raw material for processed catfish crackers. After that, the catfish is processed weekly and when consumers receive orders. In the final stage, the packaged catfish crackers are put into large jars to sell to local and out-of-town consumers. According to the order quantity, the packaging will be put into a cardboard box and taped/taped tightly on the cardboard to prevent damage. During the delivery process, it is taken using a pick-up truck to the location of the consumer who placed the order.

Collaborative planning. The Mina Sejahtera Group carries out collaborative planning with its partner cultivators. Consumers provide information regarding the number of requests for catfish crackers. The Mina Sejahtera group will target 20 kg of catfish crackers per week. The collaboration between the Mina Sejahtera Group and consumers has gone well because the Mina Sejahtera Group always does not disappoint requests and is precise in fulfilling consumer orders.

Risk aspect. The risks that cultivators accept are from external and internal factors. These external factors include changing weather, pest/disease attacks on fish, and price fluctuations, while internal factors include cultivation techniques and the use of production facilities for catfish cultivation. The risks accepted by the Mina Sejahtera Group are more than those accepted by cultivators. Several risks occur, namely that several other competitors have the same business as the catfish cracker product type because some open a catfish cracker business in several villages as a side business. This is risky for the Mina Sejahtera Group because many competitors produce the same crackers. However, despite having many competitors, the Mina Sejahtera Group consistently innovates and is creative to increase business income. Then, there is a production risk where producing catfish crackers is very dependent on the weather. During the rainy season, the production of crackers is low because they have to be made in hot weather. If the weather continues to rain, it causes the crackers to rot and become sticky when fried.

Trust-building process. Trust between the Mina Sejahtera Group and partner catfish farmers was also formed because they got to know each other. Business actors see the ability and commitment of partner farmers in supplying catfish. In contrast, partner farmers believe that business actors will accommodate production results in fresh catfish to maintain price commitments with partner farmers. Contractual cooperation agreements between partner cultivators and business actors are made verbally. The contractual contracts between catfish cracker supply chain members are formed verbally and informally. There is no written contractual evidence in the form of an agreement on the price of the payment system and the quantity of the product to be sold. However, no party has yet violated the contractual cooperation agreement.

The trust that exists between the Mina Sejahtera Group and consumers is established, where the Mina Sejahtera Group can fulfil the demand for catfish crackers sustainably and always maintains the quality and quality of the catfish cracker products sent, and sends orders according to the time required. In determining the quantity, the consumer can understand the condition of the business actor, with the condition that the business actor must provide information to the consumer, which can be done via message via WhatsApp 3 days before the delivery period if they cannot supply the number of catfish crackers that the consumer will request. Trust can also be seen in the exchange of information regarding prices. The trust of consumers and the Mina Sejahtera Group is bound by an oral contract, where the contents of the contractual agreement will change over time. Research by Yulinda et al. (2020) explained that trust is necessary in business processes.

3.6. Added Value of Catfish Crackers

The process of processing catfish into catfish crackers provides added value for processors. The raw material for catfish in the research area comes from the people of Hangtuah Village, who cultivate catfish and are

referred to as suppliers. The average capacity for using raw materials in the processing of catfish crackers is 25 kg per production process with a raw material cost of IDR 20,000/kg, and the added value obtained from the production of catfish crackers is IDR 11,600/kg.

In terms of added value, catfish crackers provide low product-added value. The results of this research align with research conducted by Ariyanto et al. (2016) analysis of the added value of catfish cracker products, and the research results show that the added value of processing fresh catfish meat into crackers is smaller than other processed catfish. This research is also in line with research (Safitri et al., 2014) which researched the performance and added value of the coconut coir agroindustry in the integrated (strong) agro-industrial business area in Pesisir Selatan District, Pesisir Barat Regency and also research conducted by (Lestari et al., 2016) regarding analysis of supply chain performance and added value of processed products from the Jasmine Farming Women's Group in Tribudisyukur Village, Kebun Tebu District, West Lampung, each of whose products provides added value greater than zero (NT>0).

Table 1. Added value of catfish crackers in the Mina Sejahtera Group per production process

	Variable	Mark
I.	Output, Input, and Price	
	1. Output (kg)	20
	2. Input (kg)	25
	3. Labor (HOK)	2,5
	4. Conversion Factor	0,8
	5. Coef. Labor (HOK /kg)	0,1
	6. Output Price (IDR/kg)	32.000
	7. Direct Labor Wages (IDR/HOK)	60.000
II.	Revenue and Profits	
	8. Price of Raw Materials (IDR/kg)	4.000
	9. Other Input Contributions (IDR/kg)	10.000
	10. Output Value (IDR/kg)	25.600
	11. a. Added Value (IDR/kg)	11.600
	b. Value Added Ratio (%)	45,3
	12. a. Labor Income (IDR/kg)	6.000
	b. Labor Market Share (%)	51,7
	13. a. Profit (IDR/kg)	5.600
	b. Profit Rate (%)	48,2
	14. Margin (IDR/kg)	21.600

The calculation of added value also uses the Hayami method, and it is known that the value-added ratio from processing catfish crackers is 45,3%, which means the value-added ratio of processing catfish crackers is included in the high category. The value-added ratio is the comparison between added value and output value. This value can be increased by reducing input costs and improving the quality of catfish cracker products.

In Table 1. The average profit provided is also calculated in the catfish processing process, amounting to IDR 5.600/kg or 48,2% of the added value of the product, meaning that every kilogram of fresh catfish raw material that is processed can provide a profit of IDR 5.600 /kg from added value. The product with added value benefits the processor. Margin is the price of catfish per kilogram minus the output value of catfish. The margin for catfish in Hangtuah Village is IDR 21.600/kg.

After processing it into catfish crackers, this calculation aims to determine the added value of one kilogram of fresh catfish. This added value is much lower than the added value in the Jambi Journal of agroindustry fish crackers (Elmida et al., 2021), equal to IDR 24.513. This is due to the expensive price of raw materials and the price of crackers the cheap one. According to Cahyahati et al. (2019), the low added value is caused by several factors. The first factor is the low level of production resulting from weak market control. This is a problem in the acquisition of orders in each industry. The second factor is height intermediate costs, especially raw material costs. The third factor is the internal ability to process raw materials. This concerns technology, equipment, and quality workforce skills in operating equipment.

4. Conclusions

Based on the results of the supply chain analysis, a supply chain pattern was obtained from catfish crackers in Hangtuah Village based on the Food Supply approach Chain Network seen from supply chain targets, supply chain structure, supply chain entities, supply chain management, supply chain business processes and supply chain resources are well integrated. The added value from processing catfish crackers is IDR 11.600/kg with a value-added ratio of 45,3%. The margin obtained is equal to IDR 21.600/kg, and the average profit given to the process catfish processing amounting to IDR 5.600/kg or 48,2% of the value of catfish cracker products.

5. Suggestion

Suggestions that can be given from the results of this research are for business actors to pay more attention to the quality and quantity of processed products and improve the quality of packaging so that they get the expected results and make a profit. Business actors should also be able to expand the reach of marketing areas further and use modern technology in processing catfish crackers so that the added value obtained is higher.

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