IOP - Supply Chain Analysis of Shrimp's

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Supply Chain Analysis of Shrimp's (*Panaeus sp.*) in Bagansiapiapi, Riau Province

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Abstract. This survey research was conducted in Bagansiapiapi, Rokan Hilir Regency, Riau Province, Indonesia on February - August 2019. The research objective was to analyze: (1) The parties involved in the supply chain of shrimp (*Panaesius monodon*); (2) Patterns of shrimp flow, money flow, and information flow in the shrimp's supply chain; and (3) The efficiency level of the shrimp's supply chain in fish storage shed of "Mara" (*Bangliau Mara*), Bagansiapiapi. The results showed that, the flow pattern of shrimp products, starts from fishermen to *Bangliau Mara*, agents, retailers, *along-along* and consumers. The pattern of money flow, started from consumers, to retailers, *along-along*, agents, *Bangliau Mara*, and fishermen. While the pattern of information flow, take place both ways (reciprocity) between the entities. The efficiency level of shrimp's supply chain in *Bangliau Mara* at each agent towards the end consumers, mostly efficient.

Keywords: *shrimp, Panaesius mangodon, Bagansiapiapi, supply chain*

1. Introduction

Bagansiapiapi in Rokan Hilir Regency, is one of the most potential marine fisheries production center in Riau Province. One of the product is shrimp (*Panaeus sp.*). Shrimp production in this area is 1,500 tons per year [1], but the production is influenced by the season. Shrimp also rot easily. Based on these reasons, the shrimp supply chain in Bagansiapiapi must be managed properly.

Supply chain management (SCM) is the managing the flow of goods, information and money, through the network from producers to consumers. With SCM, the flow of goods from from producers to end consumers, will be on time, right cost and right amount [2]. One of the shrimp distribution company in Bagansiapiapi is *CV. Bangliau Mara*.

The application of shrimp's SCM in Bagansiapiapi is important in order to provide economic significance for the region. There are three types of flows that must be managed in a supply chain, namely: (1) the flow of goods that flows from upstream to downstream, (2) financial (money) flows from downstream to upstream, and (3) flow information from upstream to downstream, or vice versa.

Shrimp is one of the reliable fisheries products in Riau Province, because it has a high economic value, so it can increase fishermen's income, as well as providing important significance to the regional economy. But the level of production is very fluctuating and depends on the season. In addition, shrimp is a product that is easy to rot, so it requires special handling during the marketing process. Unstable production levels and the nature of shrimp that easily rot, will affect the shrimp supply chain in the marketing system.

The objective of this study is to analyze the parties involved (entities) in the supply chain of shrimp in *Bangliau Mara*; to analyze the flow patterns of goods, money, and information in the supply chain of shrimp; and to analyze the efficiency level of the shrimp supply chain in *Bangliau Mara*.

2. Materials and Methods

This research uses survey methods. The research location is *CV. Bangliau Mara*, Bagansiapiapi, Rokan Hilir Regency, Riau Province. Location was determined purposively. The study was conducted from February to August 2019. The data obtained is processed by several analyzes. To identify the parties involved in the shrimp's supply chain, used descriptive qualitative analysis. The same method is used to study the patterns of shrimp flow, money flow and information flow, which occur in the shrimp's supply chain in *Bangliau Mara*, Bagansiapiapi.

To find out the level of efficiency of shrimp's supply chain, used quantitative analysis. The indicators used to determine marketing efficiency, marketing margins and supply allocation arrangements of shrimp, based on the calculation of costs incurred by marketing institutions.

To find out the efficiency level of shrimp marketing at each marketing institution, used formula: Eps = BP/HE x 100%. Eps is Marketing Efficiency, BP is Marketing Costs, and HE is Retail Price. If Eps <5% it means efficient, but Eps> 5% it means inefficient.

9. Result and Discussion

Supply chain management (SCM) is manage the supply chain of goods, where the goods flow from upstream to downstream as a chain, following a number of parties. Supply chain (SC) is a series of entities consisting of three or more entities (both individuals and groups), that are directly involved from upstream to downstream in the flow of products, services, finance, and information, from sources to customers [2]. The purpose of this SCM is to align customer needs with material flow from suppliers, to get the balance of the goal imbalances that often occur in providing the best service to customers, low inventory management, and low unit costs [3].

The results showed that the parties involved in the shrimp's supply chain in Bagansiapiapi consist of one skipper/ distributor of shrimp (*tauke*); 4 agents (that is agent for Bengkalis, Dumai, Duri, and Kandis); 4 retailers; 4 inter-city retailer (*along-along*); and consumers. The flow of shrimp products in Bagansiapiapi, starts from fishermen to skipper/ distributor of shrimp (*tauke*), agents, retailers, intercity-retailer (*along-along*), and end consumers. Instead, the flow of money, occurs from consumers to intercity-retailers (*along-along*), retailers, agents, and skipper/ distributor of shrimp. The payment process is done in cash.

While the flow of information among entities (fishermen, skipper/ distributor of shrimp (*tauke*), agents, retailers, intercity-retailer (*along-along*), and end consumers. Communication is done by telephone, social media, or face to face. The information content includes the price of shrimp on the market, available shrimp stocks, as well as ways of collecting and shipping shrimp. The flow pattern of shrimp, money and information, can be seen in Figure 1.
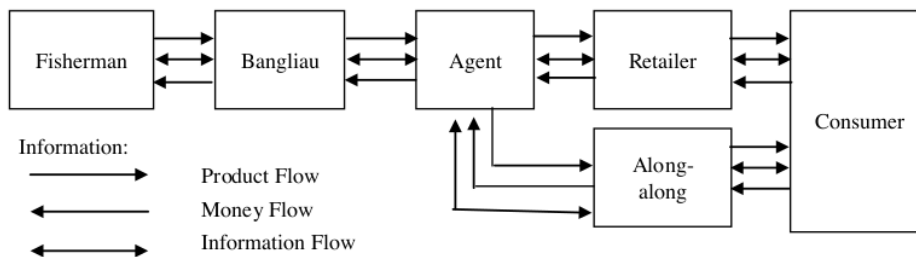
Figure 1. The flow pattern of product, money and information on the shrimp's supply chain di Bagansiapiapi

Fishermen get information about the ideal price of shrimp from skipper/ distributor of shrimp. The price of shrimp based on grade. The price of shrimp for grades A and B is IDR 40,000/ kg, and grade C is IDR 15,000/kg. Fishermen trust information about shrimp price from skipper/ distributor. Distributor get information about stock of shrimp from the fishermen.

The efficiency level of shrimp's supply chain from agent to consumers in Bagansiapiapi, are as follows:

3.1 Agent for Bengkalis
There are two marketing channels at the agent for Bengkalis, namely: Channel I (start from Fisherman → Distributor → Agent → Retailers → End Consumers); and Channel II (start from Fisherman →Distributor → Agent → Intercity-retailer *(along-along)* → End Consumers). Table 1 shows the marketing costs for each shrimp marketing agency.

Table 1. Marketing Costs at Agent for Bengkalis

Marketing Institute	Shrimp Prices (IDR/kg)	Components of Marketing Costs	Marketing Cost (IDR/kg)	
			Channel I	Channel II
1. *Toke/ Bangliau*	40,000	Plastic+ice	1,150	1,150
2. Agent	45,000	Shipping costs	1,300	1,300
3. Retailer	50,000	Plastic+ice+retribution	570	
4. Intercity-retailer	55,000	Plastic+ice		1,170
5. Consumers				
- From Retailer	57,000			
- From Intercity-retailer	62,000			
		Total	3,020	3,520

Based on Table 1, that the total marketing costs on Channel 1 is IDR 3,020, and retail price is IDR 57,000. So, the level of marketing efficiency on Channel 1 is:

Eps   = BP/HE x 100%
        = 3.020/57.000 x 100%
        = 5,2%

The results of these calculations show that the level of marketing efficiency is 5.2% > 5%. This means that marketing efficiency is inefficient.

Total marketing costs in marketing Channel II is IDR. 3,520/kg. Then the level of efficiency is;

EPS   = BP/HE x 100%
        = 3,520/62,000 x 100%
        = 5.6%

The results of these calculations show that the level of marketing efficiency is 5.6% > 5%. This means that marketing efficiency is inefficient.

3.2 Agent for Dumai

There are two marketing channels at the agent for Dumai, namely: Channel I (start from Fisherman → *Toke* → Agent → Retailers → End Consumers); and Channel II (start from Fisherman → Distributor → Agent → Intercity-retailer → End Consumers). Table 2 shows the marketing costs for each shrimp marketing agency.

Table 2. Marketing Costs at Dumai Agent Level

Marketing Institute	Shrimp Prices (IDR/kg)	Components of Marketing Costs	Marketing Cost (IDR/kg)	
			Channel I	Channel II
1. Distributor	40,000	Plastic+ice	1,150	1,150
2. Agent	43,000	Shipping costs	600	600
3. Retailer	48,000	Plastic+ice+retribution	570	
4. Intercity-retailer	53,000	Plastic+ice		1,070
5. Consumers				
- From Retailer	55,000			
- From Intercity-retailer	60,000			
		Total	**2,320**	**2,820**

Based on Table 1, that the total marketing costs on Channel 1 is IDR 2,320/kg, and retail price is IDR 55,000. So, the level of marketing effisiensi on Channel 1 is:
Eps   = BP/HE x 100%
        = 2,320/55,000 x 100%
        = 4.2%

The results of these calculations show that the level of marketing efficiency is 4.2% > 5%. This means that marketing efficiency is efficient.

Total marketing costs in marketing channel II is IDR 2,830/kg. Then the level of efficiency is;
EPS   = BP/HE x 100%
        = 2,820/60.000 x 100%
        = 4.7%

The results of these calculations show that the level of marketing efficiency is 4.7% > 5%. This means that marketing efficiency is efficient.

3.3. Agent for Duri

There are two marketing channels at the agent for Duri, namely: Channel I (start from Fisherman → Distributor → Agent → Retailers → End Consumers); and Channel II (start from Fisherman → Disributor → Agent → Intercity-retailer → End Consumers). Table 3 shows the marketing costs for each shrimp marketing agency.

Table 3. Marketing Costs at Duri Agent Level

Marketing Institute	Shrimp Prices (IDR/kg)	Components of Marketing Costs	Marketing Cost (IDR/kg)	
			Channel I	Channe lII
1. Distributor	40,000	Plastic+ice	1,150	1,150
2. Agent	43,000	Shipping costs	600	600
3. Retailer	48,000	Plastic+ice+retribution	570	
4. Intercity-retailer	53,000	Plastic+ice		1,070
5. Consumers				
- From Retailer	55,000			
- From Intercity-retailer	60,000			
		Total	2,320	2,820

Based on Table 1, that the total marketing costs on Channel 1 is IDR 2,320/kg, and retail price is IDR 55,000. So, the level of marketing efficiency on Channel 1 is:

Eps   = BP/HE x 100%
        = 2,320/55,000 x 100%
        = 4.2%

The results of these calculations show that the level of marketing efficiency is 4.2% > 5%. This means that marketing efficiency is efficient.

Total marketing costs in marketing channel II is IDR 2,830/kg. Then the level of efficiency is;

EPS   = BP/HE x 100%
        = 2,820/60.000 x 100%
        = 4.7%

The results of these calculations show that the level of marketing efficiency is 4.7% > 5%. This means that marketing efficiency is efficient.

3.4 Agent for Kandis
There are two marketing channels at the agent for Kandis, namely: Channel I (start from Fisherman → Distributor → Agent → Retailers → End Consumers); and Channel II (start from Fisherman → Distributor → Agent → Intercity-retailer → End Consumers). Table 4 shows the marketing costs for each shrimp marketing agency.

Table 4. Marketing Costs at Kandis Agent Level

Marketing Institute	Shrimp Prices (IDR/kg)	Components of Marketing Costs	Marketing Cost (IDR/kg)	
			Channel I	Channel II
1. Distribotor	40,000	Plastic+ice	1,150	1,150
2. Agent	43,000	Shipping costs	800	800
3. Retailer	48,000	Plastic+ice+retribution	570	
4. Intercity-retailer	53,000	Plastic+ice		1,070
5. Consumers				
- From Retailer	55,000			
- From Intercity-retailer	60,000			
		Total	2,520	3,020

Based on Table 1, that the total marketing costs on Channel 1 is IDR 2,320/kg, and retail price is IDR 55,000. So, the level of marketing efficiency on Channel 1 is:

Eps   = BP/HE x 100%

= 2,520/55,000 x 100%
= 4.5%

The results of these calculations show that the level of marketing efficiency is 4.5% > 5%. This means that marketing efficiency is efficient.

Total marketing costs in marketing channel II is IDR 2,830/kg. Then the level of efficiency is;
EPS   = BP/HE x 100%
       = 2,020/60.000 x 100%
       = 5.3%

The results of these calculations show that the level of marketing efficiency is 5.3% > 5%. This means that marketing efficiency is inefficient.

The efficiency level of shrimp's supply chain in *Bangliau Mara* Bagansiapiapi, at each agent to end consumers, is mostly efficient. An efficient shrimp's supply chain is found in agents for region Dumai (4.2%), Duri (4.2%) and Kandis (4.5%). While agent for Bengkalis is inefficient (5.2%). The efficiency level of *along-along* to end consumers in agent for region Dumai 4.7% and Duri 4.7% are efficient. But in Bengkalis (5.6%) and Kandis (5.3%) are inefficient.

In general, the shrimp marketing system in Bagansiapiapi is efficient. This means, the distribution of margins in each marketing institution is quite evenly distributed. According to Alamsyah (2015), longer marketing channels cause marketing costs incurred by merchants to increase and lead to large marketing margins, but inefficient marketing can also occur in short marketing channels if marketing costs are greater.

4. Conclusion and Suggestions
4.1. Conclusion
This research concludes:
1. Entities involved in shrimp SCM in Bagansiapiapai, are: *toke* (1 person), agents (4 people), retailers (4 people), intercity-retailer (4 people) and end consumers.
2. The pattern of shrimp products flow in Bagansiapaipi is from Fishermen to Distributor, Agents, Retailers/ Intercity-retail (*Along-along*), and consumers. The pattern of of money flow is Consumers to Retailers/ Intercity-retailer (*Along-along*), Agents, Distributor and Fishermen. While the pattern of information flow (such as information about shrimp stok and prices), is recepcocal between entities involved in the shrimp supply chain in Bagansiapiapi.
3. The efficiency level of shrimp's supply chain in Bagansiapiapi, at each agent to end consumers, is mostly efficient.

4.2. Suggestion
Inefficient shrimp marketing at Bengkalis Agent level and Along-along (in Bengkalis and Kandis), needs to be reorganized, so that all parties involved in the marketing, optain an even profit.

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