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Vaname shrimp (*Litopenaeus vannamei*) post-harvest marketing analysis in traditional pond systems at Turi District, Lamongan, East Java, Indonesia

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Abstract. This study aimed to determine the marketing chain of vaname shrimp (*L. vannamei*) in Turi district, Lamongan, East Java Province, Indonesia and the most frequent marketing chain based on the number of shrimp farmers chosen. This study used the survey method to describe the problem following the facts based on a field survey and simple random sampling for obtaining the appropriate respondents. Data were obtained from marketing agencies involved, marketing structures, market behavior, marketing margins, farmer's share, and profit cost ratio. The result showed that vaname shrimp post-harvest marketing in Turi district, Lamongan had four marketing chain types involving shrimp farmers, shrimp farmers, wholesale traders, retailed traders, and factories. The most frequent marketing chain type used was marketing chain I (shrimp farmers – distributors – wholesale traders – consumers), though it was the longest chain type and lowest farmer's share value, besides the most inefficient marketing chain type. This study suggested that it was necessary to cut the marketing chain to make the profit cost ratio increase, resulting in high profit for the shrimp farmers.

1. Introduction

Lamongan is one of regencies in East Java province which has the potential of aquaculture and considerable public waters comprising 9,387,860 ha for brackishwater pond area, 195,195,704 ha for rice field pond area, 541,238 ha for freshwater pond area, 522 ha for net cage culture, and 2,668 ha for reservoir area. [1]. Lamongan is also one of the regions in East Java that has applied the concept of the minapolitan region [2].

According to [2], one of the minapolitan locations in the Lamongan district is the Turi district. Turi district has a 3,870.5 ha land area for shrimp culture. The most culture commodity which develops well in Turi district is vaname shrimp (*L.vannamei*). This was based on the basis report from [3], which stated that the production of vaname shrimp on Turi District in 2014 reached 1,658,346 kg, then continued to grow in each year. Vaname shrimp culture profit can be obtained as reaching the maximum shrimp growth under the normal condition along with a good marketing system to fulfill the market demand.



Marketing is crucial in the fisheries business. According to [4], marketing is an overall system of business activities dealing with business planning and cost determination, besides promoting and distributing goods and services which is needed to the consumers.

An effective and efficient marketing system can hold a fair profit for producers as well as marketing agencies to get optimal profit among others [5], thereby encouraging increased shrimp culture production. The marketing chain system that works effectively and efficiently based on the market analysis had not been fully implemented by a group of shrimp farmers in Turi district. This became the background of this study, which was conducted to observe types of marketing chain occurred in Turi District and the most frequent marketing chain chosen by shrimp farmers to trade their products (vaname shrimp post-harvest).

2. Materials and methods

2.1. Place and period

This study was conducted in Turi District, Lamongan, East Java Province, Indonesia on March – November 2018. This location was chosen deliberately (purposive) as having great vaname shrimp culture potential.

2.2. Study design

This study used a descriptive method to draw some conditions from some places objectively and explain certain individual, situation, and group characteristics or phenomena accurately by giving some attention to some certain aspects emerged. The descriptive method usually used a data survey which was obtained from questionnaires, interviews, and observations [6].

The survey respondent's method used for obtaining respondents during the marketing management of vaname shrimp post-harvest was a simple random sampling method. The main principle of simple random sampling was that every individual on some certain location has the same probability to be taken as a respondent, besides having the same characteristics and not affecting the other individuals [7].

Marketing agency respondents in Turi District were determined using a snowball sampling method. The snowball sampling method was one of the sampling methods which were done by interviewing relevant respondents, then allowing them to choose other respondents who had the same specification and specialization [8]. Snowball sampling method was done by searching the marketing chain of vaname shrimp post-harvest in Turi District from the producers (vaname shrimp culturists) to the consumers, based on the information given by the producers. Respondent determined the result is shown in Table 1.

Table 1. Vaname shrimp farmers in Turi District, Lamongan

Village	Members	Respondents
Balun	50	15
Gedong Boyo	47	14
Tawang Rejo	45	13
Putat Kumpul	38	11
Karang Wedoro	30	9
Tambak Ploso	27	8
Jumlah	237	70

Source: Turi District technical unit of fisheries and marine department, 2017

2.3. Market structure

Vaname shrimp market structural analysis was observed based on the marketing chain that occurred, traded product condition, consumer knowledge on price and expense used, besides the market access. Market structure was analyzed by observing the number of traders and buyers involved in the market,

product condition or characteristic, market information, and some obstacles dealing with the way to enter or exit the market [9].

2.4. Marketing chain

This analysis was conducted to identify the marketing chain existed for trading the vaname shrimp post-harvest product and observe the product delivery from producers to consumers.

2.5. Marketing margin

Marketing margin analysis was used to notice the efficiency range of vaname shrimp post-harvest products. Marketing margin is the price difference between consumers and producers [10]. Marketing margin analysis was calculated to observe whether there was any difference in the price per product traded between consumers and producers that happened in the marketing chain. The marketing margin was calculated using the formula stated by [11].

2.6. Farmer's share

Farmer's share analysis was used to compare return cost for the producer with the paid cost from the final consumer [12]. Farmer's share has a negative correlation with marketing margin as a high marketing margin will decrease the cost shared for producers (farmer's share). Farmer's share was calculated based on [13].

2.7. Profit cost ratio

This analysis was used to observe profit ratio distribution and cost on each marketing agency. The efficiency level of the marketing system was also able to be observed based on this analysis as more distributed profit ration against cost would technically make the marketing system efficient. The profit ratio and cost were formulated based on [14].

2.8. Data analysis

All data and information retrieved were analyzed using a descriptive method that explained or describe some characteristics based on the following phenomenon observed. A descriptive quantified approach in this study was used to find and collect the data, besides composing and defining the data retrieved, thus able to be completely described. This approach would also make some objects or phenomena to become more thoroughly and relatively described [15].

3. Results and discussion

3.1. Results

3.1.1. Vaname shrimp production

Vaname shrimp production on Turi District in each year in 2013-2017 is shown in Table 2.

Table 2. Vaname shrimp production on Turi District in 2013-2017

Commodity	Production (kg)				
	2013	2014	2015	2016	2017
Vaname shrimp	1,539,217	1,658,346	1,883,691	2,187,130	2,219,169

Vaname shrimp production on Turi District in each year had gradually grown well. This happened because there were more people were interested to conduct vaname shrimp culture on Turi District. The number of vaname shrimp specified production in some regions of Turi District in 2017 is presented in Table 3.

Table 3. Vaname shrimp production on some regions of Turi district in 2017

Village	Production (kg)
Balun	230,781
Gedong Boyo	150,321
Tawang Rejo	139,721
Putat Kumpul	122,858
Karang Wedoro	107,923
Tambak Ploso	101,177

Vaname shrimp production on Turi district regions in 2017 which showed the highest production number was observed at Balun Village. This meant that vaname shrimp culture potential in Balun Village had developed vigorously, making the production increase well.

3.1.2. Vaname shrimp culture indicator

Vaname shrimp culture indicator in Turi district comprised investment, land, workers, fingerlings, feed, and culture technology. These indicators are presented in Table 4.

Table 4. Vaname shrimp culture indicator

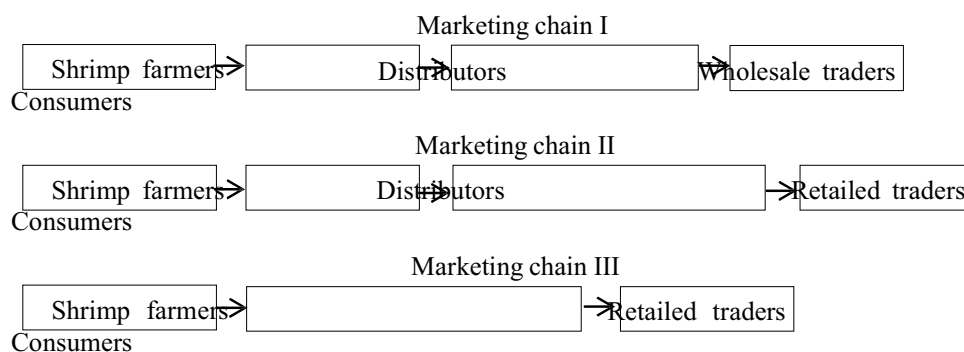
Culture indicator	Average (70 Respondents)
Investment	Rp.3,000,000.00
Land	1 ha
Workers	2 workers
Fingerlings	110,000 fingerlings
Feed	300 kg
Culture technology	Traditional culture
Harvest product	600 kg

Seventy respondents stated that the investment used for a one-time harvest on Turi District was ranged Rp 600,000.00 – Rp 6,000,000.00 or averagely Rp 3,000,000.00. This investment was depended on the land used for the cultural production, which averagely ranged 1 ha. Workers involved at one period of harvest time was averagely two people. Workers' involvement could still be increased to maximize the production result on Turi District.

Fingerlings were stocked between 22,000 – 220,000 fingerlings (averagely 110,000 fingerlings), based on the land area used for the traditional culture production, which usually had a wider land area than any other culture production technology. Feed used during one time of culture production was 50 – 400 kg (averagely 300 kg) and given twice a day in the morning and afternoon. The harvest result after one time of culture production was ranged between 120 – 700 kg (averagely 600 kg).

3.1.3. Vaname shrimp marketing pattern and agencies

The marketing chain of vaname shrimp post-harvest on Turi District can be seen in Figure 1.



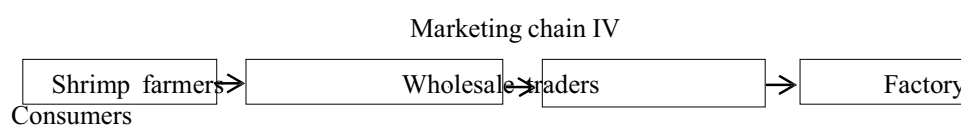


Figure 1. Vaname shrimp post-harvest marketing chain in Turi District

Vaname shrimp post-harvest marketing chain in Turi District, Lamongan had four chain types. Marketing chain I involved shrimp farmers, who directly traded their products to subscribed distributors before supplied to the wholesale traders, who would trade the products to the consumers. Marketing chain II contained shrimp farmers who traded their products to the distributors, then retailed traders, before bought by consumers. Marketing chain III comprised shrimp farmers who traded their products directly to the retailed traders before bought by consumers. Marketing chain IV used wholesale traders as the first one who faced shrimp farmers, before being traded to the factories and processed as diverse product for consumers. The frequent percentage of the marketing chain used in Turi District can be shown in Figure 2.

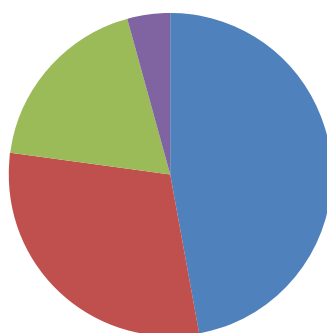


Figure 2. Frequent marketing chain percentage (Note: ■ Marketing chain I, ■ Marketing chain II, ■ Marketing chain III, ■ Marketing chain IV)

Marketing chain II was the most frequent marketing chain type used in Turi District, while marketing chain IV was the least frequent marketing chain type used, though having the perfect challenge market characteristic as there were a lot of traders and buyers. Market condition in Lamongan described that each distributor, retailed trader, and wholesale trader had possessed their subscribers, thus resulting in easier marketing interaction. Shrimp farmers had enough price information, which made them easier to trade their products in the market. Shrimp farmers obtained the price information directly from the distributors, wholesale traders, and retailed traders. Price was determined based on the price fluctuation in the market.

3.1.4. Marketing margin, farmer's share, and profit cost ratio

Marketing margin, farmer's share, and profit cost ratio calculation on marketing chain I, II, III, and IV starting from shrimp farmers, distributors, wholesale traders, retailed traders, and factories can be seen in Table 5.

Table 5. Farmer's share, marketing margin, and profit cost ratio

No	Marketing agency	Marketing	Marketing	Marketing	Marketing
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		chain I (Rp/Kg)	chain II (Rp/Kg)	chain III (Rp/Kg)	chain IV (Rp/Kg)
1	Fish farmers				
	Trading price	55,000	55,000	60,000	65,000
	Marketing cost	2,000	2,000	2,000	2,000
	Profit	53,000	53,000	58,000	62,000
2	Distributors				
	Buying price	55,000	55,000		
	Marketing cost	3,000	3,000		
	Trading price	62,000	62,000		
	Profit	4,000	4,000		
	Ratio (P/C)	1.33	1.33		
3	Retailed traders				
	Buying price		62,000	60,000	
	Marketing cost		3,000	3,000	
	Trading price		68,000	65,000	
	Profit		3,000	2,000	
	Ratio (P/C)		1.00	0.67	
4	Wholesale traders				
	Buying price	62,000			65,000
	Marketing cost	3,000			3,000
	Trading price	70,000			70,000
	Profit	5,000			2,000
	Ratio (P/C)	1.67			0.67
5	Factories				
	Buying price				70,000
	Marketing cost				3,000
	Trading price				75,000
	Profit				2,000
	Ratio (P/C)				0.67
	Farmer's share	78.57%	80.88%	92.30%	86.67%
	Marketing margin	15,000	13,000	5,000	10,000

Marketing margin and farmer's share on marketing chain I were respectively Rp 15,000.00/kg and 78.57%, marketing chain II were Rp 13,000.00/kg and 80.88%, marketing chain III were Rp 5,000.00/kg and 92.30%, and marketing chain IV was Rp 10,000.00/kg and 86.67%. profit cost ratio of marketing agencies on marketing chain I was 3.00, marketing chain II was 2.33, marketing chain III was 0.67, and marketing chain IV was 1.34.

3.2. Discussion

Vaname shrimp culture production from Turi District, Lamongan in each year has increased, due to the increased number of vaname shrimp farmers on that location (Table 2). Indicators affecting increased number of shrimp culture in Turi District were investment, land, workers, fingerlings, feed, and culture technology (Table 3).

The marketing chain can be formed from some marketing agencies that play a role in trading some harvest products [16]. [17] reported that agencies involved in fisheries marketing affected the long or short marketing chain yield fisheries, thus determining the marketing efficiency strategies.

Vaname shrimp post-harvest marketing in Turi District was started by shrimp farmers, who traded their products to some marketing agencies before bought by consumers. Marketing agencies involved in the marketing chain on Turi District comprised distributors, retailed traders, wholesale traders, and

factories. Each agency had different marketing price, therefore more marketing agencies involved would result in a longer marketing chain, affecting greatly on production cost [18].

Marketing chain located in Turi district, Lamongan was an indirect distribution chain type, which was marked by the existence of intermediary traders on the marketing chain. This was shown as shrimp farmers preferred to sell their vaname shrimp products to the distributor merchants, before traded to the retailed or wholesale traders, then conveyed to the consumers. Marketing chain types observed in Turi district had four marketing chain pattern types (Table 4). This result was the following [19], who mentioned that the optimum yield of the marketing chain generally contained four marketing chain types before grasped by the consumers.

Marketing channel type I followed with marketing channel type II were the most frequently used by shrimp farmers, whereas marketing channel type III and IV were the least used in Turi district, Lamongan (Figure 1). Marketing chain type III was rarely used because shrimp farmers typically harvested vaname shrimp in large quantities (> 100 kg), while retailed traders only bought the vaname shrimp under fewer amounts (> 60 kg), though buying it at the more expensive price without any other agencies involved. Marketing chain type IV was also rarely used as most shrimp farmers did not have any access to the large merchants, thus becoming an obstacle for shrimp farmers to trade their products to the wholesale traders.

The marketing margin is determined by the amount of the marketing cost that goes within the profit magnitude on each marketing agency involved in marketing activities on the market. Marketing profit is measured based on the reward magnitude of services obtained from costs incurred in vaname shrimp delivery products [20]. Marketing margins occurred in the marketing process of vaname shrimp in Turi District, Lamongan indicated that marketing chain type I and II were the long marketing chain types, because shrimp farmers needed to pass distributors first, before getting into the wholesale traders (marketing chain type I) or retailed traders (marketing chain type II), then into the consumer hands (Table 5).

Marketing margins on marketing chain type III showed the shortest marketing chain type because shrimp farmers only passed one intermediary trader (retailed traders), thus the margin amount was still relatively small (Table 5). [21] mentioned that longer marketing chain as the result of more marketing agencies involved would cause greater marketing margin, making the return cost which shrimp farmers received become extremely small and indicate inefficient marketing chain.

Marketing chain type III was also the most efficient marketing chain type among other marketing chains. This was because marketing chain type III had the largest farmer's share percentage value as the shortest marketing chain type, while Channel I was the lowest farmer's share percentage value as showing the longest marketing chain type (78.57%) (Table 5). The lowest percentage of farmer's share in marketing chain type I also resulted in a larger profit cost ratio of vaname shrimp post-harvest product among other marketing chain types (Table 5). This was the following [20], who stated that the greater the value of profit cost ratio the greater the profits.

Vaname shrimp marketing chain patterns in Turi district, Lamongan was inefficient based on some long marketing chains observed following [21]. This occurred because the marketing chain process of vaname shrimp products must pass through some intermediary traders before getting into the consumer hands. Long marketing chain also required greater costs and reduced vaname shrimp quality, thus greatly differing the producer and consumer cost. According to [22], marketing had to be efficient, when producers were capable of delivering the product for consumers with cheap costs and holding a fair share from the overall final consumer price paid to the side that participated in the production and marketing activities.

4. Conclusion

Vaname shrimp post-harvest marketing in Turi district, Lamongan had four marketing chain types involving shrimp farmers, shrimp farmers, wholesale traders, retailed traders, and factories. The most frequent marketing chain type used was marketing chain I (shrimp farmers – distributors – wholesale

traders – consumers). This study suggested that it was necessary to cut the marketing chain to make the profit cost ratio increase, resulting in high profit for the shrimp farmers.

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