Marketing Efficiency of the Climbing Perch (*Anabas testudineus*) Cultured with Bioflock System

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ABSTRACT

The present study aimed to investigate the marketing channels, marketing margin, and farmer's share of the climbing perch (*Anabas testudineus*) cultured with bioflock system. The fish were daily marketed in South and Central Kalimantan of Indonesia through two marketing channels i.e. the first channel: fish farmers→wholesalers→retailers→end consumers; and the second channel: fish farmers→institutional market→end consumers. The fish prices at fish farmers, wholesalers, and retailers were IDR 60,000, IDR 70,000, and IDR 77,667 per kg, respectively. In the first channel, the highest net profit was received by fish farmers (45%), followed by wholesalers (33%) and retailers (22%). While in the second channel, the restaurant earns profit (74%) almost 3 times higher than fish farmers (26%). The marketing margins of wholesalers, retailers,s and restaurants were 14%, 23%, and 50%, respectively. The current marketing system was considered efficient (farmer's share = 77.25%). Fish farming and culinary could be a promising business opportunity due to the high demand for this species.

INTRODUCTION

Indonesia is the world's largest archipelago state ,and nowadys it is the second largest global fish producer (**Suadi & Kusano, 2019**). The fishery sector contributes about 8% of national gross domestic product. More than 11 million people are working in this sector as fishermen (8.69%), fish farmers (35.06%), fish processors and fish marketers (55.84%), and salt farmers (0.41%) (**Suraya & Sulistyo, 2019**). Fish consumption increased from 47.34 kg to 50.69 kg per capita, as estimated in one year. Nowadays, perception of consumer preferences for consuming fish is highly appreciated (**Esilaba *et al*., 2017**). Fish consumption preferences are affected by individuals' socio-economic characteristics (**Can *et al*., 2015**). Consuming fish is very good for health as fish provides essential amino acid, calcium, phosphorus, iron, zinc, copper and vitamins (**Rahman *et al.,* 2012; Tilami & Sampels, 2017**). Fish contains 19.50% protein and 2.27% lipid (**Ahmed *et al*., 2012**).

In South Kalimantan province, climbing perch (*Anabas testudineus*) is locally known as "*Papuyu*", and favorably considered as one of the commercially important freshwater fish species **(Ahmadi, 2019)**. The fish are usually served as delicious food with high quality meat. The market demand for fish consumption continuously increase, meanwhile the market supply is still low in quantity. After all, freshwater fish marketing is a crucial moment of success for producers and traders to earn the profit since fish, being a highly perishable commodity, needs immediately processing or selling after harvest. It spoils soon after death due to microbial actions, which results in disagreeable taste, smell and texture thereby reducing consumer acceptability **(Garrow & James, 1994)**. Meanwhile the fish price fluctuates much depending on the season, the quantity and quality of fish, the type and size of fish, freshness, supply and demand, market structure, market distance, and also long-short marketing channels **(Aswathy & Abdu Samad, 2013; Ali *et al.*, 2014; Begum *et al.*, 2014)**. Nowadays, business transaction can be done through fish market, retail market, fishing port or even via internet order.

Numerous studies have been well-documented to describe the overview of freshwater and marine fish marketing including marketing system **(Husen, 2019)**, marketing channels **(Ali *et al.*, 2014; Rahman *et al.*, 2019)**, marketing management **(Sathiadhas & Kanagam, 2000)**, market intermediaries and marketing margins **(Hussain *et al.*, 2003)**, market integration **(Omar *et al.*, 2014)**, typical transportation system used **(Rokeya *et al.*, 1997)**, economic analysis of fresh fish marketing (**Ali *et al.*, 2008**), and marketing strategy **(Ahmed and Hossain, 2012)**. All fish marketed here are in the form of live fish, fresh fish, smoked and frozen fish sourced from capture fishery, aquaculture and fish processing. Basically the marketing system is the exchange activities associated with transferring property rights to commodities, physically purchasing and allocating resources, handling of products, disseminating information to participants and institutional arrangements for facilitating these activities **(Hossain *et al.*, 2015)**. In the present study, the marketing channels was investigated for the climbing perch (*Anabas testudineus*) held from bioflock system-based fish farming down to the end consumers, including farmer share and the profit gained at different levels of marketing. In addition, specific suggestions were provided to improve the marketing system in this area of study.

MATERIALS AND METHODS

1. Research Sites

The research activities started from the field survey to five fish farming sites in Banjarbaru, and then moved into six local fish markets located in Banjarbaru, Binuang, Rantau, Barabai, Pelaihari of South Kalimantan province, addingly Kapuas of Central Kalimantan, Indonesia (Fig. 1). These locations were purposively selected to exemplify the business prospect, marketing channels and distribution of the climbing perch at different levels.
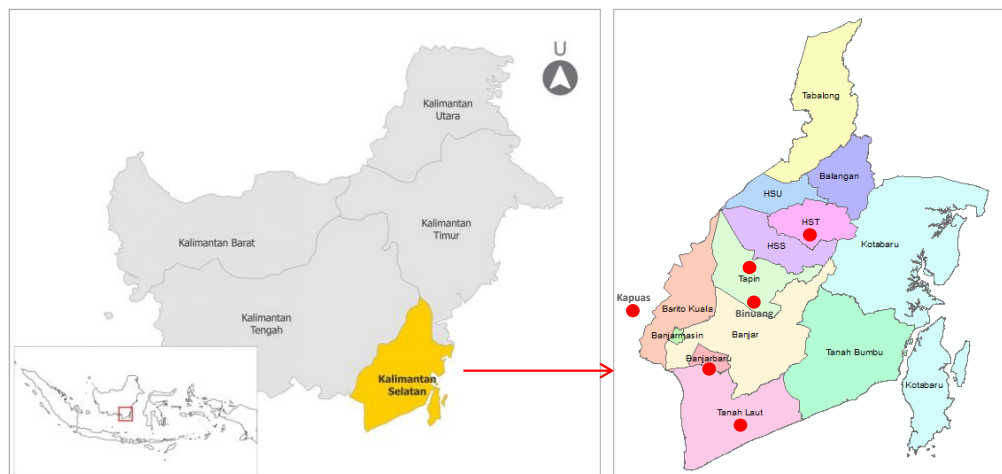
Fig. 1. The map showing the sampling areas for the climbing perch marketing

2. Characteristic of Respondents

A total of 22 respondents who directly involved in marketing channels were selected comprising 5 fish farmers, 2 fish collector traders and 15 retailers. The ages of respondents varied between 44-51 year olds with the duration of business of 2-4 years. The wholesalers and retailers were determined by the snowball sampling method. Snowball sampling is a purposeful method of sampling in qualitative research (**Naderifar et al., 2017**). The respondents were interviewed using the structured questionnaires. The deep interview was undertaken to get an overview and a reliable information on the existing fish distribution and marketing systems, marketing channels, and also the facing constraints.

3. Marketing Margin

Marketing margin is the difference between the price at the fish farmer level and the price at the end consumer level. It can simply be expressed with the following formula (**Flowra et al., 2012**):

$$MM = Pr - Pf$$

where: MM is marketing margin (IDR), Pr is the price at the end consumer (IDR) and Pf is the price at fish farmer (IDR). It can also be calculated using the following formula (**Rahman et al., 2012**):

$$\text{Marketing margin (\%)} = (\text{Selling price} - \text{Purchase price}) / \text{Selling price} \times 100$$

4. Farmer's Share

The farmer's share is the ratio of price received by the fish farmer to the price paid by the end consumer. It can be calculated using the formula of **Saravanapandeeswari and Vanitha (2017)**:

$$Fs = Fp / Cp \times 100$$

where: Fs is the farmer's share (%), Fp is the farmer's price (IDR/kg), and Cp is the consumer's price (IDR/kg). According to **Kohls and Downey (1985)**, if the portion of the price received by fish farmer is greater than 50%, then the marketing system can be considered efficient. The data were tabulated and analyzed using conventional statistical tools of MS Excel 2010, then presented in textual, charts and tabular forms.

RESULTS AND DISCUSSION

There was about 60-240 kg of fish harvested by individual fish farmer during 8 months of cultured period (Table 1). The sizes of fish varied between 120 and 300 mm total length, and between 35 and 125 g weight. The fish were typically harvested and sold on the same day. When the fish price was set at IDR 60,000 per kg, the fish farmers received about IDR 3,600,000 to 14,400,000. Of 720 kg of total fish, 672 kg (93.33%) was shared to the wholesalers and the rest 48 kg (6.67%) was given to the local restaurants. In the first channel, there were only two wholesalers, who collected the fish directly from fish farmers to the number of 162-510 kg to be distributed to 15 retailers (6-8 kg per day or 42-56 kg per week per individual). With the selling price of IDR 70,000 per kg, the wholesaler's revenue ranged from IDR 11,340,000 to IDR 35,700,000. At retail prices of IDR 75,000-80,000 per kg, each individual retailer receives income ranging from IDR 450,000 to IDR 640,000 per day depending on the quantity of fish sold out to the end consumers. Among variable cost, pellet and fish seed were the main purchase account to be borne by the fish farmers (30-41%). While for retailers and wholesalers, it counted for about 93-98% allocated for buying the fish.

Table 1. The volume and value of fish production at different marketing levels

Marketing level	n	Share of production (kg)			Price (IDR/kg)	Revenue (IDR)	
		Quantity	Average	Total		Average	Total
Fish farmers	5	60-240	144	720 [1]	60,000	8,640,000	43,200,000
Wholesalers	2	162-510	336	672	70,000	23,520,000	47,040,000
Retailers	15	42-56 [2]	44.8	672	77,667	3,479,482	52,192,224

[1] About 48 kg of total fish shared to the restaurant (second channel); [2] Weekly quota (in kg/wk)

The market demand for the climbing perch fish consumption reaches 900 kg per day, which is almost entirely sourced from the wild and only 30% produced from fish farming. In line with population growth and economy improvement, it is predicted that market need of the climbing perch, to meet fish consumption for the next 5 years, ranges from 1.5 to 2 tons per day. The biofloc technology in the aquaculture system had been successfully applied for some commercial fish and shrimp species such as the Nile tilapia (**Nahar** *et al.*, **2015**), African catfish (**Ekasari** *et al.*, **2016**), pink shrimp (**Emerenciano** *et al.*, **2013**), the pacific white shrimp (**Da Silva** *et al.*, **2013**), Japanese tiger prawn (**Zhao** *et al.*, **2012**), the green tiger shrimp (**Megahed, 2010**), Malaysian prawn (**Perez-Fuentes** *et al.*, **2013**), the giant tiger prawn (**Anand** *et al.*, **2014**) and most recently applied for the

climbing perch cultured in the ponds and business with a favorable prospect **(Izmaniar *et al*., 2018)**.

1. Marketing Channels

There were two marketing channels for bioflock system-based climbing perch cultured (Fig. 2). The first channel, four of five fish farmers sold out the fish to the wholesalers (80%), and then distributed to the 15 retailers and finally marketed to the end consumers. The second channel, one fish farmer sold out the fish through institutional market/the restaurant (20%) and then directly distributed to the end consumers. The basic reasons why most of fish farmers preferred the first channel are as follows: (1) fish farmers do not need to bear the transportation costs and other risks; (2) there are still many farmers who depend on fish traders to market their fish production. Moreover, the presence of fish traders provides convenience for fish farmers during the process of harvesting, payment, transportation and distribution; (3) each fish farmer usually has his own customer (fish trader) so that the sale transaction can work well; (4) fish traders also have the fixed customers (retailers) in some market areas so that the sales process can run quickly and timely. Furthermore, the retailers usually make the payment in cash; (5) there is a commitment and trust between fish farmers and fish traders, especially in terms of payments, which is usually done by fish traders after the fish have been sold out. Remarkably, a partner's reputation in the market has a strong positive impact on the trust-building process **(Kwon & Suh, 2004)**. Thus, success in business is determinable how the key players build a good market communication to generate a sustainable business.
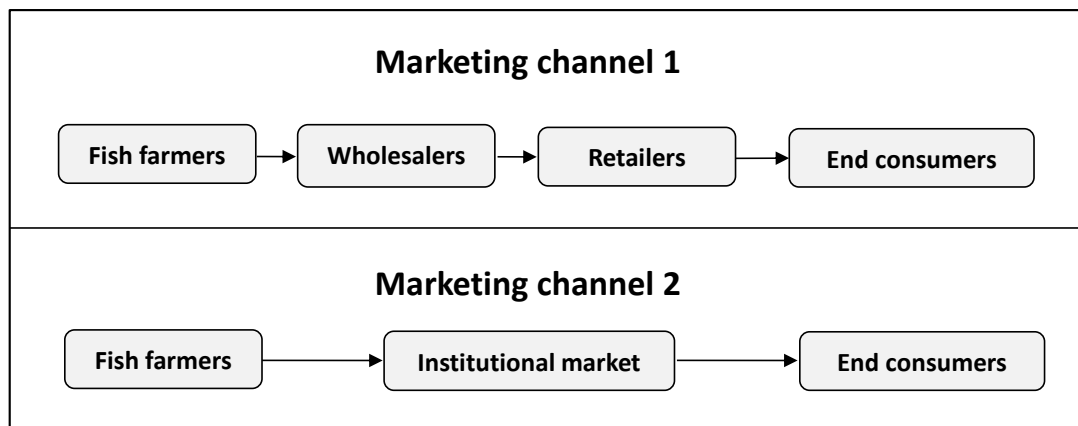

Fig. 2. Marketing channels of the climbing perch from fish farmers to end consumers

2. Marketing Margin

Marketing margin analysis was performed to see how big the role of market intermediaries as a link between fish farmers and final consumers in influencing the fish price. There was a variation in the fish prices at different marketing channels. The lowest fish price usually goes to the fish farmer level, and then increasingly at the wholesalers or

institutional market level and terminates in the retailer level that leads to variation in the marketing margin (Table 2). It was estimated that the fish farmers received the net margin of about 18% of the selling price for their fish production. According to **Huger and Hirenath (1984)**, the higher the value of marketing margin, the lower the efficiency of the marketing system becomes. **Rabby** *et al.* **(2015)** assumed that the producers and intermediaries could be more benefited financially, if efficient marketing was arranged properly. In wholesale market, marketing intermediaries usually perform important role by providing financial assistance, inputs and other marketing facilities to the farmers since their motive is also profit oriented **(Keno, 1994)**. Otherwise generally felt by the consumers is that they have to pay higher price due to the involvement of too many intermediaries in the marketing channels.

In the first channel, there was a difference in the price (IDR 17,666 per kg) between the price at fish farmers (IDR 60,000 per kg) and the average price at the end consumers (IDR 77,666 per kg). The percentages of marketing margin for the wholesalers to the fish farmers, the retailers to the fish famers and the retailers to the wholesalers were 14.29%, 22.75% and 9.78% respectively. It was clearly pointed out that the wholesalers had margin (IDR 10,000 per kg) greater than retailers (IDR 7.666 per kg), this was because: (1) they acted as the price maker in the marketing system since they have a good marketing intelligence; (2) they sold out the fish in large quantity in order to reduce the marketing cost; while (3) retailers sold out the fish in small quantity resulted in the marketing cost that was relatively high. At the same time, the amount of marketing costs paid by the wholesalers (IDR 2,050 per kg) was lower than that paid by retailers (IDR 2,456 per kg); this was because they do not need to pay for stall rental cost, market retribution or other relevant services. In the first channel, the highest net profit was received by fish farmers (45%), followed by wholesalers (33%) and retailers (22%). While in the second channel, the restaurant earn profit (74%), almost 3 times higher than fish farmers (26%), corresponding to marketing cost spent. It was calculated that the marketing margin of restaurant to fish farmer was 50% (see Table 2). The profit received by the wholesalers (IDR 7,950 per kg) was comparatively higher than that received by retailers (IDR 5,210 per kg). It means that the market intermediaries can be assumed efficient because they create the business much more profitable. **Aktar et al. (2013)** reported that, 80% of the fish retailers in Noakhali district of Bangladesh have improved their livelihood status through fish trading. **Omar** *et al.* **(2014)** suggested that efficient marketing system should be developed by reducing marketing cost and increasing marketing services to make the business more profitable. Moreover, the fish farmers should also follow standard scientific culture practices, and regularly access information on the fish prices **(Kumar** *et al.***, 2010)**.

Table 2. Market prices, marketing margin and farmer's share for the climbing perch at different levels of marketing channels

Marketing Level	Parameter Observed	Marketing Channel	
		1	2
Fish farmers			
	Production cost (IDR/kg)	49,225.52	49,225.52
	Selling price (IDR/kg)	60,000.00	60,000.00
	Marketing margin (IDR/kg)	10,774.48	10,774.48
	Marketing cost (IDR/kg)	-	-
	Profit (IDR/kg)	10,774.48	10,774.48
Wholesalers			
	Purchase price (IDR/kg)	60,000.00	
	Selling price (IDR/kg)	70,000.00	
	Marketing margin (IDR/kg)	10,000.00	
	Marketing cost (IDR/kg)	2,050.32	
	Profit (IDR/kg)	7,949.68	
	Margin of wholesaler to fish farmer (%)	14.29	
Retailers			
	Purchase price (IDR/kg)	70,000.00	
	Selling price (IDR/kg)	77,666.67	
	Marketing margin (IDR/kg)	7,666.67	
	Marketing cost (IDR/kg)	2,456.00	
	Profit (IDR/kg)	5,210.67	
	Margin of retailer to fish farmer (%)	22.75	
Restaurant (Institutional market)			
	Purchase price (IDR/kg)	-	60,000.00
	Selling price (IDR/kg)		120,000.00
	Marketing margin (IDR/kg)		60,000.00
	Marketing cost (IDR/kg)		29,000.00
	Profit (IDR/kg)		30,500.00
	Margin of restaurant to fish farmer (%)		50.00
Consumers			
	Purchase price (IDR/kg)	77,666.67	120,000.00
	Total margin (IDR/kg)	28,441.15	10,774.48
	Total marketing cost (IDR/kg)	4,506.32	29,000.00
	Total profit (IDR/kg)	23,934.82	41,274.48
	Farmer's share → efficient (Fs > 50%)	77.25	50.00

3. Farmer's Share

The selling price of fish at fish farmers was IDR 60,000 per kg, while the price at retailer level fell between IDR 75,000 to IDR 80,000 per kg or IDR 77,666 per kg in average. The price portion received by the fish farmers recorded values with ranges 75-80% or about 77.25% of the price paid by the end consumers (Table 2). This, in return,

was found higher than 50%, indicating that fish marketing system was considered efficient **(Kohls & Downey, 1985)**. Compared to other single-species from different geographical areas, the percentage of farmer's share obtained in the present study was equal to the trout marketing in Kohgiloye and Boyer Ahmad province of Iran **(Shahi *et al*., 2012)**, but it was higher than European anchovy (54%) or Atlantic horse mackerel (60%) traded in Trabzon province **(Dağtekin, 2010)**.

The great portion of the price received by fish farmers was closely related to the marketing system itself that has been formed between them and wholesalers. This was due to some reasons: (1) fish farmers willing to get greater profits with zero risk; (2) since fish farmers have a limited fish production, it was better to sell out the fish directly to the wholesalers rather than the retail market. In addition, (3) fish farmers have also the bargaining power to determine a reasonable price based on the quality and size of fish because they also knew well about the market price of this species being an important food fish. Such bargaining interaction was also shown by both the aquafarmer's association in Thambikottai village of Tiruvarur district and fishermen associations in Kombuthurai, Tamil Nadu of India **(Kumar *et al*., 2010)**. Market information is needed by the fish farmers as a part of market transparency and also as a reference for arranging a competitive pricing strategy. In this regard, there was a good lesson learned from aquachoupals model in Andhra Pradesh of India that provides access to prices on a daily basis, in which the farmers are able to take critical decisions on when and where to sell their productions **(Kumar *et al*., 2010)**. A tangible deliverable maketing system was also demonstrated by Ghana's farmers who received significantly higher prices for their productions after using mobile phone-based marketing information services (MIS) program. This shows how information affects a farmer's decision to sell at the farmgate rather than at the market **(Courtois & Subervie, 2014)**. In the present study, the retailers had more bargaining power as they sold out the fish to consumers that they purchased from wholesalers, because the bargaining power between retailers and wholesalers is almost equal, as well as the bargaining power between fish farmers and wholesalers. Dealing with the purchase ability of the party, most of wholesalers and retailers use their own capital to do business. It was similarly reported by **Jamali *et al*.** (**2013**) that, about 70% retailers in Gopalpur Upazila of Tangail district used their own money for fish trading.

4.   *Constraint and Solution*

At the fish farmer level, some constraints are encountered that are crucial to success such as; the availability of superior fish seeds, electrical supply and the limited capital for fish production. For the wholesalers, it takes time to collect the harvested fish since the fish farming sites are scattered. Moreover, asynchronous fish harvested by individual fish farmer result in high cost of fish marketing. While for the retailers, the quantity of fish which is shared by the wholesalers does not correspond with the retailer's demand,

because the supply of fish obtained from the fish farmers is still lacking. Occasionally, if there is more demand of fish among the retailers, the wholesalers prefer to deliver the fish to a location close to fish farming to reduce marketing costs. Specific suggestions to improve the current marketing systems should incorporate: the certified fish hatchery to produce superior seeds, improvement of bioflock technology for small scale fish farming to increase fish production, introduction of modern wholesaling and retailing facilities, the strengthening of institutional marketing, and promotion of mobile phone-based marketing information services to find out the global and local market transparency. In the long term, it is necessary for interested parties to form the cooperative society with legal entity. In this context, the defined role of the cooperative society would support fish marketing system as a whole **(Rabby *et al*., 2015)**.

CONCLUSION

It can be concluded that the fish marketing channel through market intermediaries was less efficient than through institutional market. The highest net profit per kg was received by the fish farmers followed by the wholesalers and retailers. The marketing margin of institutional market was 2-3 times higher than that of wholesalers and retailers. The current marketing system is considered efficient. It is a great challenge to increase fish production since the prospect of culinary business is open. Notably, the present study provides the first reference on the bioflock system-based fish marketing of the climbing perch in the investigated areas.

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