

Marketing system of striped catfish (*Pangasius hypophthalmus*) from freshwater cultivation in Banjar Regency, South Kalimantan Province, Indonesia

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Abstract. This study aims to characterize the market of striped catfish (*Pangasius hypophthalmus*) from freshwater cultivation in Banjar Regency, South Kalimantan Province. The data used are primary data obtained from fish farmers, wholesalers, and retailers. They refer to the production size of fish farmers, marketing cost, farmer's price (IDR), and retail price (IDR). Data were collected through observation and interviews. Secondary data included research map area, books, journal articles, and various websites related to the study objective. The sampling method for fish farmers was simple random sampling and for the marketing agencies was snowball sampling. Data analyses included (a) marketing channel analysis, (b) farmer's share analysis, and (c) marketing margin analysis. The results of the analysis show that (a) there are three types of marketing channels, namely, (1) fish farmers sell their fish to the wholesalers who sell it to retailers; (2) fish farmers sell their fish to retailers; and (3) fish farmers sell their fish to the institutional market which sells it to consumers; (b) farmer's share value for the first and second channel is 69%, for the it is 69%, and for the third channel the value is 57%, (c) the value of marketing margin for the first channel is IDR 5,000 (wholesaler) and IDR 4,000 (retailers), for the second channel of IDR 9,000 (retailers), and for the third channel of IDR 15,000 (institutional market).

Key Words: fish farmer, farmer's share, marketing agencies, marketing channel, marketing margin, striped catfish.

Introduction. The Indonesian fisheries sector has a Maximum Sustainable Yield of around 67 million tons/year, consisting of capture fisheries of 10.2 million tons/year, including (a) marine fisheries of 9.3 million tons/year and (b) capture fisheries in inland waters (lakes, rivers, reservoirs, and swamps) about 0.9 million tons/year. The remaining 56.8 million tons/year is aquaculture potential, including Maria culture, brackish and freshwater aquaculture. The economic potential in the fisheries sector is estimated at US\$ 82 billion per year and contributes about 8% of the national gross domestic product. More than 12 million people are working in this sector as fish farmers (35.06%), fishermen (8.69%), salt farmers (0.41%), and fish marketers and fish processors (55.84%) (Suraya & Sulisty 2019).

The demand for fishery products continues to increase in line with population growth and public awareness to consume fish because of its high nutritional value with several ingredients such as calcium, phosphorus, iron, zinc, copper, and vitamins (Rahman et al 2012; Tilami & Samples 2017). One alternative to fulfilling public consumption of fish can be increased by developing aquaculture products such as fish rearing (Sampantamit et al 2020). An increase of production in the cultivation sector is an important component because it is related to its role in supporting food supplies (Ranjan 2020), able to increase income (Hanafiah & Saefuddin 1986), and bring in state revenue from exports (Anindita & Baladina 2017).

Due to the increasing demand for fish, fish farming in Indonesia, especially South Kalimantan, is growing rapidly. Striped catfish is a popular freshwater fish that can be easily farmed in marginal conditions (Aisiah et al 2020). Striped catfish has a high opportunity to be marketed because its delicious taste (Nurhabib 2017), there are a lot of

processed fishery products made from striped catfish such as meatballs, nuggets, dumplings, sempol (Oktavianawati & Palupi 2017), and the price is can compete with the prices of other freshwater fish such as climbing perch (*Anabas testudineus*), snakehead fish (*Channa striata*), tilapia (*Oreochromis niloticus*) and goldfish (*Cyprinus carpio*) (Hayandani 2013). The price of striped catfish is the main attraction for fish farmers and traders to sell fish to main markets in South Kalimantan (Subekti 2020). The price of fish in one market affects the price of fish in other markets, while price changes are influenced by the accuracy of the delivery of fishery products from producers to consumers considering the perishable nature of fishery products (Madugu & Edward 2011) and needs prompt processing or selling after harvest (Maulu et al 2020).

The right marketing system can support the formation of price closeness between markets (Adenegan 2010) and can be used as a policy determination for efficient fisheries market development (Eltholth et al 2015). The research literature is well documented to describe an overview of the commercialization of marine and freshwater fish, including market efficiency (Lekshmi 2021), marketing channel (Madugu & Edward 2011; Nahumury & Manuhuttu 2019), marketing margin (Omar et al 2014; Lilimantik 2020), farmer's share (Hussain et al 2003; Ahmed & Hossain 2012) and typical transportation system used (Rokeya et al 1997). All fish marketed include fresh fish, frozen fish, and smoked fish originating from the catch, aquaculture, and processing industries. The Marketing of fishery products, especially in small-scale fisheries, often has not reached the ideal conditions. This happens because fish farmers are concentrated in certain locations while consumers are spread throughout the region, causing problems in their marketing channels because many marketing institutions are involved (Lekshmi et al 2020). Then there is the mastery of marketing channels by several fishery actors. This is in line with Ayyappan et al (2009) research that marketing institutions play a very important role in the fish marketing system. Another problem that often arises in the fishery commodity marketing system is the existence of fish marketing margins that are not well distributed in marketing institutions, causing prices to be relatively high (Kumar et al 2010). In this context, efforts are needed to study the fish marketing system in an area and are expected to provide up-to-date information in determining marketing policies. This paper aims to find out the striped catfish marketing system by looking at the marketing channel, farmer's share, and marketing margin from cultivation system-based fish farming to the consumers.

Material and Method

Description of the study sites. The research location in Banjar District, South Kalimantan Province in 2020, started from a field survey to 34 fish farming sites in Banjar Regency and then moved into local fish markets located in Banjar, Banjarmasin, Barito Kuala, Tapin, Hulu Sungai Tengah (HST) and Tanah Laut of South Kalimantan Province (Figure 1).

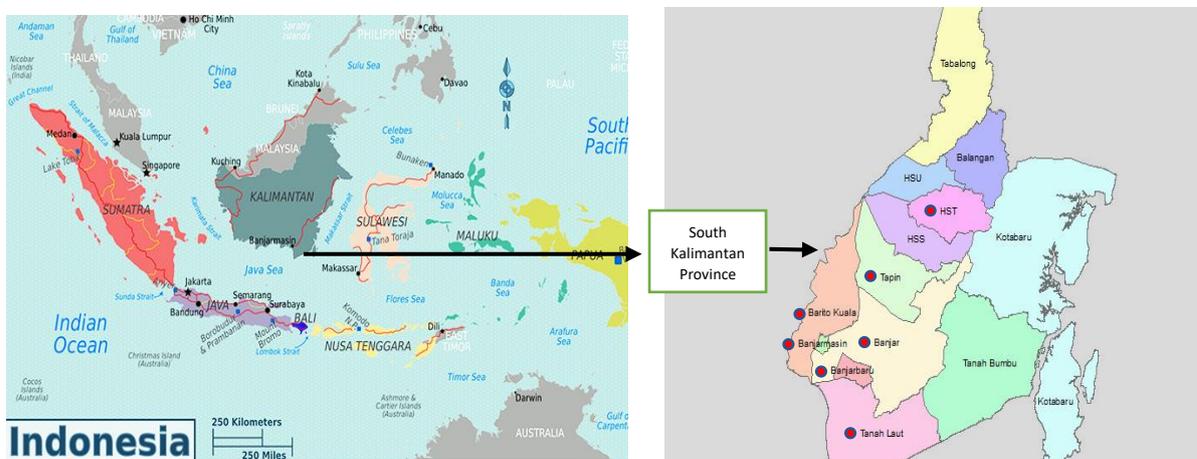


Figure 1. The map of the sampling sites for fish marketing of striped catfish in Banjar Regency, South Kalimantan Province, Indonesia (Simtaru 2020).

These locations were purposely selected to illustrate the marketing and distribution channels for striped catfish at different levels. The fish market generally opens early in the morning and then closes in the middle of the afternoon. These fish markets are often connected to wet markets that also sell fresh meat, dried fish, and other perishable items such as vegetables and fruits (Lilimantik & Ahmadi 2020; Buton et al 2017). The fish retailers are mostly women, and the fish market selling activities start in the morning and continue into the afternoon or evening (Ahmadi et al 2021).

Respondents' characteristics and data collection method. A total of 65 respondents who participated directly in the marketing channels were selected, including 34 fish farmers (out of the total population of 330 fish farmers at the study site), eight wholesalers, 20 retailers, and three institutional markets (local restaurants). The age of respondents varied between 35-50 years old and the duration of business experience was between 3 and 6 years. The fish farmer sample was selected through simple random sampling method through the following steps. The first step was to obtain from the Marine and Fisheries Office of Banjar Regency, South Kalimantan Province, a list with villages specialized in striped catfish cultivation. The list contained nine villages (Karang Intan, Pandak Daun, Jingah Habang Ulu, Jingah Habang Ilir, Pandak Daun, Sungai Alang, Mandiangin Barat, Mandiangin Timur, Mali-mali) with 351 striped catfish fish farmers (2020 data). The second step was to make an interview with the head of each village to confirm the number of fish farmers. This resulted in an adjusted number of 330 fish farmers. In the third step, a sample of 34 persons (10% of the total population) was created by selecting at random 3-4 people in each village from the list of fish farmers corresponding to each village. In the fourth step, an appointment for the interviews with these fish farmers was established with the help of the village head and, finally, the interview was done to collect study data.

The sampling of marketing agencies (i.e. wholesalers, retailers) adopted the snowball sampling method, a method of identification, selection, and sampling in a continuous network or chain of relationships (Dragan & Maniu 2013). A small sample is selected at the beginning, then the sample selects its peers for sampling, and so on, until the number of individuals who participate is the one desired by the researcher (Nurdiani 2013).

Data collection is done through observation and interview methods. The observation method directly collects data from the field for the success and accuracy of the research results (Hasanah 2016). The interview method is an event or process in which the interviewer and the interviewee interact through direct communication (Ryan et al 2016). There are two interview methods: the structured interview in which the interviewer prepares to interview with the interviewee and the unstructured interview. The interviewer does not prepare a list of questions but conducts questions spontaneously (Corbin & Morse 2003). The documentation method is used to obtain data through facts stored in the form of letters, diaries, photo archives, meeting results, souvenirs, activity journals and so on (Bowen 2009).

The data used are primary and secondary data. Primary data is data obtained directly from the first source by using measurement tools or data collection tools directly on the subject as the source of information sought (Ramallal 2018). The primary data in this study are fish farmer, wholesaler, retailer, production of the fish farmer, marketing cost, farmer's price (IDR), and retail price (IDR). Secondary data is not obtained directly by researchers, for example, the research must go through other people or search through documents (Wickham 2019). Secondary data is obtained through books, government publications, internal organization records, reports, journals, to various sites related to the information being sought (Martins et al 2018). Secondary data in this study include maps of the research area, books, journals, and various sites related to the information being sought. Generally, these two data are combined to complement each other and assist researchers in observing any existing phenomenon (Rabinovich & Cheon 2011).

Data Analysis Method. There are three ways to analyze the Marketing system of striped catfish from freshwater cultivation in Banjar district, South Kalimantan Province, Indonesia, and they are presented in the following paragraphs.

(a) Marketing Channel Analysis. The marketing channel of striped catfish in Banjar Regency, South Kalimantan Province was analyzed using a quantitative descriptive method. It analyzed every marketing agency involved and the marketing channels through which it went from a fish farmer to the consumers (Parmar 2018).

(b) Farmer's Share Analysis. Farmer's Share is a comparison of the price received by the farmer with the price at the retailer level expressed as a percentage, formulated as follows (Harviyantho et al 2021):

$$Fs = \frac{Pf}{Pr} \times 100\%$$

Where: Fs is the farmer's share (%), Pf is the farmer's price (IDR/kg), and Pr is the consumer's price (IDR/kg). According to Saravanapandeeswari and Vanitha (2017), if farmers receive more than 50% of the price, the marketing system can be considered efficient.

(c) Marketing Margin Analysis. Marketing margin is the difference between the price at the fish farmer level and the price at the retail level. It can simply be expressed with the following formula (Madugu & Edward 2011):

$$MM = Pr - Pf$$

Whereas:

MM is marketing margin (IDR),

Pr is price retail (IDR),

Pf is the price at fish farmer (IDR).

It can also be calculated using the following formula (Monica et al 2018):

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

Results and Discussion. The cultivation of striped catfish in the rearing category is usually carried out when the striped catfish fry weighs 8-12 grams/head, and after 6-8 months, it can reach 700 grams/head – 1 kg/head (Aisiah 2020). In this study, the harvesting of striped catfish per period ranges from 6-8 months with the size of the fish harvested varies between 0.5-1 kg/head, has a length of 35-40 cm with a total production of 60 tons per period (Table 1). Usually, in one rearing pond, harvests are carried out simultaneously and sold on the same day to avoid deterioration of fish quality. Of the 60 tons of total fish harvested, 49.2 tons (82%) were sold to wholesalers, 7.2 tons (12%) were sold to retailers, and 3.6 tons (6%) were given to the institutional market (local restaurants). In pricing, usually, fish farmers will calculate in advance the amount of production costs and the estimated profit they will get, while in marketing agencies, including wholesalers, retailers, and institutional markets, what is calculated is marketing costs and the estimated profit they will get. Once the price is set, the fish are ready to be distributed on-demand. There are around 1 - 3 tons of fish harvested by each fish farmer, and the price of fish at the fish farmers' level is set at IDR 20,000 per kg. Fish farmers will receive a payment of IDR 20,000,000 to IDR 60,000,000 per harvest period. There are eight wholesalers who buy fish directly from fish farmers with amounts ranging from 15 to 34.2 tons, which are then distributed to retailers. The selling price at the wholesaler level is set at IDR 25,000 per kg, and they accept payments ranging from IDR 375,000,000 to IDR 885,000,000 per harvest period. There are 20 retailers involved in the marketing process with an average purchase of 360 kg per person. At retail prices, the price is set at IDR 29,000 per kg, and they receive a payment of IDR 10,440,000 per harvest period. The institutional market in this study consists of three local restaurants, whose business locations are close to producers with an average purchase of 1.2 tons per business. At the institutional market, the price is set at IDR 35,000 per kg, and they receive a payment of IDR 42,000,000 per harvest period.

Table 1

The volume and value of striped catfish at different marketing levels per period harvest

Level of marketing	Sample	Share of production (ton)		Price (IDR/kg)	Revenue (IDR)	
		Average	Quantity		Average	Total
Fish farmers	34	1,76	60,0	20.000	35.200.000	1.200.000.000
Wholesalers	8	6,15	49,2	25.000	153.750.000	1.230.000.000
Retailers	20	0,36	7,2	29.000	10.440.000	208.800.000
Institutional market	3	1.2	3,6	35.000	42.000.000	126.000.000

Source: Data collected by authors through interviews, 2021.

Marketing channel. Post-harvest activities generally include loading and unloading harvested produce, transportation, and marketing (Yıldırım & Akyol 2012). Fish farmers often use marketing agencies as their distributors (Kakati et al 2017). Prices will usually not be the same in each distribution channel because several channels are used before fish reaches consumers (Septiara et al 2012). The right marketing will affect the income of fish farmers and marketing agencies. There are three patterns of marketing channels for aquacultured striped catfish in Banjar Regency, South Kalimantan Province (Figure 2).

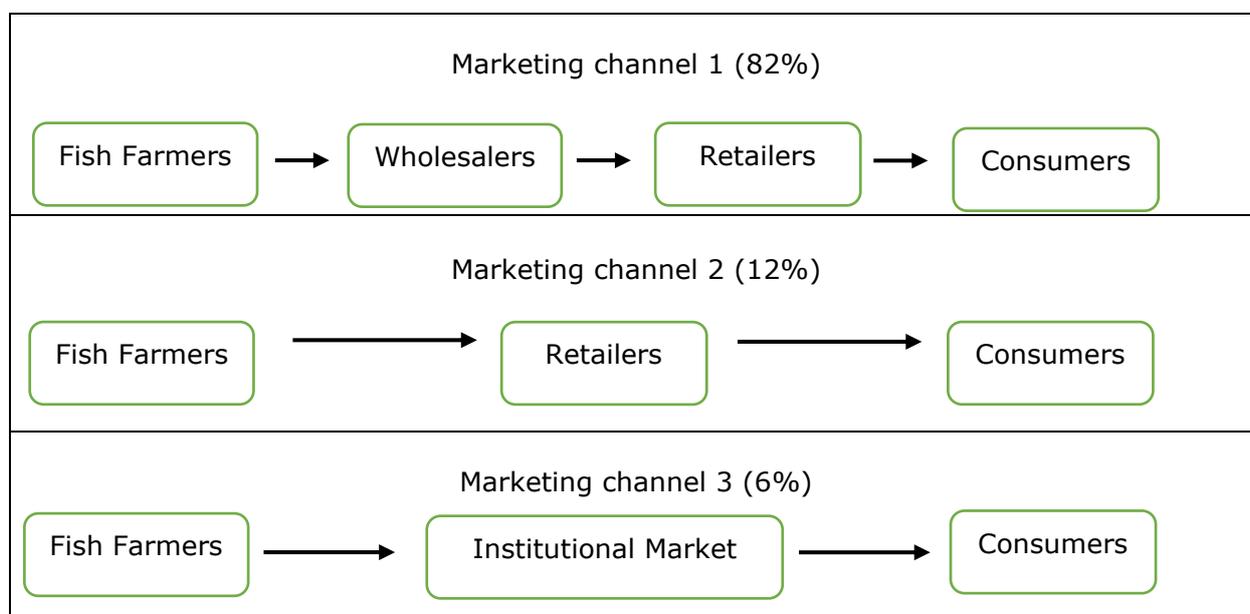


Figure 2. Marketing channels of striped catfish from fish farmers to consumers.

Source: Data collected by authors through interviews, 2021.

The first channel was composed of 28 fish farmers (82% of the fish farmers sample that had 34 persons) who sold the fish to the eight wholesalers, who, at their turn, distributed it to the 16 retailers, who finally marketed it to the consumers. The second channel was composed of four fish farmers (12% of the fish farmers sample) who sold the fish to the four retailers for distribution to consumers. The third channel was formed of two fish farmers (6%) who sold the fish to the institutional market (in this study, the institutional market referred to restaurants) where the fish was processed and sold to consumers. The most used pattern is channel 2 and has the following characteristics: (a) Fish farmer has no risk because the harvested fish are sold out; (b) fish farmer does not incur marketing costs because wholesalers usually come directly to the farm location to buy fish and then all the fish is redistributed to subsequent buyers upon request (Rokeya et al 1997); (c) fish farmers have agreements with wholesalers, especially in terms of payments (Rahman et al 2019). Wholesalers usually make payments in cash or depending on a mutually agreed agreement between fish farmers and

wholesalers (Sathiadhas & Panikkar 1992); and (d) wholesalers also cooperate with retailers so that fish is directly distributed to several market areas (Flowra et al 2012).

Farmer's share. Farmer's share analysis is a comparison of the price received by producers with the price paid by the final consumer (Subekti 2020). It is usually expressed as a percentage (%) (Kinnucan & Forker 1987). The higher the value of the farmer's share, the higher the share of the price received by the fish farmer (Sathiadhas & Panikkar 1992). The value of the farmer's share of striped catfish can be seen in Table 2.

Table 2

Share of the price received by the fish farmers

No.	Channel	The average price at fish farmers (IDR/kg)	The average price at consumers (IDR/kg)	Farmer's share (%)
1.	Channel 1	20.000	29.000	69
2.	Channel 2	20.000	29.000	69
3.	Channel 3	20.000	35.000	57

Source: Data collected by authors through interviews, 2021.

The value of farmer's share was 69% for channel 1 and 2, and 57% for channel 3 (Table 3), and the overall value was greater than 50%. From the fish farmer's perspective, this value indicates an efficient marketing system (Saravanapandeeswari & Vanitha 2017). The share of the price received by fish farmers is closely related to the marketing system that has been established between fish farmers and marketing agencies (Hanafiah & Saefuddin 1986). Fish farmers have a good bargaining position with marketing agencies in determining reasonable prices based on the size and quality of fish (Ahmadi et al 2021). They want to get bigger profits share of the price without any risks, such as the risk of deterioration of the fish because it is a perishable product and the risk to have unsold fish (Shahi et al 2012). The amount of farmer's share received by the fish farmer will affect the amount of production produced (Agbekporku et al 2019), if the share of the price received is sufficient. If the income share in selling price is high, then the income of fish farmers will increase, and this can encourage them to produce more (Hapsari 2014).

Marketing Margin. Marketing margin shows the magnitude of the role of marketing agencies (i.e., wholesalers, retailers) in a fishery market (Kaygisiz & Eken 2018). The difference in the marketing margin obtained will affect the price of fish at the consumer level (Ahmadi et al 2021). The price at the fish farmer level is the lowest price in the fishery product market system; then it increases at the marketing agency level because of the marketing costs incurred (Kartikasari 2010). The retail price is the highest price because consumers pay two types of price, namely the product price and the marketing price (Albari & Safitri 2013).

Striped catfish distribution from fish farmers to customers involves three marketing agencies, namely wholesalers, retailers, and institutional markets, and three marketing channels (Table 3). In the first channel, there is a difference in price at fish farmer (IDR 20,000 per kg) and retail price (IDR 29,000 per kg) of IDR 9,000 per kg, which is called margin. Margin share at wholesalers is 55% (IDR 5,000 per kg), and margin share at retailers is 45% (IDR 4,000 per kg). The high share margin at wholesalers is due to the marketing costs incurred by wholesalers (IDR 2,200 per kg), such as transportation costs, shrinkage, employee fees, and other expenses are greater than the marketing costs incurred by retailers (IDR 1,400 per kg) such as store rental costs, taxes, plastic wrapping, and other expenses. Furthermore, the profit obtained by the wholesaler is also greater (IDR 2,800 per kg) when compared to the profit for the retailer (IDR 2,600 per kg) because although the marketing cost is higher, the wholesaler sells fish in a larger volume than the retailer. The large volume of fish sold by wholesalers is due to the close cooperation between several fish farmers and wholesalers and their good relationship with retailers (Kumar et al 2010).

In the second channel, the price difference between fish farmers and retailers is the same as the price difference in the first channel (IDR 9,000 per kg), but because there is only one marketing agency involved, the margin share at a retailer is high. In this channel,

retailers directly buy fish from farmers so that the marketing costs incurred are relatively high (IDR 3,300 per kg), including transportation costs, transportation costs, rent costs, taxes, fish packaging costs, et al. As for the profit, it is also greater (IDR 5,700 per kg) because retailers directly sell fish to final consumers according to the prices prevailing in the market. In three channels, the price difference between the fish farmer (IDR 20,000 per kg) and the institutional market (IDR 35,000 per kg) is equal to (IDR 15,000 per kg). The high price difference is due to the institutional market (local restaurant) also buying fish directly from fish farmers for processing and selling them to final consumers in the form of ready-to-eat food. The marketing cost at the institutional market (IDR 6,500 per kg) is also higher when compared to channels 1 and 2, because in addition to transportation costs, transportation costs, they also pay for space rent, employee wages, user fees, cleaning costs, security costs, packaging costs and other costs such as the provision of cooking spices et al. The profit obtained by the institutional market (IDR 8,500 per kg) was comparatively higher than the profit obtained by wholesalers (IDR 2,800 per kg) and retailers (IDR 2,600 per kg) in channel 1 and obtained by retailers (IDR 5,700 per kg) in channel 2. This means that market intermediaries can be considered efficient because they run more profitable businesses.

In a study by Kaygisiz & Eken (2018), the share of total marketing expenses in marketing channels ranged from 38.48% to 55.11%. It can be seen that the share of the cost of shipping fish to Istanbul consumers is high. The commercial benefit has been investigated in other studies in the field of the fish market (Hussain et al 2003; Ali et al 2008; Kaygisiz & Eken 2018).

Table 3
Marketing margin of striped catfish at different levels of marketing channels

Marketing Level	Observed Parameter	Marketing Channel					
		Channel 1		Channel 2		Channel 3	
		Value (IDR/Kg)	Margin share (%)	Value (IDR/Kg)	Margin share (%)	Value (IDR/Kg)	Margin share (%)
Fish farmers							
	Production cost	14.000		14.000		14.000	
	Selling price	20.000		20.000		20.000	
	Marketing cost	-		-		-	
	Profit	6.000		6.000		6.000	
Wholesalers							
	Purchase price	20.000					
	Selling price	25.000					
	Marketing cost	2.200	24				
	Profit	2.800	31				
	Marketing margin	5.000					
Retailers							
	Purchase price	25.000		20.000			
	Selling price	29.000		29.000			
	Marketing cost	1.400	16	3.300	37		
	Profit	2.600	29	5.700	63		
	Marketing margin	4.000		9.000			
Institutional market							
	Purchase price					20.000	
	Selling price					35.000	
	Marketing cost					6.500	43
	Profit					8.500	57
	Marketing margin					15.000	
Consumers							
	Purchase price	29.000		29.000		35.000	
	Total marketing margin	9.000	100	9.000	100	15.000	100

Source: Data collected by authors through interviews, 2021.

Conclusions. Striped catfish distribution from fish farmers to customers involves three marketing agencies (wholesalers, retailers, and institutional markets) and three marketing channels. The institutional market received the highest net profit per kg, followed by fish farmers, wholesalers, and retailers. The marketing system at the fish farmer level is efficient because, in all marketing channels, the value of the farmer's share is greater than 50%. In contrast, the striped catfish marketing channel through the institutional market is more efficient than through intermediary traders because the marketing margin of the institutional market is 2-3 times higher than that of the institutional market compared to wholesalers and retailers. The current marketing system is considered efficient. With the opening up of the culinary business prospects, increasing fish production is a considerable challenge. In particular, this study references the commercialization of striped catfish in fish farming systems in the study area.

Acknowledgements. The authors would like to thank the Dean of the Faculty of Fisheries and Staff of the Fisheries Socio-Economic Study Program for their support, fish farmers, and marketing agencies involved in the research. The authors also thank all colleagues who advised how to write this paper.

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Received: 02 September 2021. Accepted: 20 October 2021. Published online: 23 October 2021.

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How to cite this article:

Lilimantik E., 2021 Marketing system of striped catfish (*Pangasius hypophthalmus*) from freshwater cultivation in Banjar Regency, South Kalimantan Province, Indonesia. AACL Bioflux 14(5):2947-2957.