

SUPPLY CHAIN ANALYSIS OF GUPPY FISH (*Poecilia reticulata*) CASE STUDY AT MAESTRO ORNAMENTAL FISH GROUP (CIBIRU SUBDISTRICT, BANDUNG WEST JAVA)

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ABSTRACT

Fresh water ornamental fish sub-sector is one of the most potential sub-sectors of Fisheries in Indonesia. As one of the Biggest City in Indonesia, Bandung was statistically improving ornamental fish production in each year. This research aim is to analyze the supply chain of guppy fish (*Poecilia reticulata*) in Bandung in terms of product flow, information flow, also marketing efficiency of each chain that is involved in the supply chain. This research was conducted out in April – September 2020 in Maestro Ornamental Fish Group, Cilengkrang Street, Cibiru District, Bandung City, West Java Province. The research method that used was descriptive qualitative and quantitative using primary and secondary data which was sampled using snowball sampling methods. Product flow and information flow is gained through interviews with the respondents then analyzed descriptively, whereas the marketing efficiency is processed quantitatively in terms of marketing margin, farmer's share, and Revenue and Cost (R/C) ratio. The result of this study showed that the process of the product flow of guppy fish in Bandung are involving few parties which is the farmer, wholesaler, small traders, and end consumers. Each of these parties were well informed and sharing the market knowledge and information such as market price information to each other respectively. The distribution channel of guppy is divided into 3 types of marketing chains in terms of marketing agencies' involvement. The most efficient marketing chain is Chain I whereas the marketing margin value is 0 and the farmer's share value is 100% because Chain I was Direct Marketing Channel that only involves the farmer/producer and the end consumer.

Keyword: Guppy, Supply Chain, Marketing Efficiency, marketing chain

1. INTRODUCTION

The potential of ornamental fish is utilized by farmers and producers in conducting freshwater ornamental fish aquaculture business. These ornamental fish farmers prefer ornamental fish because culturing ornamental fish can provide same economic value compared to consumption fish culture even though it is only done in a narrow area [1]. Geographically, Bandung is in a highland area far from the sea, therefore the freshwater aquaculture sector is the main choice for aquaculture. One of them is ornamental fish. however, ornamental fish business activities are inseparable from several problems that result in inefficiency in the marketing system [2]. In the process of ornamental fish business activities, the actors certainly carry the postproduction process which includes supply chain to describes differences of each marketing channels. The supply chain for guppy fish (*Poecilia reticulata*) is generally the same as the supply chain for other commodities where the supply chain consists of all parties, either directly or indirectly involved in meeting consumer demand. A supply chain includes not only producers and suppliers, but also aspects such as transportation, warehouses, retailers and even the consumers themselves. The supply chain more emphasis on all activities in fulfilling consumer needs in

which there is a flow and transformation of goods from raw materials to end consumers and is accompanied by the flow of information and money [3]. The supply chain of guppy fish in practice cannot be separated from the various problems that occur between existing marketing agencies, and these problems can certainly become an obstacle in product procurement and the ultimate effect is that product cannot meet consumer demand. The supply chain for aquaculture, including ornamental fish, especially guppy fish (*Poecilia reticulata*), is important to know clearly because it is a network of various organizations that have the same goal, namely the best possible procurement or distribution of goods [4]. The problems that are often found in the supply chain system of ornamental fish are present due to limitations in existing facilities and infrastructure, this causes procurement activities to be less than optimal. To build an efficient supply chain pattern, it is necessary to know the marketing patterns in a supply chain. Good supply chain management can maintain its existence in an ornamental fish farming business. The existence of linkages between marketing agencies in the fish supply chain can cause losses or stop business activities.

2. METHODOLOGY

This research was conducted in Maestro Ornamental Fish Group, an organisation of ornamental fish cultivators in Cibiru Village, Bandung City, West Java Province. This research was carried out from April – September 2020. Data collection and retrieval of information related to the research activities were carried out by observation and interviews with the marketing agencies.

2.1 Research Method

The research method used in this research is a case study with the case unit at Maestro Ornamental Fish Group in Bandung. According to Nazir, a case study is a research on the status of research regarding a specific or specific phase of the whole personality. The aim is to provide a detailed description of the background, traits, and clear character traits of the case or individual status, which then make these distinctive characteristics a general matter [5].

2.2 Data Sources and Types

Sources of data in this study using primary and secondary data. Primary data is obtained directly from the field by interviewing respondents who are interviewed, while secondary data comes literature sourced from related agencies. There are two types of data used, namely qualitative data and quantitative data. Qualitative data is descriptive data in the form of spoken or written words from humans about observed human behaviour, while quantitative data is data in the form of values or numbers presented in a concise form [6].

2.3 Data Retrieval Method

The sampling technique in this study was carried out using the snowball sampling method. Snowball sampling is a sample determination technique which at first is small, then gets bigger [7]. In the process of determining the sample, the researcher made the producer the main key in determining the next respondent in a chain. Such as wholesalers, retailers, to consumers. The criteria used to select respondents in the study are as follows:

- Producer respondents who are part of the Maestro Ornamental Fish Group.
- Guppy fish retailer on the recommendation of the producer.
- Guppy fish wholesaler on the recommendation of the producer.
- End consumers on the recommendation either by the producers, retailers, or wholesalers.

2.4 Data Analysis

The supply chain analysis of guppy fish (*Poecilia reticulata*) was directly observed by looking at the supply chain patterns that occurred in Cibiru Subdistrict, Bandung City and analyzed descriptively qualitatively looking at aspects of the mapping of actors and processes to know the characteristics of supply chain actors and to know the stages in the supply chain of guppy fish starting from providing input to distribution of guppy fish. Product flow mapping is observed to determine what functions are carried out by each marketing agency and can map guppy fish products in the hands of consumers, mapping information flow is observed to determine the flow of market information and financial information from each actor in the supply chain structure. Product volume mapping is useful for estimating market demand, price, product potential that can still be extracted and the value of the product that should be maximized.

Marketing efficiency analysis was analyzed descriptively quantitative. The calculations were made include income analysis, marketing margin, the farmer's share, and the ratio of benefits to costs. Income analysis is carried out with the aim of knowing the cost of profit received from the business undertaken. The formula used is as follows:

$$\text{Profit } (\pi) = \text{Total Revenue} - \text{Total Costs}$$

Criteria:

- Total Revenue > total cost, profit
- Total revenue = total costs, the business has neither a profit nor a loss
- Total revenue < total cost, business loss

Marketing margin analysis is used to determine the difference in term of price of guppy fish at the consumer level and the price from the producer. The difference in price is due to each marketing agency takes their own profits and advantage, also there is difference in costs incurred by each marketing agency in the process of marketing guppy. Mathematically, the marketing margin is formulated as follows:

$$Mp = Pr - Pf$$

Description:

- Mp = Marketing Margin (IDR/pcs)
- Pr = Guppy fish price at consumer level (IDR/pcs)
- Pf = Guppy fish price at producer level (IDR/pcs)

Farmer's share is a useful indicator in seeing the efficiency of marketing activities, by comparing the share received by farmers against the price paid by the final consumer. The share that marketing agencies receive is often expressed as a percentage. Farmer's share or farmer revenue is the ratio between the price at the farmer level and the price at the end consumer level, thus farmer's share is the portion of the value paid by the final consumer received by farmers in the form of a percentage [8]. Mathematically, the farmer's share is formulated as follows:

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

Description:

- FS = Farmer's Share (%)
- Pf = Guppy fish price at producer level (IDR/pcs)
- Pr = Guppy fish price at consumer level (IDR/pcs)

Revenue and Cost Ratio Analysis (R / C) is a business feasibility analysis to measure the rate of return of the business, as a measure of cost acceptance. R / C is formulated as follows [9]:

$$R/C = \frac{TR}{TC}$$

Description:

- R/C = Revenue / Cost Ratio
- TR = Total revenue (IDR)
- TC = Total cost (IDR)

loss

Criteria:

- R/C > 1, profit
- R/C = 1, neither profit nor loss
- R/C < 1, loss

3. RESULTS AND DISCUSSION

3.1 Guppy Supply Chain Analysis

The condition of guppy fish supply chain in Bandung was analyzed descriptively to retrieve knowledge about the product flow and the information flow whereas the data concludes into chain structure, chain objectives, chain management, chain resources, and the business process of chains. The result about the condition of guppy fish supply chain can be seen below in Table -1.

Table -1: General Condition of Guppy Fisch Chain Supply

Component	Supply Chain Conditions
Chain Structure	Guppy Fish supply chain consists few marketing agencies as members, in which there are farmers, retailer, wholesaler and end consumer. The marketing chain itself is distributed through three marketing chain.
Chain Target	The target of the supply chain for guppy fish is the domestic market, with the target market being intermediary traders, namely wholesalers and small traders/retailer who are domiciled in the city of Bandung.
Chain Management	The farmer is a member that has the biggest role. The partnership relationship between farmers and intermediary traders is a relationship that is bound to each other, farmers can sell guppy fish to intermediary traders who have communicated in advance at a price that is deemed appropriate. The transaction system between farmers and intermediary traders is a cash transaction. Some of the operational assistance is obtained by farmers through the Food and Agriculture Office of Bandung City for the procurement and guidance of the Guppy Fish Aquaculture Group.
Chain Resources	Chain resources include guppy fish as the main resource. The resource chain consists of physical resources which include aquaculture tools such as aquariums, pumps, and aeration equipment as well as land. The human resources in the process consist of 10 members of “Maestro Ornamental Fish Group”, 1 wholesaler institution, and several small trades (ornamental fish stalls). Technological resources include communication aids in the form of mobile phones.
Chain’s Business Process	The business cycle in the guppy fish supply chain is a business cycle that starts from the culturing process and then goes through the marketing process by involving intermediary traders (marketing agencies).

The product flow in the supply chain of guppy fish is basically formed from the marketing and distribution channels carried out by the Marketing agencies. The producers usually distribute the harvest to wholesalers and small traders because it is considered faster, more efficient, and has sustainable characteristics.

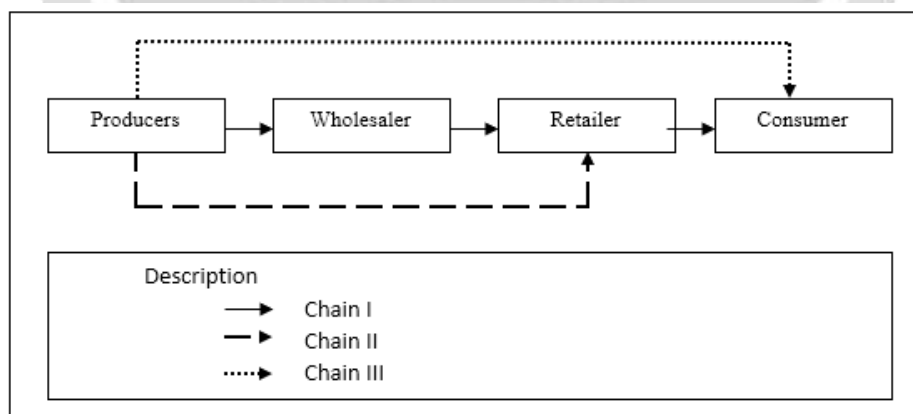


Fig -1: Marketing Chain

- a. Chain I: The first Chain is a distribution channel that involves the Maestro Ornamental Fish Village Group and directly sells guppy fish to a final consumer. This distribution channel is a direct distribution channel, or it is also called a zero-level marketing channel. It is called “direct” because in this distribution channel the only components involved are producers and end consumers, not passing through other intermediary agencies.

- b. Chain II: The second Chain is a distribution channel with one intermediary marketing agencies who is a retailer, therefore this channel is called a one level marketing channel. Guppy fish are purchased by these retailers from the producer for then sold to the end consumer directly.
- c. Chain III: The third chain is a distribution channel with two sales intermediaries who are the parties of a wholesaler and a retailer. This channel is also known as a two-level marketing channel. In this channel, wholesalers buy guppies from the producers, then divide them into plastics containing smaller quantities of guppy fish and sell them to retailers then retailers will sell the guppies to the end consumer.

3.2 Marketing Efficiency of Guppy Fish Supply Chain in terms of Income Analysis, Marketing Margin, Farmer's Share, and Revenue to Cost Ratio

Table -2: Income Analysis

Marketing Parties	Total Revenue	Total Cost	Income/Profit
Producer	1.800.000	946.542	853.458
Wholesaler	1.600.000	1.450.000	150.000
Retailer	500.000	431.000	69.000

Table -3: Guppy Fish Marketing Margin

Description	Unit	Chain I	Chain II	Chain III
Producer				
a. Selling Price	IDR	2.500	2.000	1.750
b. Farmers Share	%	100	80	70
Retailer				
a. Selling Price	IDR		2.500	2.500
b. Marketing Margin	IDR		500	500
c. Revenue	IDR/month		100.000	100.000
Wholesaler				
a. Selling Price	IDR			2000
b. Marketing Margin	IDR			250
c. Revenue	IDR			200.000
Consumer				
a. Selling Price	IDR			
b. Purchase Price	IDR	2500	2500	2500
c. Marketig Margin	IDR	0	500	750

The results of the research have been described in Table -2 and -3, as can be seen above, Chain I is a marketing channel between Farmers and end consumers, not through retailers or wholesalers or also known as direct marketing channel. The selling price from the producer to the final consumer is IDR 2500. Producers provide a higher price to the final consumer because the quantity purchased is much less than the quantity of fish purchased by retailers or wholesalers.

Chain II consists of producers and small traders as well as consumers. The selling price from producers to small traders is 2,000 per head of guppy fish, while the selling price between small traders and end consumers is IDR 2500 / fish. The selling price of small traders to consumers is the same as the selling price of farmers to the end consumers because small traders have received a discount from the farmers based on the quantity of fish purchased, information about the selling price to the final consumer is also one of the information products between supply chain institutions so that prices in the market did not compete each other out. The margin received by small traders is IDR 500 / head. Based on the results of the study, it is known that the profit earned by retailers in one month for selling guppy fish ranges from IDR 100,000, while the farmer's share received by producers is 80%.

Table -3 also provides an overview of the marketing margins in Chain III in which there are cultivators or producers, wholesalers, retailers, and consumers. The selling price of cultivators to wholesalers is IDR 1750 / head. This price is cheaper than the farmer's selling price to retailers because the guppy fish purchased by wholesaler are much higher in quantity than retailers. Wholesalers sell the guppy fish to retailers and, which are retail stores or retail outlets in Bandung City for IDR 2000 / guppy fish. Based on the research results, it is known that the average profit obtained by wholesalers for selling guppy fish per month is IDR 200,000. Farmer's share obtained by farmer in Chain III is 70%.

Table -4. Farmer's Share

No	Chain	Farmers Share (%)
1	I	100
2	II	80
3	III	70

Based on the results of the research in the table above, it can be seen from the three marketing channels that the portion of the price received by the producer or farmer's share in each marketing channel for channels I, II, and III is 100%, 80%, and 70%, respectively. The three channels have a percentage value of farmer's share which can be said to be good because it is above 40%, so that each marketing channel has met the criteria in determining an efficient marketing channel based on the theory put forward by Kohls and Downey [10]. Sudyono states that farmer's share has a negative relationship with marketing margin, so the higher the marketing margin, the lower the farmer's share percentage [11]. Based on the results of the research on farmer share and marketing margin above, the pattern of the relationship between these two variables is an inverse relationship so that it is in accordance with the statement that the higher the marketing margin, the lower the percentage of farmer's share will be.

The value of R/C is calculated to determine the business feasibility of selling guppy fish. The R/C value is obtained from the comparison between total revenue and total cost. The value of R/C will show the value of $x < 1 < x$. If the value of R/C shows a value of less than one, it can be said that the business is not feasible or needs evaluation so that there is an improvement so that the business is feasible to develop. If the R/C value equals to one, then the business will not generate profit but also not experience a loss. If the R/C value is more than one, it can be said that the business is feasible to continue to be developed so that a form of development strategy is needed so that the business is feasible to continue to be developed. R/C ratio of this research can be seen in

Table -5 below:

Table -5. R/C Ratio of Each Supply Chain Member

Chain Member	R/C	Efficiency Status
Producer	1,90	Efficient
Retailer	1,16	Efficient
Wholesaler	1,10	Efficient

All institutions involved in the supply chain of guppy fish show the results of the ratio to costs > 1 , even the R / C value at the farmers level shows the highest value, namely 1.90, meaning that the business run by each supply chain member is feasible to develop.

4. CONCLUSIONS

The Guppy Fish Supply Chain in the Maestro Ornamental Fish Village Group has three marketing channels consisting of farmers, namely the Maestro Ornamental Fish Village Group, retail or small traders, wholesalers, and end consumers. Marketing of Guppy Fish in the Maestro Ornamental Fish Village Group in terms of efficiency as measured by marketing margin, Farmer's share and profit-to-cost ratio can be said to be efficient in each of its marketing channels. The channel that has the least margin is Chain I whereas Chain I is a direct distribution channel between farmers and consumers, but economically it is not necessarily the most effective channel because the number of products sold in Chain I is the smallest. The highest Farmer's share value is also on Chain I, which is 100% because Chain I is a direct channel. The business activities of each institution in the

supply chain of guppy fish, in terms of the profit to cost ratio, are a feasible effort because each institution has an R/C value > 1 and the highest R/C value is the R / C value at the producer level itself of 1,90.

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