ANALYSIS SUPPLY CHAIN MANAGEMENT OF GOGOKAN FISH (*OTHOLITES MACULATUS)* IN PANGANDARAN

Rifqi Ramdani[1], Atikah Nurhayati[2], Achmad Rizal[2], Asep Agus Handaka[2]

[1]*Student at Faculty of Fisheries and Marine Science, Padjadjaran University, Bandung – Sumedang KM. 21 Jatinangor 45363, Indonesia E- mail address: rifqiramda-ni29@gmail.com*
[2]*Lecturer at Faculty of Fisheries and Marine Science, Padjadjaran University, Bandung – Sumedang KM. 21 Jatinangor 45363, Indonesia*

ABSTRACT

This research is about to analyze of gogokan fish (*Otholites maculatus*) supply chain management which is processed into fish bladders in Pangandaran which was held in March 2019 - July 2019. The purpose of this research was to analyze the supply chain of *Otholites* sp. products which processed into fish bladders in Pangandaran. The method used in this research is descriptive qualitative and quantitative using primary and secondary data with the snowball sampling method. The analytical tool used is analysis of supply chain conditions, risks and consequences of supply chains for *Otholites* sp. fish bladders. The results of this research is that the supply chain conditions are running quite well marked by product flow and supply chain financial flow *Otholites* sp that run properly even though there are some risks that must be faced by all business stakeholders along with each consequence. Supply chain distribution of *Otholites* sp. are divided into two types, the first is: fishermen → processors → consumers (also as a traders) and the second is fishermen → FAP (Fish Auction Place) → processors → consumers (also as a traders).

INTRODUCTION

Pangandaran is one of the sea areas included in the Fisheries Management Zone or WPP-573, covering the Indian Ocean as a part of southern Java to the south of Nusa Tenggara, Savu Sea, and the West Timor Sea. The area of Pangandaran reaches 1,680 km2 with sea and coastal areas with regional boundaries. Pangandaran is one of the areas included in the zone of Fisheries Management Areas (FMA) 573 (Regulation of the Marine and Fisheries Ministry Indonesia No.01 / MEN / 2009). This area is a mainstay area for the marine tourism and capture fisheries sector.

Pangandaran is one of the capture fisheries production centers in Indonesia, especially in West Java. The coastal area of Pangandaran is directly facing into the Indian Ocean so that it has generally been developed as a tourism and fisheries activity area. Capture fisheries is one of the mainstay sectors that can provide economic impact for the Pangandaran community. The tourism sector and capture fisheries are noted to make a major contribution to the regional economy and communities in the region [1].

Based on 2016 West Java Agency for Regional Development data capture fisheries production in Pangandaran in 2014 amounted 2,483,370 kg increased to 2,846,068.05 kg in 2015 and 2,526,929 kg in 2017. The main commodities in Pangandaran were shrimp, red snapper, white snapper, grouper, black pomfret, white pomfret, mackerel, hairtail fish, *Otholites* sp. and cob (mackerel). One of the most recently worthy commodities is *Otholites* sp. It's rapidly increasing after the introduction of Liong Bun fishing gear in Pangandaran, made *Otholites* sp. being one of the 10 largest productions of capture fisheries in Pangandaran, with a total production of 64,451 kg [2].

The price of *Otholites* sp. which is significantly increasing makes the *Otholites* sp. increasingly targeted by fishermen. The price of fresh fish as of August 2018 reached 200,000 - 240,000 rupiah/kg (FAP Pangandaran 2018). Modification of fishing gear continues to be developed to increase the chance of getting *Otholites* sp., one of which is to increase the efficiency of liongbun or basic gill nets used. The time and location of *Otholites* sp. fishing which can be said the extreme one and high risk makes only a few fishermen who can catch *Otholites* sp. This fish has a high selling price due to the presence of the fish bladder. This fish bladder will later be used by health agencies as wound sewing thread material, in the best quality. The selling price at the TPI level (from fishermen sold to collectors) is already high, around 200,000 - 240,000 rupiah / kg so that as little as the catch of the fishermen, they will still generate profits. The selling price of *Otholites* sp. is based on the quality and size of the fish bladder inside. When it comes to collectors, fish bladders will be separated and resold at a fantastic price. For dry fish bladders, the best quality can be valued at up to 150,000,000 rupiah/kg, and fish meat resold at a price of 40,000-50,000 rupiah/kg. The benefits obtained by fishermen are still very far below, when compared to fish bladder sellers. Therefore, supply chain analysis is finally needed to determine the increase in the value of *Otholites* sp., and to know the benefits of each chain, so that each chain especially fishermen, can feel the same benefits from these *Otholites* sp.

Supply chain management or supply chain is the integration of procurement of materials and services, replacing semi-finished goods and end products, and shipping to customers through distribution systems [3]. These companies usually include suppliers, factories, distributors, stores or retail and supporting companies such as logistics services companies. According to Supriyadi (2014), that supply chain is a study of operational management in which there is a financial supply chain in which the activity or flow of the company's financial processes is a measure of the company's supply chain performance through a company ratio [4]. A healthy company in its performance is a company that has a high supply chain ratio. In addition to meeting consumer demand, forms of regulation in the fish supply chain also aim to provide benefits to each of the links involved. So that it takes an approach to the supply chain system in a set of interrelated activities and decisions to efficiently integrate suppliers, manufactures, warehouses, transportation services, retailers and consumers [5]. Proper decision making will be beneficial in maintaining the supply and quality of fish commodities [6].

Too long in the flow of processed fish products in the supply chain will increase costs because prices are the highest-ranking factor, followed by shipping and quality [7]. Therefore, we need a strategy in designing the most effective and efficient supply chain process in order to prevent concentrated distribution from occurring at one point [8]. According statement from Silva et al. (2016) that fish supply chains are characterized by long supply waiting times combined with significant supply and demand uncertainty [9]. Mapping the distribution network and matters relating to technical distribution and operational costs within a certain period of time also need to be assessed because there are changes in the price pattern in each supply chain to reach consumers [10].

MATERIAL AND METHODS

This research was conducted in March 2019 - July 2019 in Pangandaran, West Java. The study was conducted in 4 fish landing locations in the Pangandaran area. The four locations are Cikidang FAP, Nusawiru FAP, Bojongsalawe FAP, and FAP Pangandaran. Especially in places related to supply chains of *Otholites* sp. The object examined in this study was in the form of fresh fish supply chain stakeholders at the Cikidang fish auction place as a marketing institution that has a role to channel *Otholites* sp. to consumers. The method used in research is descriptive qualitative and quantitative.

The data collected in the study consisted of two types of data, such primary data obtained directly through filling the questionnaires or interviews with *Otholites* sp. entrepreneurs and secondary data obtained from the Maritime and Fishery and Food Security Agency and West Java Marine and Fisheries Service. The sampling technique in this research was carried out using the snowball sampling method. This technique is used to determining samples which are initially small in number, then enlarged.
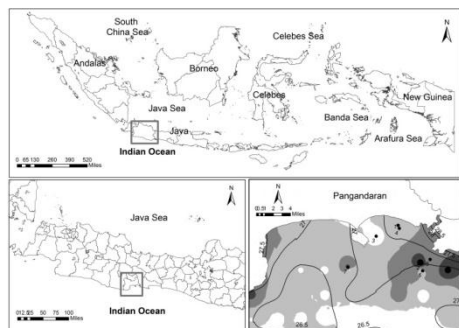
Figure 1. Research Location

DEFINITION AND OPERATIONALIZATION OF VARIABLES

Supply chains are networks that consist of various business stakeholders involved in the process of distributing resources where the products distributed originate from producers to reach the end-level consumers.

Table 1. Operational Variables

Variables	Operational Variables		
	Assessment Aspect	Score	Measurement scale
Supply Chain Management	Condition if catch Procurement of raw material Price Condition Risk Payment Marketing Competition	Very good = 5 Good = 4 Ordinary = 3 Not good = 2 Very bad = 1	Ordinal
Gogokan Fish	Quality Continuity of production	Very good = 5 Good = 4 Ordinary = 3 Not good = 2 Very bad = 1	Ordinal

Validity test is used to determine the level of validation of the questionnaire instrument used in data collection. Using a valid and reliable instrument in data collection, it is expected that the research results will be valid and reliable [11]. So that it can be seen that the questionnaire submitted to obtain data related to research to respondents is true and has been tested.

Reliability testing in this study was carried out by calculating the value of *Cronbach's Alpha* instruments from each of the research variables tested. The formula used is as follows:

1. Determine the score variant for each question (Si):

$$Si = \frac{\sum Xi^2 - \frac{(\sum Xi)^2}{N}}{N}$$

2. Measure sum varians (ΣSi):

$$\Sigma Si = Si\,1 + Si\,2 + \cdots + Si\,n$$

3. Measure total varians (St):

$$St = \Sigma(\Sigma Xi)^2 - \frac{(\Sigma Xi)^2}{N}$$

4. Determine reliability coeffecient *Cronbach's Alpha*

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum s^2 j}{s^2 x}\right)$$

Information:

α   = Reliability coefficient Cronbach's Alpha

k   = Number of items
Xi   = Item answer
σb^2 = Item variance
σt^2 = Total variance
N   = Number of populations

Indicators of reliability measurement according to Sekaran (2000) which divide the level of reliability with the following criteria [12]: If alpha or r counts:

1. 0.8 - 1.0   : Good reliability
2. 0.6 - 0.799   : Reliability received
3. Less than 0.6   : Poor reliability

Analysis of *Otholites* sp. supply chain conditions is carried out by product flow and flow approaches finance described descriptively qualitatively and supported by an evaluation of indicators in both streams based on the opinions of selected respondents. The product flow approach includes marketing objectives, application of supply chain management, demand and supply. The financial flow approach includes capital and payments (cash, tempo).

In abnormal supply chain conditions, there are risks that can threaten the sustainability of the supply chain, both those that are easy to replace and those that are not easily replaced quickly within the management period [13]. This risk value is referred to as a risk consequence (α) which can be calculated using the following formula:

$$\alpha = \frac{\delta \text{ replace}}{\delta \text{ collapse}}$$

Description:
α   : Risk consequences of a product in the supply chain
δ replace   : Time needed for a supply chain to replace a required sub-product or service to handle interference from product flows, and return to normal scheduling conditions with the same level of quality.
δ collapse   : The time of the sub-product failed to be completed before the supply chain suffered a loss at a critical point in its market service.

Assessment indicators for supply chain sustainability risks are presented in Table 2.

Table 2. Consequences of Risk

Risk	Description	α
Important	Irreplaceable	1,0
Needed	Not easy to replace	0,6
Nessecary	Replaceable	0,3
Desirable	Replaceable	0,1

RESULTS

General Conditions of Pangandaran

Fisheries activities in Pangandaran Regency are dominated by capture fisheries. Pangandaran District Marine and Forestry Department (2014) states that the geographical location of Pangandaran region is at coordinates 108º18'-108 º 47'W and 7 º 30'20''-7 º 50'00''S with adjacent territorial borders north namely Ciamis District; west of Tasikmalaya District; east of Cilacap District, Central Java; south of the Indonesian Ocean.

Based on 2016 West Java Agency for Regional Development data capture fisheries production in Pangandaran in 2014 amounted 2,483,370 kg increased to 2,846,068.05 kg in 2015 and 2,526,929 kg in 2017. The main commodities in Pangandaran were shrimp, red snapper, white snapper, grouper, black pomfret, white pomfret, mackerel, hairtail fish, *Otholites* sp. and cob (mackerel). One of the most recently worthy commodities is *Otholites* sp.

Characteristics of Respondents

Respondents in this research were obtained using the snowball sampling method, which begin with primary informants namely gogokan fishers, pool bladder processors and continued to fish bladder traders.

Related respondents to the supply chain of gogokan fish bubbles are scattered, especially in 3 sub-districts in Pangandaran, including, Pangandaran, Cijulang, and Parigi. The first respondent or primary respondent of this research is a fisherman of gogokan fish, which is then explored with information about the next supply chain, namely fish collectors, pool bubble processors (wet / dry), and fish bladder traders. All respondents selected have very close links in the supply chain of gogokan fish bubbles.

The number of respondents is only determined by the previous respondent and when all the information needed has been fulfilled, the interview is sufficient. Respondents in this research were divided into 3 major groups, namely:

a. Raw material providers consisting of 7 fishers & collectors are 5 people

b. Processor of fish bladder as many as 5 people,

c. Traders consisting of, 2 people small-scale traders & 1 people large-scale trader.

Respondents interviewed had an age range of 30-63 years and could be said to be a productive age. This is consistent with the statement of Tjiptoherijanto (2001) that the productive age of people to work is between 15-64 years. In addition, according to conditions in the field, all respondents were interviewed, were or were already working[18].

Instrument test
Validity of Data
The results of the validity test of questionnaires that have been submitted to respondents from raw material providers, processors, and traders are declared valid. This is indicated by the value of the validity r count of each respondent is greater than the value of r table.

Reliability Data
Test reliability is performed on items that are otherwise valid. A variable is said to be reliable or reliable if the answers to questions are always consistent. The calculation results of the reliability test that the value of the coefficient *Cronbach Alpha* of the overall data obtained is greater than 0.6. This value indicates that the questionnaire submitted for respondents can be trusted.

Condition of *Gogokan* Fish Supply Chain Management
Fish supply chain is considered quite good when viewed in terms of product flow and financial flow. The two-way information system from the processor to the consumer and vice versa runs properly because the provider of raw materials and processors has a mutually beneficial relationship. In addition, the relationship from the provider of raw materials to processors runs well and vice versa is also due to the existence of mutually beneficial relationships.

The risk of supply chain *Otholites* sp. is still an obstacle but does not cause the cessation of the supply chain *Otholites* sp. to cease because the activities are considered very profitable. All risks that occur in the supply chain are tested to find out how important they are and to know whether they are replaceable or irreplaceable even though they still suffer losses. Channels for supply chain distribution of gogokan fish in Pangandaran Regency are detailed in Table 4.

Tabel 4. Distribution Channel of Gogokan Fish Supply Chain

	Fisherman	→	**Processor**	→	**Consumers**			
(I)	(Rp 4 million– Rp 7 million)*	(<1 day)	(Rp 21 million– Rp 30 million)	(3 day)	(Rp 25 million– Rp 35 million)			

	Fisherman	→	**Fish Auction Place**	→	**Processor**	→	**Consumers**
(II)	(Rp 5 million– Rp 8 million)*	(<1 day)	(Rp 5,5 million– Rp 8,5 million)	(<1 day)	(Rp 21 million– Rp 30 million)	(6 day)	(Rp 25million– Rp 35 million)

Each distribution channel has its own characteristics, the time efficiency and quality from the channel distribution chain fish bladder *Otholites* sp. is a channel (I) on the whole channel has the same price for every consumer or trader. Distribution channel (I) shows that there is very little flow of products entering the supply chain of gogokan fish bubbles. Based from the table 7, prices at the fishermen level, amounting to IDR 4.7 million are the value of the price needed to get 1 kg of fish swimming bubbles. The price of gogokan fish sold by fishermen on this channel is IDR 90,000 - IDR 180,000 per kg. The quality and size of the stray fish determines the pool bubble products produced. The best quality of gogokan fish cannot be obtained by processors continuously because the number of catchers is not too much, so the number of gogokan fish as raw material for bubble swimming is very limited.

In the supply chain gogokan fish bubbles, time is not a determinant of the quality of the supply chain. Because both chain (I) and chain (II) both have relatively nearly the same time to reach the final consumer. Effectiveness itself occurs more frequently and better in the supply chain (II) because of the excess excess that is obtained by processors such as better quality of fish so that it is able to run its supply chain with tanks to consumers.

CONCLUSIONS

The condition of the *Otholites* sp. supply chain in Pangandaran runs quite well. There are two distribution channels, namely distribution channels (I) fishermen → processors → consumers, distribution channels (II) fishermen → FAP (Fish Auction Place) → processors → consumers. Time efficiency is in the distribution channel (I). The risks faced by *Otholites* sp. chain business actors are the availability of raw materials for *Otholites* sp., late payments, weather, the success of processing *Otholites* sp. bladders in a row worth 1.0; 0.4; 1.0; 1.0. All of these risks have consequences that are not easily replaced and are irreplaceable with their important and necessary characteristics.

REFERENCES

[1]   Nurhayati A. 2013. Analysis of Sustainable Potential of Fishing Fish in Region Pangandaran. *Journal of Aquatics,* Vol. IV, No.2, 2013: 195-209.

[2]   Maritime Fisheries and Food Security Agency. 2016-2018. TPI Production Data Pangandaran. Published every year.

[3]   Heizer J, Render B. 2009. Operation Management, Pearson Education Inc., Upper Saddle River, New Jersey.

[4]   Supriyadi. 2014. *Performance Supply Chain Management. Study and Accounting Research.* Vol. XI No. 2 2014: 44-55.

[5]   Ling L. 2007. Supply Chain Management: Concepts, Techniques, and Practices Enhancing Value Trough Collaboration. Singapore: *World Scientific Publishing* Co. Pte. Ltd.

[6]   Tompodung, E. 2016. Analysis of Supply Chain of Mujair Fish in Eris District, Minahasa Regency. *EMBA Journal*, Vol.4 No.4 September 2016: 279-290

[7]   Suryaningrat, I.B. 2016. Raw Material Procurement on Agroindustrial Supply Chain Management: A Case Survey of Fruit Processing Industries in Indonesia. *Agricultural Science Procedia* Vol. 9, 2016: 253-257.

[8]   Benassi, C., A. Chirco, C. Colombo. 2017. Mixed Spatial Duopoly, Consumer's Distribution and Efficiency. *Economics Letters* Vol. 156, 2017:74-77.

[9]   Silva, W.E.S., E.N. Roig, M.C.G. Araya, L.M.P. Aragones. 2016. Operational Research Models Applied to The Fresh Fruit Supply Chain. *European Journal of Operational Research* Vol. 251, No. 2, 2016: 345-355.

[10]   Lee D., S.G. Yang, K. Kim, B.J. Kim. 2017. Product Flow and Price Change in an Agricultural Distribution Network. *Physica A* S0378-4371(17)30723-9.

[11]   Sugiyono. 2013. Quantitative Approach Educational Research Methods, Qualitative and R&D. Bandung: Alfabeta.

[12]   Sekaran, U. 2000. Research Methods for Business. Fourth Edition. Translator: Kwan Men Yon. Salemba Empat. Jakarta.

[13]   Neureuther, B.D., G. Kenyon. 2009. Mitigating Supply Chain Vulnerability. *Journal of Marketing Channels* 16: 245-263.

[14]   Sudiyono, A. 2002. Agricultural Marketing. Yogyakarta: UMM Press.

[15]   Nurhayati, A., W. Lili, T. Herawati, I. Riyantini. 2016. Derivative Analysis of Economic and Social Aspects of Added Minapadi Value (Paddy-Fish Integrative Farming) Case Study in the Village of Sagaracipta Ciparay Sub District, Bandung West Java Province, Indonesia. *Aquatic Procedia* 7 (2016) 12-18.

[16]   Suryaningrat, I.B. 2016. Raw Material Procurement on Agroindustrial Supply Chain Management: A Case Survey of Fruit Processing Industries in Indonesia. *Agricultural Science Procedia* Vol. 9, 2016: 253-257.

[17]   Sugiyono. 2013. Educational Research Methods Quantitative, Qualitative Approach and R & D. Bandung: Alfabeta.

[18]   Tjiptoherijanto, P. 2001. Population Projection, Work Force, Labor, and the Role of Trade Unions in Increasing Welfare. Development Planning Magazine / Issue 23 of 2001.