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ANALYSIS OF TILAPIA AGRIBUSINESS SYSTEM IN CALM WATER POUNDS IN KEPAHIANG DISTRICT, BENGKULU PROVINCE

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ABSTRACT

The purpose of this study was to analyze the production process, marketing and the role of supporting institutions for tilapia development. This research was conducted in Kepahiang and Ujan Mas subdistict, Districts of Kepahyang, Bengkulu Province in which 76 tilapia producers were selected ramdomlay and interviewed. Analysis of data involved income and R/C ratio, marketing margins as well as a descriptive qualitative analysis. The results showed that the production income of tilapia was IDR 2,129,587, - and an R/C ratio of 1.29. This resealsoh found that there are three marketing channels including (i) farmer to consumer, (ii) farmer to diluent to consumer, and (iii) farmer to collector trader to diluent to consumer. The marketing channel for Tilapia in Kepahiang Regency is efficient and the third channel is the main channel for marketing Tilapia. The role of supporting institutions involve (i) government provides feed to farmers and machine assistance to farmer groups, (ii) extension workers are tasked with improving the human resources of tilapia farmers, and (iii) banking support credit farmers according to the terms and conditions that apply.

INTRODUCTION

The fisheries and marine sub-sector is one of the supporters of national economic growth. With the increasing population growth, the demand continues to increase.Menurut The Director General of Fisheries (1975) in Astuti (2017), the classification of fisheries, namely marine and inland fisheries, consists of catching and cultivating. Aquaculture, for example, is Tilapia fish

cultivation in fresh and brackish water such as rice fields, cages and ponds. The development of aquaculture is carried out in almost all parts of Indonesia. One of them is Bengkulu Province, which annually increases sea and land production. The largest inland fish production in Bengkulu Province is from Calm Water Pond cultivation(KAT). In 2019, it was recorded that 122,589 tons of aquaculture were produced. Based on the type of fish cultivated, there are three types of fish with the highest aquaculture production, namely Tilapia, Goldfish and Catfish.

Kepahiang Regency is one of the lowest land fishery production in Bengkulu Province. Farmers complain because the price of feed is high and the availability of seeds is smallwhich resulted in a decrease in production yields. The growth of tilapia can be influenced by feed, water quality, stocking density and pond area. According to Irwandi (2015), states that the wider the pond, the better for fish growth and increase production. The ideal pool area ranges from 100-500 m2. This is done to reduce competition for tilapia to get food and oxygen in the pond. According to Djarijah (2002),stocking 10-15 fish seeds/m2 with a water discharge during maintenance of 1 liter/second for a pond area of 100 m2.

Farmers' ponds in Kepahiang Regency have an average area of 150 m2. This means that the size of the pond in Kepahiang Regency is included in the ideal category. However, the stocking density of the number of fish exceeds the recommendation, namely as many as 41 fish/m2, it is suspected that this inhibits the growth of tilapia. According to Pardiansyah (2018) states that an increase in maximum stocking density will inhibit fish growth due to an increase in the amount of feed, body metabolic waste, oxygen consumption and reduced water quality. This will result in tilapia competition, increasing the population in the same space and a lack of food and oxygen which causes stunted fish growth or death. This study wants to analyze the production process of Tilapia in Kepahiang Regency whether it has reached efficiency or not.

The average weight of tilapia produced by farmers in Kepahiang Regency is an average of 100 grams/head with a rearing age of approximately 100 days. Farmers sell their crops to collectors and diluents at a price of IDR 22,000-23,000/Kg. In this study, the Tilapia channel is limited to the final consumer, namely housewives. There are differences in selling prices and marketing costs for each channel. This study wants to analyze the marketing process of Tilapia in Kepahiang Regency whether it has achieved efficient marketing or not.

The Department of Fisheries and Food Security of Kepahiang Regency in collaboration with the Ministry of Maritime Affairs and Fisheries through the Director General of Drugs and Fish Feed is trying to provide support for increased production. Provision of 5 (five) units of Tilapia feed machines. This feed machine is placed in farmer groups in Ujan Mas District and Kepahiang

District, Kepahiang Regency. The Department of Fisheries and Food Security of Kepahiang Regency also distributed aid for raw materials for making tilapia fish feed, namely flour and soybeans. This study wants to analyze the role of supporting institutions in the production of tilapia in still water ponds in Kepahiang Regency.

There are not many literature reviews that are directed at the comprehensive analysis of tilapia as an agribusiness system, especially in Bengkulu Province. Some of the studies that analyze tilapia include, on the production aspect (Sitepu (2019); Hussain et al., (2004); and Ponzoni et al., (2010)), social and economic (Cai JunNing, et al (2017); Kaliba, et al (2007); and KAliba, et al (2006)), and technical (Mandal, et al (2014); Husain, et al (2003)). Therefore, the analysis of the agribusiness system in this tilapia business will be very important and contribute to the development of agribusiness science.

In the process of enlargement of Tilapia, farmers are guided by extension agents from the Department of Fisheries and Food Security of Kepahiang Regency. However, the number of extension workers from the Department of Fisheries and Food Security in Kepahiang Regency is still very small. Dissemination of information regarding the process of rearing tilapia according to procedures not like 10 fish/m2, as well as pest and disease control of tilapia was not channeled properly due to the minimal number of extension workers. Farmers often carry out the process of enlarging tilapia not according to the procedure, so that tilapia production is not in accordance with the general weight of 200 grams/head. Therefore, this study wants to analyze the production process, marketing of tilapia and the role of supporting institutions in the production process of tilapia in still water ponds in Kepahiang Regency.

RESEARCH METHODS

Location and Time of Research

Determining the research location was carried out in Kepahiang and Ujan Mas Districts. The choice of location was chosen based on several considerations. This consideration is that the two sub-districts have the largest population of tilapia fish cultivators when compared to other sub-districts in Kepahiang Regency. In addition, the production of tilapia aquaculture was the highest in this selected research location compared to other sub-districts. The research was conducted in June-August 2022.

Population and Research Sample

This study has 4 research objectives, namely the management of subsystems of procurement of facilities, production, marketing and support for tilapia aquaculture in Kepahiang Regency. In order for this goal to be achieved,

there are three types of population that will be the sample in this study. The three types of population are: (i) Tilapia Cultivator with Calm Water Pond (KAT) technique, (ii) Marketing agencies such as collectors and distributors, and (iii) Supporting institutions such as government, banking and extension workers.

Sampling in each population is also different. The number of samples used to answer each objective also varies. The following describes the number of samples taken in each population to answer the objectives of this study.

Sampling Technique.

Samples taken from the KAT Tilapia breeder population are the samples used to answer objectives one and two in this study. The first objective is the management of the procurement of production facilities subsystem and the second objective is the management of the KAT tilapia production subsystem in Kepahiang Regency. Tilapia fish farming population was carried out by sampling technique with purposive sampling method. Purposive sampling techniquenamely data collection techniques with certain considerations (Sugiyono, (2012); Sukiyono, (2018)).

The total population of Tilapia Fish Farmers in Still Water (KAT) in this study were Tilapia Fish cultivators in Kepahiang District and Ujan Mas Districtnamely as many as 310 tilapia cultivators (Table 1).

Table 1 Total Population of Calm Tilapia Fish Farmers

No	Subdistrict	Number of Population (people)
1	Kepahiang District	210
2	Ujan Mas District	100
Amount		**310**

Source: Fisheries Service, 2020

Measuring the number of samples using the solvate formula, referred to from the opinion of Riduan and Engkos, (2011) that sampling uses the solvate if the population size is known. The slovin formula calculates the number of samples, namely:

$$n=\frac{N}{1+Ne^2}$$

Note:
n = Number of samples
N = Total population
e = Presentation tolerance for sampling error (0,1)

In the Slovin formula, there are the following provisions:
value e= 0.1 (10%)
large population; value e= 0.2 (20%) small population

Of the farmer population, the sample range ranges from 10% to 20% in sampling.Sample allocation is aa method for mapping samples at each sample size for each stratum with their respective proportional sizes. This method of dividing the sample based on the total population in each region or stratum is very often used because it is simpler and easier than other methods, with the result that the number of samples is not much different. The following formula is used to allocate samples proportionally:

$$\text{ni} = \frac{Ni}{N} \cdot n$$

Note:
ni = number of samples based on stratum
n = The total number of samples
Ni = Number of population by stratum
N = Number of the entire population

By applying above formulae, the total number of samples and samples for each sub-district are presented in Table 2.

Table 2 Number of Research Samples

No	Subdistrict	Number of Samples/ District (Person)
1	Kepahiang District	51
2	Ujan Mas District	25
	Total	**76**

Source: Secondary data processed, 2022

So from the above calculations, there were 76 KAT Tilapia cultivators who were the samples in this study. Sampling was 76 tilapia farmers represented by 3-4 members of farmer groups in the three districts selected as research locations. This sample is a respondent who provides data so that objectives one and two in this study can be achieved.

Marketing agency

These marketing institutions in this study are collectors and diluents. This marketing agency sample as a respondent who provides data or information needed to answer the third objective in this study. The third objective in this study is the management of the KAT tilapia marketing subsystem in Kepahiang Regency.

Sampling techniques at marketing institutions such as collectors and diluents must deal directly with tilapia cultivators in their marketing. Sampling of marketing institutions was sampled by direct tracing (Snowball sampling), namely tracing the next sample from the previous sample information in Kepahiang Regency. It will start from the tilapia cultivator where to carry out sales transactions of aquaculture products and so on until the final marketing agency is obtained from selling tilapia in the sub-district. So with this technique we can find out how far and how far the level of the marketing channel has been.

After tracing the marketing channels from KAT Tilapia cultivators to the final consumers, namely consumers. So it is known that there are marketing institutions, namely collectors and diluents in this study.

Table 2 Distributioan of Marketing Institution

No	Marketing Institute	Number of Samples (people)
1.	Collector Traders	8
2.	Diluent	33
Number of Samples		**41**

Source: primary data (2022)

This study found that there were 41 samples of KAT tilapia marketing institutions in Kepahiang Regency. So that the sample of this marketing agency is a respondent who provides the information and data needed to answer the third objective in this study.

Supporting institutions

Supporting institutions in this research are the government, banking and extension workers. The KAT tilapia aquaculture supporting institution in Kepahiang Regency is the respondent chosen to answer the fourth objective of this study. The fourth goal is the management of the supporting subsystem for KAT tilapia aquaculture in Kepahiang Regency.

The sampling technique for supporting services was carried out by purposive sampling. Purposive sampling techniquenamely data collection techniques with certain considerations (Sugiyono, 2012). This means that samples from supporting institutions were chosen deliberately and determined in advance from researchers with considerations in accordance with the provisions. The following is the number of samples of supporting institutions selected in this study:

Table 3. supporting institutions

No	Supporting Institutions	Samples (people)	Position Status
1.	Government	1	Section Head of Cultivation and Production from the Department of Fisheries and Food Security and Fisheries of Kepahiang Regency
2.	Extension	6	a) Three Extension Workers from Ujan Mas District b) Three extension officers of Kepahiang District
3.	Banking	1	Bank BRI employees
	total sample	8	

Source: primary data (2022).

There are 8 samples of Tilapia fish cultivation supporting institutions in Kepahiang Regency. These supporting institutions as respondents provide information and data needed to achieve the four objectives of this study. Supporting institutions provide information and data in the form of qualitative descriptive data describing supporting institutions for Tilapia aquaculture in Kepahiang Regency.

Data collection technique

Primary data collection by direct interviews with respondents as data providers. The types of samples chosen were Tilapia fish cultivators, collectors, and retailers. In addition to primary data, secondary data is also used to add to and complement primary data so that the study of the research object becomes stronger. Secondary data can be in the form of mass media, governmental data and agencies related to the object of research.

Data analysis method

Tilapia Aquaculture Production Facility Procurement Subsystem

In this study, a description of the business activities of Tilapia in Still Water (KAT) will be carried out in the input subsystem (procurement of production facilities), where observations are made on several attributes, namely feed, seeds, labor and equipment. On the four attributes of production procurement facilities, open and closed questions will be given which will be analyzed descriptively quantitatively. Quantitative descriptive can be a sum, average and percentage on three attributessubsystem procurement of production facilities. This analysis describes what actually happened to KAT tilapia cultivation in Kepahiang Regency.

Tilapia Cultivation Production Process Subsystem

Production cost

According to Supriyono (1999), cost is the price paid in order to gain profit. Business costs referred to in this study are costs paid or incurred by Tilapia Fish cultivators such as fixed costs and variable costs. The formula for determining the total cost is:

TC = TFC + TVC

Note: TC : Total cost (Rp/production), TFC : Total fixed costs (Rp/production), and TVC : Total variable costs (Rp/production)

Revenue

Revenue is calculated, by multiplying the amount of Nila production by the price per unit Kg with the formula:

TR = P x Q

Note: TR : Income from tilapia cultivators (Rp/production), P: Selling price (Rp/Kg), and Q : Amount of production (Kg/production)

Income

Farm income is estimated by subtracted total revenue with total costs:

$\prod$ = TR – TC

Note: $\prod$: Income of tilapia fish cultivators (Rp/production), TR:Tilapia cultivator income (Rp/production), and TC : Total operating costs (Rp/production).

Efficiency

The formula for calculating the business efficiency of tilapia production by cultivators is as follows:

$$\text{R/C Ratio} = \frac{Revenue\ (TR)}{Total\ Cost\ (TC)}$$

From the formula above, it can be seen that the criteria for the R/C Ratio are as follows:

1. If the R/C Ratio > 1 efficient category
2. If R/C Ratio = 1 BEP category (break even)
3. If the R/C Ratio < 1 category is inefficient

Tilapia Marketing Subsystem

Marketing channel

The marketing channel for Tilapia in Kepahiang and Ujan Mas Subdistricts was observed starting from the cultivators to the final consumers. Marketing channels will provide an overview of the movement of goods through any marketing agency until it reaches the hands of consumers. Tilapia marketing channel by observing and conducting interviews with the marketing agencies involved to form a marketing channel level.

Marketing Efficiency

i. Marketing Margin

Marketing margin is calculated by substracted the prices that are obtained by farmers/producer and prices that are paid by consumers (Suprianto, Putu Karismawan, and Eka Agustiani. (2021); Aşkan and Dağdemir (2015); Pearce and Robinson (2011); Topcu (2003); Topcu (2004)).

Nj = Hk-Hp

Note: Nj : Marketing margin (Rp), HK : Price at consumer level (Rp)
Mobile phone : Price at producer level (Rp)

ii. Profit

Acharya and Agarwal (2016) stated that marketing channel profits can be estimated by following formula:

Π= Nj – TB

Note: Π : Profit (Rp), Nj: Marketing margin (Rp), and TB: Total marketing costs (Rp)

iii. Marketing Efficiency

Marketing efficiency can be defined as completing the marketing activities with more efficiency (Arnold, et al., (2002); Kotler, (2000)). Marketing efficiency can be known by the formula:

$$Ep = \frac{TB}{NP} x\ 100\%$$

Note: ep : Marketing efficiency (Rp), TB : Total cost (Rp), and NP: Product value (Rp)
Criteria:

a) EP of 0-50%, efficient category
b) EP greater than 50% less efficient category

Supporting Services Subsystem

Supporting institutions that play a role in the development of Tilapia aquaculture in the Regency are government, extension workers, banking in

Kepahiang Regency. Analysis of the data used in the management of the supporting services subsystem by using descriptive qualitative.According to Maleong (2013) suggests that qualitative descriptive analysis is a research procedure that produces descriptive data in writing and orally from the behavior of the people being observed.This means that the analysis uses descriptive quantitative to describe a phenomenon, event, or event that occurs factually and accurately in accordance with the conditions in the field as it is.In this study, a description of the role of supporting services will be carried out in providing perceptions and narrative evaluations on the business activities of Tilapia Ponds in Calm Water (KAT). These observations and assessments are expected to provide solutions and directions for production progress.

RESULTS AND DISCUSSION

Analysis of Tilapia Aquaculture Production

Production Costs

Production costs are costs incurred by Tilapia Fish Farmers during the production process. There isThe three stages of the process during the production process are pond preparation, rearing, and harvesting. The following is a description as follows.

Table 4. Tilapia Production Cost

Production cost	Value (IDR/season (MT))
Variable Cost	
1. Equitment	
a) Lime	130,581
b) Fertilizer	42,624
c) Feed	3,232,043
d) Seed	1,694,892
e) Medicines	60,000
In family Employment	
a) Site Preparation	165,161
b) Fish Enlargement	562,500
c) Harvest	80.000
Out-of-family workforce	189.247
Total Variable Cost	**6,097,048**
Fixed cost	
a) Tax	9,817
b) Depreciation	93,161
Total Fixed Costs	102,979
Total cost	**6,200,027**

Source: Primary data processed (2022)

The costs above are costs incurred by farmers to carry out the production process. There are two kinds of costs, namely variable costs and fixed costs. The following is a description of these costs used in the stages of the production process as follows:

Site Preparation

There are two types of ponds for tilapia production in still water ponds, namely earthen ponds and cement ponds. Tilapia fish farmers in Kepahiang Regency 96.06% use earthen ponds, while 3.94% use cement ponds. The advantages of using earthen ponds are as a place for animals and plants to grow which are useful as natural food for tilapia. In preparing a Tilapia pond, there are several steps needed, namely drying and plowing, liming, fertilizing and irrigation. The pool preparation work is carried out by the workforce in the family. In table 5.2, it is known that the costs that should be incurred by farmers for labor costs in the family for pond preparation are an average of IDR164,211.

The first is done for pond preparation, namely drying and plowing the pond. After drying, plowing is carried out on the surface of the pond soil. The average area of the tilapia pond is 10m x 15m, the lime needed is an average of 10.6 Kg at a price of IDR 12,000/Kg. In table 5.2, farmers incur a liming fee of IDR 130,581 in one liming process. The next step is to fertilize with organic fertilizer or compost. Giving compost is done as a medium or a place to grow phytoplankton for tilapia natural food. The compost is spread evenly over the bottom of the pond. The average amount of fertilizer given is 10.8 kg at a price of IDR 4,000/Kg. Table 3 , the costs incurred by farmers for fertilizer costs IDR 42,624. The final step is to gradually infuse the water into the pool.

Fish Nurture

In the enlargement process, there are several steps needed, namely seed dispersal, feeding and drug administration. Tilapia enlargement process is carried out by labor in the family. In Table 3 , the costs that should be incurred by farmers for labor costs in the family are IDR 807661.Farmers sow an average of 5,973 fish, with a purchase price of IDR 291/head. In Table 3 , the average cost incurred by farmers to buy seeds is IDR 1,694,892. According to Djarijah (2002), 10-15 fish fry/m2 with a depth of 50-70. Tilapia fish farmers in Kepahiang Regency have an average pond size of 10 x 15 m, meaning that the pond is recommended to accommodate 1,500-2,250 fry. Meanwhile, farmers spread 5,973 fish, which means 41 fish/m2.

Farmers also provide additional feed derived from bran. The amount of feed given was 302 Kg with a purchase price of IDR 11,617/Kg. In Table 3 , the costs incurred by farmers for feed are an average of IDR 3,232,043 or around

48% of the total cost. Farmers overcome diseases and pests that attack Tilapia by giving inroflox drugs. In Table 3 , the costs incurred by farmers for medicines are an average of IDR 60,000. This inroflox drug is used to prevent and treat Tilapia so that it is not attacked by bacteria and viruses. As much as 28% gave inroflox to prevent tilapia disease, while 72% of farmers used the traditional method by putting one handful of salt or about 100-150 grams into pond water. According to Daelami (2017) that adding salt to pool water can minimize the presence of notonecta pests during cultivation. Salt solution can also prevent the development of microorganisms and fungi that attack the gills, skin and fins.

Harvest

The harvesting process is carried out by labor within the family and outside the family. In Table 3 , the costs incurred by farmers for labor costs within the family are on average IDR 807,661 and for labor outside the family, which is IDR 189,247. The harvesting process is carried out by closing the water channel door and opening the water outlet door. Usually farmers harvest when the big collectors have arrived or have made an appointment. This is because Tilapia cannot be moved to a basin or bucket. The harvest is directly weighed and put into plastic by adding oxygen. The equipment used for the harvesting process are waring, nets and tangguk. In Table 3 , the cost of depreciation of equipment incurred is IDR 93,161 and the tax fee is IDR 9,817. Farmers produce an average production of 406 Kg with a selling price of IDR 22,763/Kg.

Revenue, Income and Efficiency

Analysis of revenue, income and efficiency in this study aims to determine the level of efficiency of Tilapia aquaculture in Kepahiang Regency. Efficiency analysis can be measured by calculating the costs incurred by farmers and the income earned by farmers. The following is the value of revenue, income and cost efficiency incurred by Tilapia farmers as follows:

Table 5. Revenue, Income and Efficiency

Details	Value (IDR/season)
Revenue (Rp/MT)	9,152,366
Total Cost (Rp/MT)	6,200,027
Revenue (Rp/MT)	2,952,339
R/C	**1.7**

Source: primary data processed (2022)

One of the factors that affect production is the pond area and fish stocking density. According to Irwandi (2015), states that the wider the pond, the better for fish growth and increase production. A good pool area ranges from 100-500 m2. This is done to reduce competition for tilapia to get food and

oxygen in the pond. According to Djarijah (2002),stocking 10-15 fish seeds/m2 with a water discharge during maintenance of one liter/second for a pond area of 100 m2.

Calculation of tilapia rearing revenue is calculated based on one harvest season within 3-4 months with an average pond size of 10 x 15 m. The results showed that the total production of tilapia farmers in Kepahiang Regency was 406 kg, with an average weight of 100 grams/head. In table 5.3, the income received by farmers in Kepahiang Regency is IDR 9,152,366/MT and the income received by farmers is IDR 2.915.366/MT. In this study, it was found that 26% of farmers experienced losses, the income received was minus. In fact, many farmers do not realize that tilapia production business suffers losses. This is also supported by the results of business efficiency tests showing that tilapia production is worth 1.7, above one. This means that the Tilapia production business is efficient to run.

Tilapia Marketing Analysis

Marketing channels are often also called distribution channels, one of the main functions of the distribution channel (Distribution Channel). The marketing of Tilapia in Kepahiang Regency involves several marketing agencies, namely farmers, collectors, retailers and consumers. Based on the results of observations and interviews with 93 farmer respondents where to market Tilapia fish, three types of Tilapia marketing channels were obtained in Kepahiang Regency. Farmers are tilapia producers, collectors and distributors are marketing agencies and housewives are the end consumers.
The number of tilapia distributed in each marketing channel is as follows:

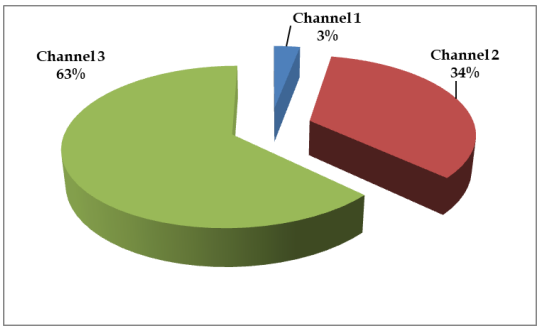

Figure 1
Number of Tilapia per Channel

The first channel involves farmers selling directly to housewives. The number of tilapia in the first channel is channeled as much as 3% of the total amount of tilapia production. The second channel involves farmers selling tilapia to retailers, then selling it back to housewives. The number of tilapia in the second channel was channeled as much as 34% of the total production.

Meanwhile, in the third channel, farmers sell to collectors, then collectors sell to retailers, then lastly retailers sell to housewives. The amount of Tilapia from farmers distributed to housewives is 63%. That is, channel three becomes the main channel. A more complete description of marketing agencies, margins and profits for each channel is as follows:

Marketing Channel I

The marketing agencies that play a role in the Tilapia marketing channel in Kepahiang Regency can be seen in the image below.

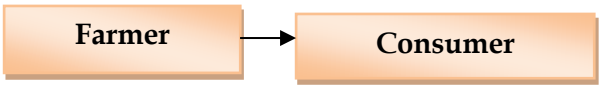

Figure 2.
Marketing channel I Tilapia

Farmers as tilapia producers are farmers who carry out production activities in Kepahiang District and Ujan Mas District, Kepahiang Regency. Consumers are housewives who are residents in the area around Kepahiang District and Ujan Mas District.In marketing channel one, farmers directly sell their produce to housewives who are usually from the same area as the farmers themselves.This one marketing channel, the buying price and selling price are determined by farmers. Farmers usually sellFishTilapia with prices ranging from IDR 22,000-23,000. The components of costs, profits and marketing margins of Tilapia in this marketing channel 1 can be seen in Table 6.

Table 6. Cost, Profit and Marketing Margin Components in channel 1

No	Marketing Institute	Value (IDR/Kg)
1.	**Farmer**	
	Tilapia Selling Price	22,818
	Marketing Cost	477
2.	**Consumer**	
	Purchase price	22,818
	Total cost	477
	Profit	22,341

Source: Primary data processed (2021)

In Figure 5.4 it can be seen that in the first marketing channel, farmers sell Tilapia directly to housewives with an average selling price of IDR 22,818/Kg. Marketing costs such as the cost of oxygen, bulk plastic, and scales, total IDR 717/Kg. Farmers do not incur transportation marketing costs, because housewives buy directly from farmers. Housewives who buy directly from farmers are usually for recitation events, social gatherings or weddings. The amount that housewives buy is in large quantities, around 10-50 kg with an

average purchase of 32 kg. Housewives buy directly at farmers' locations to get cheap buying prices from buying prices at the market, around IDR 25,000-28,0000/Kg.

The advantage of this channel is that farmers incur low marketing costs, namely IDR 477/Kg and housewives get a low purchase price, which is around IDR 22,818/Kg. The drawback is that this channel can only distribute 3% of tilapia from the total production of farmers in Kepahiang Regency.

Marketing Channels II

The marketing institutions that play a role in the Tilapia marketing channel II in Kepahiang Regency can be seen in the following figure.

Figure 3.
Marketing channel II Tilapia

Marketing channel II involves marketing institutions, namely farmers and retailers and end consumers. Diluters buy tilapia to farmers and come directly to the farmer's location. Then the retailer sells to housewives by selling using tables or traveling around using motorbikes. The number of tilapia distributed in channel II was 34%. The components of costs, profits and marketing margins of Tilapia obtained by farmers and diluents are in Table 7.

Table 7. Components of Costs, Profits and Marketing Margins II

No	Marketing Institute	Value (IDR/Kg)
	Selling price	22,724
1	Marketing costs	1.162
	Profit	21,561
	Retail Traders	
	Purchase price	22,724
	Selling price	28,000
2	Marketing Expenses	861
	Total marketing costs	2024
	Profit	4,415
	Margin	5,276

Source: Primary data processed (2022)

Farmers sell Tilapia to diluent traders with a selling price of IDR 22,724/Kg. Farmers incur marketing costs such as oxygen, large plastic, scales and labor, totaling IDR 1,162/Kg. Then the distributor sells to housewives at a selling price of 28,000. So that a marketing margin of IDR 5.276/Kg. Marketing costs incurred by diluents such as scales, asoy, labor,

transportation, knives, buckets, risk, total IDR 861/Kg. So that the profit obtained by the diluent trader is IDR 4,415/Kg.

The advantage of this marketing channel is that the amount of tilapia distributed in this study is quite large, namely around 34% of the total production of farmers. The drawbacks are that the total marketing costs are quite large, which is around IDR 2,024/Kg, and the selling price to housewives is quite large, which is around IDR 28,000/Kg.

Marketing Channels III

The marketing institutions that play a role in marketing channel III Tilapia in Kepahiang Regency can be seen as follows:

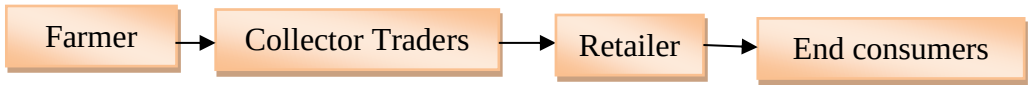

Figure 4
Marketing channel III Tilapia

Marketing channel III in this channel involves marketing institutions, namely farmers, collectors, retailers and consumers. Collector traders buy tilapia to farmers who come directly to the location. Then the collecting trader sells to the retailer at the point of sale or the collector trader's house. After that, the retailer sells to housewives using tables in the market or traveling around using motorbikes to sell fresh water fish. This marketing channel is more important because the amount of tilapia distributed in this channel is 63% of the total production of farmers. The components of costs, profits and marketing margins of Tilapia in these two marketing channels can be seen in Table 8

Table 8. Components of Costs, Profits and Marketing Margins III

No	Marketing Institute	Value (IDR/Kg)
	Farmer	
1.	Selling price	22,776
	Marketing Expenses	852
	Profit	21,924
	Collector Traders	
	Purchase price	22,776
2.	Selling price	25,000
	Marketing costs	504
	Profit	1,720
	margin	2,224
	Retailer	
3.	Purchase price	25,000
	Selling price	28,000

No	Marketing Institute	Value (IDR/Kg)
	Marketing costs	637
	Profit	2,363
	margin	3,000
	Total marketing costs	1993
	Total Profit	4,083
	Total Margin	5,224

Source: Primary data processed (2022).

Farmers sell Tilapia to collectors with a selling price of IDR 22,776/Kg. Farmers incur marketing costs for oxygen, plastic, scales, labor, a total marketing cost of IDR 851/Kg. The profit earned by farmers is IDR 21,924. Farmers do not incur marketing costs for transportation because the collectors come directly to the location.

Marketing costs incurred by collectors such as scales, large plastic, transportation, electricity, labor, buckets and risk costs total IDR 504/Kg. So that the profit earned by the collecting traders is IDR 1,720. Collector traders bring Tilapia to their homes or to places where Tilapia is sold.

Diluters buy Tilapia from collectors at a price of IDR 25,000/Kg. Then the diluent traders sell the fish to housewives by using tables in the market or traveling around using motorbikes. Marketing costs incurred by diluents such as scales, asoy, labor, cutting boards, knives, buckets and risk costs total IDR 637/Kg. The profit earned by the diluent trader is IDR 2,363.-

The advantages of this channel are that the amount of Tilapia distributed is 63% of the total production of farmers and the low marketing costs of IDR 1,993/Kg. The drawback is that the longer the marketing channel, the higher the selling price received by housewives.

Marketing Efficiency

The smaller the percentage obtained, the more efficient marketing activities. The efficiency level of the three tilapia marketing channels in Kepahiang Regency can be seen in Table 8.

Table 9. Efficiency of Tilapia Marketing Channels in Kepahiang District

No	Marketing channel	Marketing Expenses	Product Value	Efficiency (%)	Margin (IDR)
1	I	477	22,818	2.09	0
2	II	2023	28,000	7,26	5,276
3	III	1,781	28,000	6,36	5,224

Source: Primary Data Processed, 2022

In Table 8, the three marketing channels for Tilapia in Kepahiang Regency have been efficient. Measurement of efficiency by comparing marketing costs with product value multiplied by 100%. Based on the table, the three marketing channels have been efficient, with the percentage of channel I efficiency being 2.09%, channel II 7.26% and channel III 6.36%. The smaller the percentage obtained, the more efficient marketing activities. Based on the efficient value, channel one is more efficient. The smaller the existing marketing margin, the more efficient the marketing is. This is in accordance with Hanafie's statement (2010), that the level of marketing margins is used to measure marketing efficiency (depending on the marketing function being carried out).

Role of Supporting Institutions

The analysis used to answer this third objective uses descriptive qualitative to narrate the role of supporting institutions. Supporting institutions for tilapia production are the government, extension workers and banks. Researchers conducted interviews with questionnaire instructions to supporting institutions. The questionnaire is in the form of open questions (can be seen in the appendix of the three research questionnaires).Supporting institutions provide an overview of the condition of farmers as tilapia producers in Kepahiang Regency and provide information on the roles or contributions that can be made by supporting institutions for progress

Extension

In the fisheries extension process carried out by extension workers from the Department of Fisheries and Food Security of the Kepahiang Regency, the extension officers act as facilitators in providing information and providing training in developing the knowledge and skills of farmers. Farmers' perceptions of the role of extension agents in tilapia enlargement and marketing activities are classified into three parts, from disagreeing to agreeing. The following is the percentage value based on the role of the extension worker as follows:

Table 10 . Farmers' perceptions of the role of extension workers.

Attribute	Don't agree (%)	Enough (%)	Agree (%)
Visit the location once per month.	10.75	3,22	86.03
Discussion of problems	11.82	3,22	84.96
Cultivation training	44.08	9,6	46,32
Brochure distribution	62,36	15.05	22.59
Problem solution	27.95	3,22	68,83

Source: primary data processed (2022)

Based on table 9, farmers' perceptions of the role of extension agents in the process of growing and marketing Tilapia. As many as 86.03% of farmers said that extension workers visited the location at least once a month. This is done to see the potential of the area as well as to see the conditions and circumstances of growing tilapia owned by farmers. 84.96% of farmers stated that extension workers held discussions with farmers to accommodate suggestions, opinions and farmers' constraints in the process of growing Tilapia. Extension officers also act as motivators, encouraging farmers that tilapia business in still water ponds can be used as the main source of income and can provide maximum results. This must be accompanied by farmers who follow production procedures in accordance with technical instructions.

Government

Government at lower levels is usually given the responsibility to carry out coaching on the intended subject. This responsibility must be carried out in earnest from the government down to the layers of society. In terms of national development to be achieved can be implemented properly. This coaching is not only in the form of materials, but can also provide motivation and support so that we can raise awareness together to always participate actively in agricultural development.

In this study interviews were conducted to see farmers' perceptions of the government's role in Tilapia enlargement activities. Based on the results of interviews and observations in the field, the percentage values obtained from disagreeing to agreeing from the perceptions of farmers are as follows:

Table 11 . Farmers' perceptions on the government's role

Government Role	Don't Agree(%)	Enough (%)	Agree (%)
Distribution of feed assistance	2.16	0	97.84
Distribution of tools/machines	2.16	0	97.84
Sufficient needs	63.44	20.43	16.13
According to the needs	52.69	11.83	35.48
Obstacle resolved	80.65	6.45	12.90

Source: primary data processed (2022)

Based on table 10, it is known that 97.84% of farmers stated that the government distributed feed assistance and tools/machines for making feed to farmers. The government from the Department of Fisheries and Food Security of the Kepahiang Regency provided a program for distributing production facilities for tilapia cultivation in still water ponds. The procedure that needs to be carried out is through a proposal process addressed to the government of the Department of Fisheries and Food Security of the Kepahiang Regency. Submission of proposals is carried out by farmer group institutions where the

fishery group has a minimum of 10 members. After that, the department will check the locationfarmerto see field conditions. Proposals will be processed for the provision of production facilities assistance.

Based on table 5.9 above, it is known that 63.44% of farmers stated that the distribution of feed and tools/machines from government programs was not sufficient for farmers' feed needs. There were 52.69% of farmers who stated that the distribution of tool/machine assistance from government programs did not meet the needs of farmers. The following is the percentage of recipients of feed assistance and tools/machines from the distribution of government programs as follows:

Table 12. Government Assistance for Tilapia Cultivation

Support	Amount	Recipients of assistance (%)
Feed (Kg/Year)	772.38	27.63
Feed Machine (unit)	5	17.8

Source: primary data processed (2022).

The assistance received was in the form of tilapia feedin package form once a year.The feed given is 772.38/year, in one year the average farmer produces Tilapia fish three times, so the feed value received by farmers is 257.46 kg in one production. Weaknesses in the distribution of this feed aid are uneven distribution. The amount of feed provided from government assistance is quite large, it's just that only 27.63% of all farmers receive this assistance. This means that the distribution of government assistance has not been evenly distributed to all farmers in Kepahiang Regency. This can happen allegedly due to the low activity of farmer groups, so that they are not administratively complete to get feed assistance or are late in submitting feed assistance proposals to the government.

In this study interviews were also conducted with government agencies through open questions discussing the government's role in growing Tilapia in Kepahiang Regency. This is done to find out the problems faced by the government as facilitators and farmers in the process of Tilapia enlargement activities. The government from the Department of Fisheries and Food Security of the Kepahiang Regency assesses that there are several things that need to be improved in the following areas: (i) The budget for developing Tilapia fish farming is further increased, (ii) Quality human resources, farmers have more adequate knowledge and skills in the development of still water pond fisheries, (iii) Innovative feed manufacturing was carried out to overcome the high price of feed, and (iv) It is necessary to increase superior tilapia breeders in order to produce quality tilapia seeds.

Banking

In this study interviews were also conducted with farmers regarding the role of BRI banking as a supporting institution that provides savings and loan services in assisting the process of growing tilapia. Following are the results of the interviews presented in the table looking at the percentages of disagreeing to agreeing regarding farmers' perceptions of the role of banking as follows:

Table 12 Farmers' perceptions of the role of banking

Banking role	Don't agree (%)	Neutral (%)	Agree (%)
Savings/loan services	30.11	8.60	61.29
Access credit application information	30.11	7.53	62.36

Source: primary data processed (2022)

Based on table 12 above, as many as 61.29% to 62.36% of farmers stated that banks provide savings and loan services and provide easy access to information on credit applications. Meanwhile, 30.11% of farmers stated that banks did not provide savings/loan services and it was easy to receive access to information regarding credit applications. So it can be concluded that the savings/loan services from banking institutions to the agricultural sector are not evenly distributed. This is because banks have principles and prudence in credit applications.

CONCLUSIONS AND POLICY IMPLICATIONS

Conclusions

Conclusions on research as follows:

1. Tilapia production process income received by farmers is IDR 2,952,339, - The production process is included in the efficient category with an R/C Ratio value of 1.7 or > 1.
2. The Tilapia marketing channel in Kepahiang Regency consists of three marketing channels.
   These three marketing channels are considered efficient. Channel three is the main channel in marketing Tilapia in Kepahiang Regency.
3. The role of extension agents in tilapia procduction activities including attending farmsites, discussing with farmers and conducting training. The government's role involve providing feed assistance and tools/machines for making feed while the role of banking are providing convenience and access to information in applying for credit.

Suggestion

Suggestions that can be built from this research are as follows:

1. Stocking density of 10-15 fish/m2 from fish ponds and water discharge of 1 liter/second can help the growth of tilapia. This can prevent fish competition, lack of oxygen and maintain water quality from the rest of fish metabolism.
2. Marketing of Tilapia Channel III is the main channel that can accommodate large quantities of farmers' production. Therefore, good cooperation between marketing agencies is needed.
3. Extension officers are needed to increase human resources in managing tilapia fishery production in Kepahiang Regency. The government in distributing assistance for tilapia production facilities needs equity by conducting a thorough re-data collection so that it can touch all fish farmers. Banking can increase the provision of credit in agriculture.

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