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Analysis of freshwater ornamental fish production (goldfish, koi, and Betta fish) in Tulungagung district, East Java, Indonesia

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ABSTRACT

Freshwater ornamental fish such as carp, koi, and betta fish is a kind of a very potential happy developed in the Tulungagung district. The total production in the last 3 years is still above the average production of other freshwater ornamental fish. This study aims to know the best influence on the production of freshwater ornamental fish by the influence of capital, cultivation pond, manpower, and technology. The method of research used is by the purposive sampling method of predetermined culture. Furthermore, the data that has been in can be inserted into SPSS 18 which is in multiple linear regression. The results of this research show that on the cultivation of goldfish, the production factor has a significant effect on the production and the technology variable has the highest beta coefficient of 0.364. For the cultivation of Koi fish, the production factor does not have a significant influence on the production, and the technology variable has the highest beta coefficient of 0.462. For betta fish farming, production factors have no significant effect on production variable and capital variables have the highest beta coefficient of 0.353 which means that production variables are heavily influenced by modal variables. Based on the results of the research can be concluded that out of all production factors, technology has the most influential likelihood on the marketing of freshwater ornamental fish.

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1. Introduction

The development of aquaculture and the marine sector are part of the National Development program. It aims to allow each fishery and marine activities program conducted by all citizens,

whether in production, processing, or Marketing. Economic development in an area based on the economy of each area is free to apply and develop in the region. The pattern of growth and utilization of existing resources and found in a city should be able to be optimally utilized. It is intended to provide economical income between one space and other regions (Buletin Geometri, 2017).

Efforts to achieve that goal to be more directed, then the wisdom that was taken as the implementation of fisheries development operations is to be guided to the increase of production and productivity and fisheries business that aims Improving the welfare of fish and fishers farmers through the extensification, intensification and rehabilitation with market orientation products, the development of quality of the favored fishery commodity selection (DKP, 2009).

The development of the Indonesian ornamental fish world is now increasingly rapid, characterized by the increasing animal society of ornamental fish. So ornamental fish farming business is one of the efforts that provide an alternative source of income to increase income for farmers or ornamental fish entrepreneurs. This is due to the cultivation of ornamental fish has the advantages of which, namely the technology is easily absorbed and applied, ornamental fish cultivation can be cultivated in the household scale, do not require too full land, turnover Capital is fast, can be harvested in a short time, and the market share promising both domestic and export (Kusniati, 2007).

The most ornamental fish producing areas in Indonesia are East Java, West Java, North Sumatera, Riau, Jambi, East Kalimantan, West Kalimantan, South Sulawesi, Papua. In the areas of Sumatra, Jambi, Riau, Kalimantan, Sulawesi, and Papua rely on ornamental fish resources from the natural catch. While in the East Java and West Java region for the production of ornamental fish is dominated by cultivation. East Java is the biggest ornamental fish supplier for the exporter with the production of ornamental fish commodity namely koi fish and goldfish (Service Marine and Fisheries Tulungagung District, 2018).

Tulungagung Regency comes in the Golden Triangle of East Java ornamental fish beside Kediri and Blitar. With the role of each of which the district of Tulungagung is a large production center of ornamental fish in East Java. Freshwater or land fisheries can thrive because of the abundant source of groundwater. Production of freshwater ornamental fish in Tulungagung has become a livelihood that is so vital to society and becomes an alternative to increase foreign exchange through the process of exporter of freshwater fish in Indonesia (Mulyadi, 2005).

Theoretically business profits are determined by production, selling price, and production costs. Production is one of the factors that can be controlled by producers as business actors, while the price of outputs and inputs are formed by market mechanisms beyond the control of businesses. Production is influenced by inputs used in business. These factors include land or soil, capital, labour, and technology management. The efficient use of production factors will result in optimal production increases. Efficiency in a production process has significance in the effort to increase revenue. If production efficiency is executed correctly it will encourage the use of production factors optimally, which will further provide the maximum benefit for the business actors (Nevy,2013).

To find out the factors that can increase the production yield of freshwater ornamental fish above, then the author will try to examine whether the factors can improve the production of freshwater ornamental fish. With the efficient use of resources, it will get optimal results.

2. Material and methods

This study was held in January 2019, located in 3 (three) sub-district, Tulungagung Regency, East Java. The tools and materials used in this research process is the primary data related to the

production of freshwater ornamental goldfish, namely goldfish, Koi fish, and betta fish in Tulungagung District. The method of determining the location and data collection using Purposive Sampling, which is the respondent chosen, is the person who is considered to understand all information in the cultivation of ornamental fish and understand the problems that occur in the district Boyolangu, Tulungagung Sub-district and Kedungwaru sub-district.

Data is obtained through direct observation techniques through termination and interviews that are accompanied by the recording of the target object's circumstances or behavior. The data collected is the primary data and secondary data. Primary data collection is done by direct interviews to farmers by using a list of questions that have been prepared. Secondary data is obtained from departments and agencies related to research in order to obtain information that can strengthen the research results. Data is analyzed in a qualitative descriptive and quantitative description. Qualitative descriptive analysis is conducted through logic considerations by using sentences from authors systematically based on observed behavior. Quantitative analysis using mathematical calculations such as summation, percentage and average numbers (Umar, 2004).

In this step will be known a number of acceptable or feasible factors representing a set of analyzed variables. In these studies, the variables analyzed were grouped into one factor, but for analysis and subsequent inner achievements were based on the results of statistical analysis by analyzing the influence of working capital, area of pool, labor, and Production technology of freshwater ornamental fish to the production level of goldfish, koi fish, and betta fish in Tulungagung regency. The Data obtained will be analyzed with SPSS 18. The equation of multiple linear regression according to Walter (2002) is as follows:

$$\mathbf{Y = a + bX_1 + bX_2 + bX_3 + bX_4 + e}$$

Where:

Y = revenue-Cultivination variable
a = value constants
b = regression coefficient
X_1 = Working capital
X_2 = Pool area
X_3 = Labor
X_4 = Technology
e = Standart Error

The variable definition of variables affecting revenues and measurements can be explained in order to get a common understanding of the concepts in the study, namely:

1. Income farmers (Y) is the advantage obtained by farmers from the cultivation activities of goldfish is the result of the reception of farmers minus the total cost used in the cultivation process of goldfish in units of rupiah (RP).
2. Working capital (X1) is the operational cost used to buy seedlings, feed, and medicines in groups of thousands of rupiah.
3. The area of the pond (X2) is the area of a fishery that is the pond in m^2.
4. Human resources (X3) the amount of labor employed in catfish farming efforts by using a unit of people.
5. Technology (X4) technology used cultivation fisheries differentiated between advanced technology options and simple techniques. Simple technique is a technology that is easy to understand, inexpensive and has a low production scale, while modern technology is a technology that has a multiple difficulty level and high production scale. Data obtained is

nominal data with a value of 1 (modern) and 2 (simple). Then for the analysis needs, the data is converted into dummy 1 (modern) and 0 (simple). So the technology variable (D) is a dummy variable.

3. Results and Discussion

3.1. Overview of fisheries in Tulungagung district.

Location of the geographical area of Tulungagung regency with an area of 105,565 Ha with varying topographical conditions consisting of low, medium, and high plains with a flat configuration, hills, and mountains and directly adjacent to the ocean Indonesia makes Tulungagung district has marine potential and fisheries are quite abundant. Tulungagung Regency is one of the centers of ornamental fish producers in East Java province or often called the Golden Triangle area of ornamental fish consisting of Kediri regency with the flagship commodity of Fish Cupang/Betta, Blitar with products Seeded Koi Fish and Tulungagung District with the most commodities ornamental fish goldfish. Goldfish ornamental fish are many in the district of Boyolangu, Kedungwaru, Sumbergempol, and Tulungagung. The marketing areas are Malang, Surabaya, Semarang, Yogyakarta, Jakarta and Bali. 2017 has been working with exporters in Tangerang to export to foreign countries.

Table 1. Ornamental fish production and value

Fish Type	2013	2014	2015	2016	2017
Production (fish)	57,877,721	59,431,072	48,543,109	44,560,665	50,968,753
Production value (Million Rp)	227,585.40	171,441.62	116,147.00	98,848.97	75,353.37

Source: Fisheries Office of Tulungagung Regency, 2018

Marketing is the spearhead of ornamental fish farming activities because the purpose of cultivation is the advantage. So that sales and more prices of the cost of cultivation are expected for the respondent.

Table 2. Ornamental Fish Production Volume

Commodities	2014	2015	2016	2017
Cupang	2.001.900	1.323.264	1.487.404	1.454.521
Koi	2.365.279	1.647.476	1.090.021	879.646
Koki	21.686.980	17.336.979	18.039.784	12.925.611

Source: Fisheries Office of Tulungagung Regency, 2018

Referring to the results of the research on the production of freshwater ornamental fish (table 2) especially in the goldfish, koi fish, and betta fish for the last four years in Tulungagung East Java district, obtained data that the volume of ornamental fish production according to commodities 2014-2017 experienced a pretty significant ride down. According to (Soekartawi, 1996), the function of output is a function that indicates the relationship between the physical production with the production factors (input). Inputs such as ponds, labor, capital, technology and so on it affect the massive production of the product obtained. Because the chef carp farmers, koi fish, and betta fish know how many inputs are used, then it can guess how many production factors are produced.

3.2. The role of the fish farmers group.

This group of fish Farmers (POKDAKAN) can assist in market certainty, input storage certainty, and the place of technological adoption. Also, it can provide cultivation techniques and counseling as well as an organization of farmers in marketing outputs and providing inputs collectively. With the institutional-like, this is a first step that can help in the process of ornamental fish productivity in the district Tulungagung.

The emergence of various difficulties experienced by farmers in resource capabilities and capital constraints. The idea of the fishery group allowed the farmers to develop skills and experience in the field of business. The empowerment Program of the Fish Farmers Group (POKDAKAN) is summarized in the development activities of rural Mina farming aquaculture (PUMP-PB) as a means of providing direct aid of the community to build a thriving business for all Group members. This means the existence of the Fish Farmers Group, whose members are engaged in small business in the field of fisheries, is expected to be a milestone in the excavation potential of the region and build a community economy. Development in question is participatory development, which is the development of the mission to, from, and by the people of Gunawan (2005) as a step-reformer agent to become an empowered agent that has been passed by POKDAKAN. It is evident from the existence of Change of economic business activities undertaken by farmers.

3.3. Data analisys using SPSS.

3.3.1. Goldfish.

Dependent variables on multiple regression test results are production (Y) while the independent variable is capital (X_1), Aquaculture Pond (X_2), Manpower (X_3), and Technology (X_4). Regression models based on analysis results (see Appendix 6), are:

$$\mathbf{Y = 9.571 + 0.261\ X_1 - 0.242\ X_2 + 0.025\ X_3 + 0.270\ X_4 + e}$$

Based on the analysis that has been done obtained the Adjusted R Square value of 0.212 or 21.2 % (see Appendix 7). That is, the magnitude of variable influence capital (X_1), cultivation Pool (X_2), labor (X_3), and Technology (X_4) to Production (Y) is 21.2 %. While the remaining influences of 78.8% are described by other variables not examined in this study.

Table 3. Partial test result (test t)

Free Variable	$T_{calculation}$	Sig. t	T_{table}	Description
Capital (X_1)	1,900	0,065	2,021	not significant
Cultivation Pool (X_2)	-0,998	0,324	2,021	not significant
Employment (X_3)	0,094	0,925	2,021	not significant
Technology (X_4)	2,407	0,021	2,021	significant

On the hypothesis testing, the influence of Modal variables (X_1) on production (Y) obtained Thitung amounted to 1.900 with a significance value of 0.065. The statistical value of the Thitung test is smaller than the This (1.900 < 2.021), or the significance value is greater than α = 0.05, then the capital variable deduced (X_1) partially does not give a significant effect to the production variable (Y).

In the variable testing of the cultivation pool (X_2) on production (Y), obtained Thitung amounted to 0.998 with a significance value of 0.324. The statistical value of the Thitung test is smaller than a This (0.998 < 2.021), or the significance value is more significant than α = 0.05 then inferred the cultivation pool variable (X_2) partially does not have a significant effect on the production variable (Y).

At the test of the labor variable hypothesis (X_3) on production (Y), obtained Thitung amounted to 0.094 with a significance value of 0.925. The statistical value of the Thitung test is smaller than the This (0.094 < 2.021), or the significance value is greater than α = 0.05, then the deduced Labor variable (X_3) partially does not give a significant effect on the production variable (Y).

In the technology variable hypothesis (X_4) testing of production (Y), obtained Thitung amounted to 2.407 with a significance value of 0.021. The statistical value of the Thitung test is higher than this (2.407 > 2.021), or the significance value is less than α = 0.05; hence, the conclusion technology (X_4) variable will partially give a significant effect on the production variable (Y).

3.3.2. Koi Fish.

Dependent variables on multiple regression test results are production (Y) while the independent variable is capital (X_1), Aquaculture Pond (X_2), Manpower (X_3), and Technology (X_4). Regression models, based on analysis results, are:

$$\mathbf{Y = 14.882 - 0.102X_1 - 0.166X_2 - 0.254X_3 + 0.308X_4 + e}$$

The magnitude of the variable influence of capital (X_1), Aquaculture Pond (X_2), Manpower (X_3), and Technology (X_4) for production (Y) is 5.8 % while the remaining influences of 94.2 % are described by other variables outside of the regression equation or which are not examined in this study.

Table 4. Partial test result (test t)

Free Variable	$T_{calculation}$	Sig. t	T_{table}	Description
Capital (X_1)	-0,434	0,667	2,021	not significant
Cultivation Pool (X_2)	-0,737	0,465	2,021	not significant
Employment (X_3)	-1,257	0,216	2,021	not significant
Technology (X_4)	2,229	0,032	2,021	significant

On the hypothesis testing, the influence of Modal variables (X_1) on production (Y) obtained Thitung amounted to 0.434 with a significance value of 0.667. The statistical value of the Thitung test is smaller than the This (0.434 < 2.021), or the significance value is more significant than α = 0.05, then the capital variable deduced (X_1) partially does not give a substantial effect to the production variable (Y).

In the variable testing of the cultivation pool (X_2) on production (Y), obtained Thitung amounted to 0.737 with a significance value of 0.465. The statistical value of the Thitung test is smaller than a This (0.737 < 2.021), or the significance value is more significant than α = 0.05 then inferred the cultivation pool variable (X_2) partially does not have a considerable effect on the production variable (Y).

At the test of the labor variable hypothesis (X_3) on production (Y), obtained Thitung amounted to 1.257 with a significance value of 0.216. The statistical value of the Thitung test is smaller than the This (1.257 < 2.021), or the significance value is more significant than α = 0.05, then the deduced Labor variable (X_3) partially does not give a substantial effect on the production variable (Y).

In the technology variable hypothesis (X_4) testing of production (Y), obtained Thitung amounted to 2.229 with a significance value of 0.032. The statistical value of the Thitung test is higher than this (2.229 > 2.021), or the significance value is less than α = 0.05; hence, the conclusion technology (X_4) variable will partially have a significant effect on the production variable (Y).

3.3.3. Betta Fish.

Dependent variables on multiple regression test results are production (Y) while the independent variable is capital (X_1), Aquaculture Pond (X_2), Manpower (X_3), and Technology (X_4). Regression models based on analysis results can be viewed (Appendix 26), are:

$$\mathbf{Y = 7.032 + 0.271X_1 + 0.055X_2 + 0.157\ X_3 - 0.082X_4 + e}$$

Based on the analysis that has been done, obtained the Adjusted R Square value of 0.027 or 2.7 %. That is, the magnitude of variable influence capital (X_1), cultivation Pool (X_2), labor (X_3), and Technology (X_4) to Production (Y) is 2.7 % while the remaining influences of 97.3 % are described by other variables outside of the regression equation or which are not examined in this study.

Table 5. Partial test result (test T)

Free Variable	$T_{calculation}$	Sig. t	T_{table}	Description
Capital (X_1)	1,987	0,054	2,021	not significant
Cultivation Pool (X_2)	0,488	0,628	2,021	not significant
Employment (X_3)	0,761	0,451	2,021	not significant
Technology (X_4)	-0,654	0,517	2,021	significant

On the hypothesis testing, the influence of Modal variables (X_1) on production (Y) obtained Thitung amounted to 1.987 with a significance value of 0.054. The statistical value of the Thitung test is smaller than the This (1.987 < 2.021), or the significance value is more significant than α = 0.05, then the capital variable deduced (X1) partially does not have a considerable effect on the production variable (Y).

In the variable testing of the cultivation pool (X_2) on production (Y), obtained Thitung amounted to 0.488 with a significance value of 0.628. The statistical value of the Thitung test is smaller than this (0.488 < 2.021), or the significance value is more significant than α = 0.05; hence, the inferred pond cultivation variable (X_2) partially does not have a considerable effect on the production variable (Y).

At the test of the labor variable hypothesis (X_3) on production (Y), obtained Thitung amounted to 0.761 with a significance value of 0.451. The statistical value of the Thitung test is smaller than the This (0.761 < 2.021), or the significance value is more significant than α = 0.05, then the deduced Labor variable (X_3) partially does not give a substantial effect on the production variable (Y).

In the technology variable hypothesis (X_4) testing of production (Y), obtained Thitung amounted to 0.654 with a significance value of 0.517. The statistical value of the Thitung test is smaller than this (0.654 < 2.021), or the significance value is more significant than α = 0.05, and the unconcluded technology (X_4) variable partially does not have a significant effect on the production variable (Y).

4. Conclusion.

The productivity of the freshwater ornamental fish business in the period of the last three years decreased drastically. The role of POKDAKAN in Tulungagung District is helpful in market certainty, the assurance of input storage, and the place of technology adoption. Besides, it can provide cultivation techniques and counseling as well as an organization of farmers in marketing outputs and providing inputs collectively. The first factor is the working capital, where the research result shows that the Modal variables partially do not have a significant effect on the production variables. The second factor is the cultivation pond partial does not have a substantial impact on the production variables. Where it can be concluded that having a vast land in cultivation has not been biased as a reference for success process cultivation. The third factor is the labor variable, which also partially does not have a significant effect on the production variables. The fourth factor is a technology variable which partly gives a substantial impact on the production variable.

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