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Analysis of capture fish demand in Indonesia

Firmansyah¹, Shanty Oktavia^{2*}, Ryan Prayogi¹, Dita Wahyu Puspita¹

¹Department of Economics, Universitas Diponegoro, Jl. Prof Sudharto SH, Tembalang, Semarang, Central Java Province, Indonesia

²Faculty of Economics, Semarang State University Jl. Sekaran, Gunung Pati, Semarang, Central Java Province, Indonesia

*Corresponding author: oktavia@mail.unnes.ac.id

Abstract. Indonesia has a large population that faces food supply problems in the future, when it is estimated that Indonesias population will reach 300 million by 2045. To ensure the availability of accessible food with sufficient quality and quantity, appropriate policies are needed to overcome the problem originating from the supply and demand side. This study analyzes the domestic capture fish demand, which is influenced by the determinants such as fish price levels, the prices of product substitution of fish and income. By employing the data panel with fixed effect model (FEM) and random effect model (REM), the relationships of the dependent and independent variables are estimate. This study finds that income affected by the capture fish demand positively and elastic. The results of this study identified that one percent increase in income could increase capture fishery demand in Indonesia by 1.26 percent.

1. Introduction

Indonesia is the fourth most populous country in the world, which by 2045 is projected to reach 318,9 million people [1]. As one of the the largest archipelago in the world, Indonesia consists of 17,504 large and small islands [2]. Nearly two-thirds of Indonesia is the water in which there are abundant water resources, which is evidenced by the Gross Domestic Product of the Indonesian fisheries sector in 2018 of IDR 385.9 Billion [3]. The wealth of these water resources are able to support the people's live in Indonesia.

However, the wealth of water resources has not been optimally utilized by the community. It appears in the data on yearly fish consumption per capita that Indonesian people are lower compared to other countries. Indonesian fish consumption in 2013 was 28.17 kg per capita/year, while the consumption of fish from neighbouring countries such as Malaysia was 58.97 kg per capita/year, Brunei Darussalam was 46.7 kg per capita/year, the Philippines was 31.58 kg per capita/year [4].

There are several benefits of the demand for fish in the community increases. Consuming relatively large quantity of capture fishery is able to encourage better community nutrition adequacy based on the Desirable Dietary Pattern (DDP). Besides that, with the increase of the capture fishery demand, the impact on fishermen welfare is better too. In addition, an increase in demand for capture fishery in the community shows the optimization of the utilization of aquatic resources so that awareness of environmental preservation both from the community and the government also increases because of the importance of the sea as a source of life.

Microeconomic theory explains that the relationship between income and the quantity of goods demanded is positive. This means that the increase of individual income increase the amount of goods demanded. However, for some goods, the amount demanded may decrease because income increases in some ranges, this is called inferior goods [5].

Besides being influenced by income, the demand for the quantity of goods is also affected by the price of the goods themselves. Rising prices cause a shift in the indifference curve lower. The income effect and the substitution effect cause the quantity of goods demanded to fall due to price increases. However, the price



of substitution goods also affects the quantity of goods demanded, the tendency is that if the price of replacement goods falls, then the number of primary goods requested will go down and switch to substitute goods [5].

In empirical work, demand elasticity is often used to summarize how individuals react to changes in prices and incomes. The most important elasticity is the price elasticity of demand. It measures proportional changes in quantity in response to changes in price of 1 percent. The same elasticity can be defined for movement along compensated demand curved.

The study in Japan showed that the income elasticity of seafood commodities was positively elastic [6]. This study is in line with the study in Java Island [7]. The study in Philippines found the income and fish prices affect the fish demand [8]. The study of the demand for canned tuna in the United States found that the relationship price and the demand canned tuna was inelastic [9]. The study on the demand for catfish in Bandung, Indonesia found that the broiler chicken is a substitute of the catfish, and has a positive effect on catfish demand and elastic [10].

This research is important to give consideration in the formulation of policies regarding the use of water resources, more specifically capture fisheries. The right policy will have an impact on the community, both in terms of income of coastal communities and improving the overall nutritional quality of the community as previously explained. This study aims to analyze this problem from an economic perspective.

2. Research Method

This study is conducted to analyze the effect of personal income, capture fish price and meat price as substitution of capture fish on the demand fish in Indonesia. The data used are the secondary data of 32 provinces in Indonesia along 2013-2017, which was collected from Ministry of Agriculture and Statistics Indonesia (*BPS*). The analytical model used is the econometric regression of data panel model intended to figure out the most efficient estimation result due to the increasing number of observations which implications may improve the degree of freedom. The approaches used for data panel are both fixed effect model (FEM) and random effect model (REM) [11][12].

The model analyzes the influence of personal income (INCOME), fish price (FISH_PRICE) and price of meat proxied with farmer's term of trade of livestock (MEAT_PRICE) on the capture fish consumption per-capita per year (CONSUMPTION). Capture fish demand equation is stated as follows:

$$\text{LNCONSUMPTION}_{it} = \beta_0 + \beta_1 \text{LNINCOME}_{it} + \beta_2 \text{LNFISH_PRICE}_{it} + \beta_3 (\text{LNMEAT_PRICE})_{it} + u_{it}$$

where LN indicate the natural logarithm, u points the error terms, i shows the observations based on provinces and t shows the observations based on the time series.

3. Result and Discussion

By employing FEM and REM, the study finds that the community income variable has a significant effect on the variable of fish consumption. However, according to the Hausman Test (chi s statistics = 24.814625) shows that the use of REM is rejected, so FEM is used as the empirical model. The estimation results of FEM and REM are shown in Table 1.

Table 1. Estimation Result

Variable	FEM		REM	
	Coefficient	t-Statistic	Coefficient	t-Statistic
C	-8.758316	-6.121149***	-6.503308	-4.840821***
LNINCOME	1.269825	7.551457***	0.986277	6.35972***
LN FISH PRICE	-0.072819	-0.82294	-0.030158	-0.343138
LNMEAT PRICE	0.164881	1.455061	0.196002	1.744205*

Notes: ***) Significant at 1%, **) Significant at 5%, *) Significant at 10%

The estimation results show that all direction variables are in accordance with the theory that income and meat price have a positive effect on the quantity of demand, and the price of capture fish has a negative effect on the quantity of demand. Statistically, the estimation results show that community income significantly influences capture fish demand, where every increase in income by 1%, the demand of fish per capita increased by 1.26%. So it can be seen that the elasticity of people's income towards capture fish demand is elastic. Based on the t-table value of 1.65, the study finds also that the fish prices has no statistically significant effect. The price of meat as capture fishery substitution indicates a positive relationship to capture fish demand, but it is not statistically significant because t-statistic less than t table [12].

The results of this study are in line with another research which was utilized an error correction model to show that the income affects fish consumption in the long run Indonesia, whereas it has no statistically significant effect in the short run [13]. According to several studies which were conducted in several countries also reveal that income significantly influences fish consumption and demand [7][14]. Although the variable price of meat as a substitution of fish shows a positive sign that confirms the theory, even if this study shows the not statistically significant relationship. This means that the price of meat has no effect on the demand for capture fish in Indonesian society.

4. Conclusion

The study results exhibit that individual income affects capture fish demand positively elastic. In addition, the price of fish has a negative but not significant effect on capture fish demand. This is possible because of the increased of public awareness to consume capture fishery. Likewise, the price of meat as a substitute product for fish has a positive but not significant effect. So that, the study suggests the policy to improve the welfare of fishermen by optimizing of the use of water resources, and the policy on improving the quality of community nutrition by increase community income such as raising the minimum wage, controlling the price of goods and services, and providing subsidies to the community.

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