

**THE CHALLENGE OF IMPROVING FISH CONSUMPTION IN DEVELOPING COUNTRY  
: THE CASE STUDY OF INDONESIA**

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**ABSTRACT**

The fisheries sector is an important contributor to the Indonesian economic in term of protein supply, employment and income generation. Average per capita of fish consumption was 18,00 kg in 1990 and 22,84 kg in 2002. In the last 13 years, the dietary life of Indonesian people mainly consist of cereal 194,55 kg, starchy roots 67,46 kg, oilcrop and vegetable oils 53,08 kg, fruit 31,35 kg, vegetables 23,59 kg, fish and aquatic product 16,60 kg, sugarcrops and sweetener 15,14 kg, meat and offals 10,31 kg, milk 5,48 kg, pulses 3,88 kg, eggs 2,52 kg, and others 3,06 kg per capita per year.

The demand for fish is facing an inelastic demand function. Fish, however, account for more than 60% of animal protein consumed in Indonesia. Fish consumption in urban area is slightly higher than that of rural area, the dominant fresh fish consumed are indian mackerel, skipjack, eastern tuna, tilapia, milk fish and for processed food are anchovies, indian mackerel, trevallies, tilapia. Total expenditure items for consumer who monthly per capita income above Rp 300,000,- was spent 33.14% for food which are 4.38% for cereal, 2.18% for fish, 5.90% for meat, eggs, milk and consumer who monthly per capita income less than Rp 150,000,- was spent 72.32% for food which are 31.54% for cereal, 8.39% for fish, 0.36 for meats, egg, milk.

Fish is the main source of protein especially for lower income, therefore, increasing fish consumption is depending on improving of people's purchasing power and availability of fish within affordable price range. Based on static demand analysis income elasticity of demand of fish was 0.506 which showed per capita income definitely increase fish consumption, demand of fish is inelastic with elasticity of price -0.102 and the cross price elasticity of chicken and eggs were 0.028 and 0.271 both products are substitute for fish especially for higher income. The dynamic model of demand analysis explained fish consumption is related to a psychological fish-buying habit, this condition support the phenomenon of higher consumption of fish in coastal area but this habit is eroding quiet rapidly. The short run marginal propensity to consume is relatively low (0.17) which is consistent with lower growth of fish consumption but the long run marginal propensity to consume is higher (0.701) which means promising growth in fish consumption in the future. The expected increase in consumption in the future is not only because of habit, but is also due to the increase in per capita income. The dynamic analysis showed sizeable differences between the short and long run elasticities and the adjustment coefficient is low. The finding indicated that per capita consumption of is growing but at a slow rate. Therefore, policy to enhance consumer's preference towards fish by extension, advertising and increasing purchasing power especially in the densely populated areas, could boost fish consumption in Indonesia at a faster rate.

**Keywords:** fish consumption, demand analysis, price elasticity, Indonesia

**Background**

Fisheries sector has significantly contributed to Indonesian economy through protein supply for the human consumption, providing employment opportunities, increasing national income from export activities as well as increasing income of the people. In 2003, national fisheries production has reached in the level of 5.9 million ton with growth rate of 5.21 % per year during 2000-2003. Of this production,

395.5 thousand ton has been exported resulting export value as of US\$2,4 billion or US\$ 6.15 per kg in average (MMAF, 2003). From the perspective of human consumption, it is also revealed that consumption level of fish has increased from 18 kg/capita/year in 1990 to 22.84 kg/capita/year in 2002.

Nevertheless, compare to other country, the level of fish consumption per capita in Indonesia is still lower than of, for example, ASEAN countries. Fish consumption in Singapore is recorded to be 80 kg/capita/year, Malaysia 45 kg/capita/year, Thailand 35 kg/capita/year and Philippines 24 kg/capita/year. In developed countries such as Japan and USA, the fish consumption has reached the level of 100 kg/capita/year and 80 kg/capita/year respectively. This low level of fish consumption in Indonesia is predicted to be related to the lag of information about fish protein and nutrition as well as the low average income of the people.

It has been widely known that fish is one of animal protein sources, which benefit to human health through its Omega 3. Omega 3 naturally contains fatty acids DHA and EPA which is believed has positive relations with human intelligent. Moreover, DHA and EPA are also considered to have ability in avoiding fat clot in blood vessel so that they are very beneficial for human health. In order to improve the level of fish consumption it is necessary to identify factors related to people behavior including other socio-economics factors such as education, level of income, etc.

### **Fish and Non-Fish Consumption**

FAO reported that during the last 13 years, the average fish consumption level of people in Indonesia is 17.3 kg/capita/year. In the same time, cereal dominated the supply of food which consumed to be 196.0 kg/capita/year, followed by Starch Roots of 67.6 kg/capita/year, natural oil 54.2 kg/capita/year, fruits 31.7 kg/capita/year and vegetables 25.7 kg/capita/year. Furthermore, it is also revealed that calorie of fish consumed has attained to be 36.4 kcal/capita in the same period. This calorie consumption level of fish is, however, still lower than of non-fish calories consumption level but higher than fish substitution foods such as egg (10.7 kcal/capita/day) and other animal fats (9.1 kcal/capita/day).

From the protein point of view, level of protein intake from fish is considered to be higher than of non-fish food except of cereal (35.3 gram/capita/day) and natural oil (12.4 gram/capita/day). The level of protein intake from fish is recorded to be 6.0 gram/capita/day, still higher than of fish substitution foods such as egg (0.8 gram/capita/day) and other animal fats (0.03 gram/capita/day). From these facts, it can be said that fish is the important source of human nutrition which contains the highest calorie and protein for human consumption.

Another important fact shows that the level consumption of vegetables foods is still higher than animal foods. Total calorie consumed from vegetables presently is about 2.681,8 kcal/capita/day, while from animal is 122,3 kcal/calorie/day. The same condition is also found from the protein intake point of view. Total protein intake from vegetables is considered to be 52.8 gram/capita/day and from animal foods is recorded to be 11.0 gram/capita/day.

In other countries such as Asian countries, ASEAN, USA, Europe and Japan, a different pattern of calorie consumption as well as protein intake is also found. Table 1 presents the pattern of calorie consumption and protein intake in some countries and regions.

Table 1. The Pattern of Calorie Consumption and Protein Intake From Fish and Meats in Several Countries and Regions (2001)

No	Country /Region	Fish		Meat	
		Calorie Consumption (kcal/capita/day)	Protein Intake (gram/capita /day)	Calorie Consumption (kcal/capita /day)	Protein Intake (gram/capita/day)
1	Asia	29	4.6	188	8.8
2	ASEAN	48	7.6	149	9.3
3	USA	30	4.9	442	40.3
4	EU	37	5.5	339	24.5
5	Japan	168	22.3	161	13.7

From Table 1 we can reveal that although the level of fish consumption in all regions can be considered as high consumption of fish, however, only in Japan the level of fish consumption is higher than of meat.

### Fish Production and Human Population

In this chapter, trend of fish demand is estimated using three scenarios of population growth. With the assumption of 1.49 % of growth for example, population level in 2005 is estimated to be 225,681,170 and then increase to be 243,002,970 in 2010, 261,654,250 in 2015 and 281,737,150 in 2020 respectively. Relating to the fish consumption level and using assumption that fish demand increase as of 1 % per year, total fish consumptions in 2005, 2010, 2015, and 2020 are estimated to be 20,91 kg, 21,98 kg, 23,20 kg and 24,28 kg/capita/year. Actual level of consumption exceeds the estimation level since that according to MMFA (2001), the level of fish consumption has been 22.20 kg/capita/year. Table 2 shows in detail the estimation results of fish consumption related to the human population trend.

Table 2. Estimated fish consumption, fish demand 2005-2020

Item	Year			
	2005	2010	2015	2020
Fish consumption (kg/cap/yr)	19.56	21.23	23.04	25.00
Population (x 1000)	227,958.9	243,846.5	258,069.0	280,211.8
Fish demand (ton)	4,458,644	5,175,997	5,994,901	7,005,294
Loss of production (ton)	786,820	913,411	1,049,100	1,236,228
Total supply (ton)	5,245,464	6,089,408	6,994,001	8,241,522
Export (ton)	1,034,536	1,200,983	1,379,391	1,625,433
Import (ton)	59,099	68,607	78,799	92,854
Total production (ton)	6,220,901	7,221,784	8,294,593	9,774,101

Table 2 indicates that if population growth increases more than 2 % and fish demand also increases more than 1.5 % per year, Indonesia will be the net importer of fish in the future if there is no acceleration of national fish production. If actual fish consumption in 2002 is 22.84 kg/capita/year in 2002 and in the same time the total population in 2002 remains 220 million, therefore total fish consumption is estimated to be 5,024,800. In order to provide adequate supply, production of fish should be increased mainly by aquaculture production and improving technology for fish handling and processing so that loss of production which is about 15-40 % of total production can be reduced.

### **Fish consumption pattern of urban and rural communities**

There is a significant difference in fish consumption pattern between urban and rural communities. In general, urban community prefers to consume fresh fish while those who live in rural areas consume fish processing products. The big city as an urban areas in Indonesia are located in the coastal areas and this is mainly due to the differences in area characteristics, where most of the fish producer centres are situated along the coast close to urban area. These areas generally have excellent infrastructures, enabling better transportation of fresh fish. Conversely, in rural areas, usually they are located remotely far beyond the fresh fish distribution route.

Based on 2002 survey, it is recorded that the fresh fish consumption rate of urban community was 11.54 kg/capita/year, while that of rural community was 10.56 kg/capita/year. The fish processed products consumption rate of urban community was 1.55 kg/capita/year, while that of rural community was 2.27 kg/capita/year. Total expenditure items for consumer who monthly per capita income above Rp 300,000,- was spent 33.14% for food which are 4.38% for cereal, 2.18% for fish, 5.90% for meat, eggs, milk and consumer who monthly per capita income less than Rp 150,000,- was spent 72.32% for food which are 31.54% for cereal, 8.39% for fish, 0.36 for meats, egg, milk. Total expenditure per capita for fish in urban area (Rp. 105,404/year) was higher than that of rural area (Rp. 84,760,-/year).

In urban area, the consumed dominant fish is kembung (Indian Mackerels) (1.82 kg/capita/year), followed by tongkol (Eastern Little Tuna), tuna (Tunas) and cakalang (Skipjack Tuna) (1.51 kg/capita/year), and mujair (Tilapia) (0.99 kg/capita/year). In rural area, the most common fish consumed are tongkol (Eastern Little Tuna), tuna (Tunas) and cakalang (Skipjack Tuna) (1.40 kg/capita/year), kembung (Indian Mackerels) (1.14 kg/capita/year) and mujair (Tilapia) (0.83 kg/capita/year).

For the fish processed product consumed by urban community, the dominant fish is teri (Anchovies), kembung (Indian Mackerels) and tongkol (Eastern Little Tuna) (0.40 kg, 0.21 kg and 0.17 kg/capita/year, respectively) In rural area, the dominant fish product are teri (Anchovies) (0.54 kg/capita/year), kembung (Indian Mackerels) (0.31 kg /capita/year), tongkol (Eastern Little Tuna), tuna (Tunas) and cakalang (Skipjack) (0.17 kg/capita/year) and sepat (Snakesking gouramy) (0.17 kg/capita/year).

### **Problems on improving fish consumption**

Eventhough Indonesia is well known as a archipelagic nation containing huge marine and fish resources and around 60% of its people is living in coastal areas, the fish consumption rate is relatively low. As have been mentioned previously, there was an increase on fish consumption rate from 18 kg/capita/year in 1990 to 22.84 kg/capita/year in 2002, this rate is still far below the fish consumption rate of some countries such as Japan (110 kg), South Korea (85 kg), USA (80 kg), Hongkong (85 kg), Malaysia (45 kg), Thailand (35 kg), and the Philippines (24 kg).

The main problem of this low consumption rate is due to lack people knowledge on advantages of fish consumption and fish nutritional contents. In addition to that, other important factor is low level of community income and lack people skills in processing fisheries products, which can be able to compete with other agricultural processing products. This low ability also cause fisheries product unable to be as a substitution product for other products such as eggs and meat.

Eggs are substitution product that has significant price elasticity level. According to fish demand analysis, as has been analyzed by Kusumastanto and Jolly (1997) and Kusumastanto (2004) showed that egg is a significant substitution product for fish. Calculation showed that cross price elasticity of egg towards fish is 0.271, while that of chicken is 0.028. Price elasticity shown by egg demand coefficient of 0.271 showed that by the increase of 1% of fish price will affect the increase of that of egg as high as 0.271%.

Other result showed that by using double log model, its fish demand coefficient is  $-0.102$ , showing that fish price demand is inelastic, meaning that if the fish price demand increases as high as 1 % will decrease the fish demand as high as 0.102 %. Income is a significant variable towards fish demand. Income elasticity on fish demand is 0.506, showing that fish is categorized as normal goods. Coefficient of 0.506 shows that the increase of 1% of income will increase of fish demand as high as 0.506%. In other words, fish consumption rate highly depends on the increase of income. Based on static demand analysis income elasticity of demand of fish was 0.506 which showed per capita income definitely increase fish consumption, demand of fish is inelastic with elasticity of price  $-0.102$  and the cross price elasticities of chicken and eggs were 0.028 and 0.271 both products are substitute for fish especially for higher income. The dynamic model of demand analysis explained fish consumption is related to a psychological fish-buying habit, this condition support the phenomenon of higher consumption of fish in coastal area but this habit is eroding quiet rapidly. The short run marginal propensity to consume is relatively low (0.17) which is consistent with lower growth of fish consumption but the long run marginal propensity to consume is higher (0.701) which means promising growth in fish consumption in the future. The expected increase in consumption in the future is not only because of habit, but is also due to the increase in per capita income. The dynamic analysis showed sizeable differences between the short and long run elasticities and the adjustment coefficient is low. The finding indicated that per capita consumption of is growing but at a slow rate.

## Results and Recommendation

The fish consumption of Indonesian people is still relatively low, in fact, demand of fish is inelastic, income per capita is dominant variable in fish consumption and per capita consumption of fish is growing but at a slow rate. Therefore, policy to enhance consumer's preference towards fish by extension, advertising and increasing purchasing power especially in the densely populated areas, could boost fish consumption in Indonesia at a faster rate.

Hence, the improving of fish consumption in Indonesia can be performed through the following measures : *firstly*, it is of necessary to conduct continuous promotion as well as socialisation about the high nutritional contents of the fish, especially in the dense-populated region. This is of importance since the main cause of low fish consumption rate is caused by lack information of local people on the fish nutritional status. *Secondly*, it is of importance to increase community income since this is a dominant factor in determining fish demand in the country. *Thirdly*, the community ability in fish handling and processing skills should be improved so that will able to attract consumer preferences. In fact, a measure that might be performed in increasing consumer preferences on fish is by improving its consumer awareness and more interesting variation of fish products. In line to that measure, it is also important to improve the effectiveness of distribution and packing method that able to maintain fish quality, since fisheries products are highly perishable.

*Fourthly*, it is needed to increase the incentive on fishing technology and fish processing methods, especially in order to provide a good quality of fish raw materials and reduce fish loss which accounted more than 15- 40 % of total production. Other important factor in increasing fish consumption rate is the ability to supply the fish products for all people. *Fifthly*, it is necessary to increase the efficiency of production and distribution of fish products. This is true, since the price at fisherman level is very low and it can be increased by improving quality and efficiency in production and distribution so that able to increase the fisherman income. Hence, the increase of fish product distribution efficiency will

able to keep affordable fish price for consumers, resulting the increase of consumption rate, which is finally will increase fish consumption of the Indonesian people.

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