Development of Fish Products in Indonesia

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Introduction

The largest country in Southeast Asia, Indonesia has over 13,000 islands and a population estimated at 180 million, 60% of whom live in Java island.

For these people fish is very important in nutrition making up 60% of the animal protein in the diet. Although the target of the fish consumption is 18 kg/year per person, current estimated consumption is 14 kg/year per person. This consumption is not evenly distributed. In some areas of Java for instance consumption is extremely low (ie 4 kg/year per person).

Fishery production in Indonesia has been increasing by about 4% a year and by 1985 the production was 686,423 tons in Java and 1,709,139 tons for the other islands.

Although 71% of fish landings are in Java, 60% of the population live on the island. This causes a problem in the distribution, transportation and product development.

Disposition and Distribution of Fish Landed

About 60% of the catch landed in Indonesia is distributed as fresh fish and 40% as preserved fish. The disposition and type of processing are shown in Table 1.

From Table 1 we can see that curing is the most popular processing method and in particular drysalted and boiled fish. Because of the short storage life of boiled fish *(pindang)* this method can be found in Java only, but drysalted fish which is produced in Sumatera and Kalimantan can be conveniently transported to Java. However in east Indonesia, curing is not so popular as in the west area where mostly fresh fish is consumed.

Curing Method

Curing is a simple method but it involves some challenging problems.

As in other Asian countries, dry salted fish is the most popular (Table 1). This is probably because the technology is very simple and cheap, uses simple storage methods and results in long storage life. The problems associated with curing trace back usually to low education and low capital, leading processors to process the fish without much attention to hygiene and efficiency.

Hygiene problems include lack of clean water and poor quality of available salt. Undeveloped techniques cause low efficiency in processing time, energy (even of solar energy) and some losses during processing. For example, in processing *ikan jambal* (dry salting

Table 1. Disposition by type of processing 1983 — 1985 (tons)

Year	Dry/Salting	Boiling	Smoking	Fermentation	Freezing	Canning	Meals	Others
1983	611737	104647	88104	53062	60422	17478	14285	39610
1984	637513	121683	53403	45421	46183	16913	9317	19172
1985	708083	122195	53033	41845	58573	8054	6001	19285

of catfish) approximately 20% losses in weight and 30% losses in price are incurred because of insect (fly) infestation.

Pindang (boiled fish), a popular food in Java, is usually made from skipjack, bonito, mackerel, sardines etc. The problem associated with this method is short storage life. *"Pindang air garam"* which is processed by boiling the fish in the boiled brine for 15 minutes, has a storage life of two to three days. *"Pindang garam"* which is produced by boiling the fish with 30% salt for 3-5 hours in the covered pot, has 2-4 weeks storage life. However this method is difficult to develop outside Java because transportation facilities are not yet as good as in Java. This method has been modified in central Java by using high pressure cooking. The advantage of this modified method which is called *"Pindang Presto"* is that it breaks the bones making it useful for bony species such as milkfish. Although the processing method has been modified, storage life is still a problem because vacuum packaging is not yet applied. The use of high pressure cooking also consumes more energy and raises production cost. As a result this product is usually consumed by middle- and high-economic class city-dwellers.

Smoked fish are also common products in some area (i.e. Sumatera, east Java, South and North Sulawesi and Maluku). As with boiled fish, the storage life of this product is between 2-6 days. This makes it difficult to develop markets where refrigeration is not available. Some smoked fish from Sumatera have a long storage life (3-6 months). This is because the fish as raw material is very thin (glass cat fishes), and the smoked product is very dry (20% moisture content).

The other curing products are fermented products (fish paste, fish sauce and fermented fish) (Table 1). Usually, fermented products like fish paste and fish sauce are used for flavouring only and are consumed in small amounts.

All cured products are still quite important as protein sources, but in some cases need attention. In the development of curing technology, a new, simple small scale technique is probably needed. It should incorporate the following principles:

a. The equipment and technique used should be very simple in construction and in procedure, so that the fishermen/processor can use them without any trouble.

b. The cost of the equipment or production should be kept as low as possible.

c. The equipment and the processing technique should be efficient in the use of energy.

d. The design of the equipment should be such that it can be constructed with varied capacities.

The other problem related to cured products is the wide range of the standards of quality. These include safety problem, particularly with microorganism and heavy metal contamination, insecticide residues and probably formation of the toxic compounds for example, histamin, rancidity products, lipid — protein interaction product, Millard browning. These toxic compounds may need more attention by food scientist especially in Asia where so much cured fish is consumed.

Frozen and Canned Products

Freezing and canning technologies have fewer problems except in terms of the efficiency of the technique and equipment used. This varies with the management and capital cost of the factory.

Frozen products like shrimp, tuna are export products. However some frozen tuna (skipjack) are also for domestic consumption.

Canned tuna is an export product but canned mackerel and sardines are for domestic consumption. Currently, some canning factories also can molusca and crustacea for export.

Development of New Products

To maximise utilization of available fish, new products should be developed. The type of new products developed must be suitable in terms of fish landed, the level (simple or high) of technology used, geographical and socio-economic conditions. For example, while simple technology for curing may be used extensively in Java or in Sumatra, high technology would probably be more suitable in east Indonesia, particularly for utilisation of by-catch.

Particularly in east Indonesia, distribution and transportation of the raw material and end products are significant problems. Fresh

or frozen fish contain 80% moisture and 30-40% waste (head, gut, bone and skin) and therefore increase transportation cost. However mince fish or surimi can decrease 40-60% in weight, and fish protein concentrate or fish meal type-B (for human consumption) probably can save 80% of transportation cost.

Similarly we must decide whether to develop fish silage which contain more moisture, or fish meal which contain less moisture if continuity of supply of raw material is not ideal for investing in fish meal production. However, one must also consider the high transportation cost of fish silage.

In the development of mince fish or surimi, species of fish of specific chemical composition (in particular, type of protein and lipid content) will influence the quality of the product. A characteristic of tropical fisheries, with so many kinds of species is another problem to overcome in order to produce a constant quality and quantity of the product. In this case probably more analytical data especially proximate composition of tropical fishes is necessary.

Development of fish meal for human consumption (fish meal type-B) is probably useful.

This product has been developed in some countries and it is possibly a better product but its high production cost is a problem.

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