DIVERSIFICATION
FISHERIES PRODUCTS

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DIVERSIFICATION of FISHERIES PRODUCTS

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Global market and product distribution development make us easy to find various products from other countries in Indonesia. Products from Indonesia are also marketed or distributed worldwide. We can find fresh salmon from Europe or Tasmania in any supermarket in Indonesia. Fresh tuna from Indonesia can be found easily in Japan. These global marketing and distribution supported with development in fisheries products. Product diversification is fisheries product diversification that giving value to the product. The value that added to the product makes it marketable and acceptable for consumer in a wider range. Wider range of consumer also makes nutritional value advantages of fisheries products possible to be consumed for any generation.

Diversification of fisheries products is not only improve and develop fresh and existing product, but giving value by delivering new product, mixing several products and involving specific culture in product.

This book is delivered for students that study modern fisheries processing technology. Diversification of fisheries products play an important role in fisheries modern processing technology. This book discuss about diversification from fresh consumed products (fish, shellfish and others) up to fish based breaded products. Beside describing modern product like sausage, burger, fish stick, etc., we also discuss about popular traditional products like 'pempek', traditional product from Palembang, South Sumatra Diversification of Fisheries Products and...
kamaboko, traditional product from Japan. Related processing methods to products diversifications are also described as well as discussion about tuna and its derivated products which are popularly consumed in Japan, famous fresh consumed fish in Japan.

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The Authors

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CHAPTER I
FOOD DIVERSIFICATION

1.1. Introduction to Food Diversification

Recently almost all developing countries in the world have problems with sustainability of their aquatic resources. These problems are related with over fishing, a condition where aquatic resources are exploited over their maximum sustainable yield (MSY). The problems was completed with bad practices in fishing, handling and processing of fish which results in large volume of non-economic value fishes and waste. Therefore it is important to maximize quality and utilization of caught or harvested fishes in order to optimize fish utilization and reduce fish waste. A maximum utilization of harvested fish will fulfill demand growth of fish consumption due to functional benefit of fish for human. Considering fish as food, fish not only provide high nutritional value but healthy and has functional effect due to high content of protein and unsaturated fatty acid composition. Many researches have reported that regular fish consumption contained high in unsaturated fatty acid of omega-3 and taurin will prevent from arteriosclerosis.

Fish handling is the most important thing in fisheries industries. A good fish handling must be conducted after fish is landed or harvested until delivered to industries or consumer. This good handling process is usually performed by Cold Chain System. Good Cold Chain System practices will provide raw materials sufficiently with better quality and bigger volume for fisheries industries.

Fish processing industries have developed some value-added products onto harvested fish, giving a longer shelf-life by preservation and effectively utilize fisheries resources (OFCF, 1987). Development of fish processing industries, fishing
industries and fish culture industries will generate national economic activities.

Total production volume from fishing and fish culture industries in Indonesia is around 5 million tons in 1999 but only 644,000 tons (13%) was exported overseas. This indicates that only 13% from the total fish resources harvested in Indonesia meet international standard. Development in fish handling and processing technology can improve fisheries industries in Indonesia. An effort to utilize non-economic value fishes to produce value-added products had been recorded from the cooperation of Marine Fisheries Research Department (MFRD) and Fish Product Quality Development and Assessment Bureau (FPQDAB) (MFRD-SEAFDEC, 2003). This cooperation has studied and applied on production process of frozen minced fish (Surimi) from non-economic value fishes and produced some value-added products from surimi which can give high economic value.

Surimi is an intermediate product that will be processed into many value added products by doing diversification of the product such as fish nugget, fish ball, fish sausage, "pempek", "siomay", etc. Recently, through development of traditional market or modern outlet, people can easily find value-added fish jelly products. These value-added products will enlarge market consumption of fish products, since large volume of fish based snack products can be produced from surimi. Surimi-based products are now very popular in South-East Asia, including Indonesia. Nowadays, such kind of products can be easily found in traditional and super market with different quality, variety and prices. Surimi is usually processed using white meat fishes as raw material for surimi.

Maximizing utilization of 87% harvested fish that couldn't meet export standard is a challenge for fisheries industries.
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development in Indonesia. Value-added products can be produced from surimi or fresh fish, so that non-economic-value fish could be utilized as raw material for value-added products. Many traditional fish-based products such as salted-boiled fish, 'pempek', and 'otak-otak', are potential to be developed into more valuable product and penetrated for global market orientation. Value-added products can be produced using either raw fish (fresh fish) and surimi (minced fish product). Value-added products do not require a high economic value of fishes as raw material, non-economic fishes that have not been utilized effectively can be used as raw material to produce value-added products. The most important requirement for raw material of surimi is their quality of freshness. Therefore, handling of fishes after catching or harvesting will definitely influence the freshness quality of the fishes. Producing value added products from low or non economic value fish not only giving more valuable on the products but also extending market distribution of the products.

In recent globalization era, food products trading, especially value added products have been distributed globally all over the world. Today we can easily find many products and value added products from any place in the world. Development of value added products and their distribution can be related to development of knowledge and people's requirement on healthy and functional food. Fish based products is the right choice to provide health food.

Food market demand and people's preference seems to change into larger volume and more various products. In order to fulfill food demand in various market all over the world, food diversification plays an important role. Food diversification can be done by horizontal and vertical diversifications. Food diversification can be divided into 2 groups (Ismanadji and Sudari, 1985):

1. **Horizontal diversification**, Define as utilization of several fish species to produce a certain processed product. It is usually applied for non economic value of fish (lizard fish,
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kuak/croacker, Alaska Pollock, Indian scad, yellowtail scad, etc.) to become surimi and value added products

2. **Vertical diversification**, Define as utilization of certain species to produce several type of processed products. It usually applied when there is a peak season or when supply is maximum.

1.2. **Diversification of Fisheries Products**

Product diversification in fisheries can be done from fish or surimi as raw materials. Fresh fish or surimi is processed into value added products with addition of starch, egg condiment like onion, garlic, and spices. Raw material and component are mixed into a dough and shaped to form certain products with specific shape, flavor and aroma. Value add products that usually processed from fresh fish or surimi are sausage, siomay, 'otak-otak', fish ball, fish burger, fish stick (Ismanadji and Sudari, 1985).

Value added products can be produced from small industry (home industry) with simple technique and process from high technology industries with modern machinery. Recent development in packaging, storage technology and distribution system give support to value added products to be distributed in the global market.

Many countries like Japan, Singapore and Thailand is produced fish based value added products in industrial scale. Value added products are produced after market assessment define market development, market demand and market growth. Market assessment leads food producer to get successful product in the market.

Modern production process of food also implement modern technology and management during production. Modern technology and management process include good manufacturing practice (GMP).
REFERENCES


Ilmu Pengetahuan dan Teknologi, Gedung II BPPT Lt. 6, Jakarta

16. http://www.alphasea.net/catalog_0.html.0.html
17. http://www.bob-an.com/recipe/English/index_e.html

Freezing
27. http://www.xirong.net.cn/.../200771317365155782.jpg

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Tanaka, Munehiko (2003). Surimi and Surimi Products. Department of Food Science and Technology, Tokyo University of Fisheries Japan


Winarno, FG and Surono. 2002. HCCP dan Penerapannya dalam Industri Pangan, M-Brio Press, Bogor