

DIVERSIFICATION FISHERIES PRODUCTS

harni Agustini
aeli Fahmi
Amalia

adan Penerbit
niversitas Diponegoro



Tri Winarni Agustini

She is one of of the teaching staff at Fisheries Department, Faculty of Fisheries and Marine Science, Diponegoro University. Her PhD was completed at the Tokyo University of Marine Science and Technology, Japan on the subject of Fish Freshness Assessment and Fish Processing Technology. She is involved in some international collaboration works on fish processing technology. Recently she is joined Research Fellowship funded by Japan Service for Student Organization (JASSO) on the specific subject of kamaboko. Some research activities in relation to fish product development and fish processing had been conducted. She has involved as an expert staff of Research and Community Service Institute of Diponegoro University since 2007.

Akhmad Suhaeli Fahmi

He graduated from Diponegoro University on 1999. After working at perishable department and fast moving consumer goods for biggest retailer in Indonesia and a multinational company, since 2005 he was joining Diponegoro University as lecturer at Fisheries Department, Faculty of Fisheries and Marine Science. Diversification and product development is one of his interest subjects that he concern for development.

Ulfah Amalia

She graduated from Diponegoro University on 2003. Her experience in the field of fisheries products obtained from her job experience as Quality Control staff at fisheries company PT Dharma Samudera Fishing Industries, Tbk Jakarta during 3 years. Since 2006, she was joining as lecturer at Fisheries Department, Faculty of Fisheries and Marine Science, Diponegoro University.



**Badan Penerbit
Universitas Diponegoro**



DIVERSIFICATION of FISHERIES PRODUCTS

By :

Tri Winarni Agustini

A. Suhaeli Fahmi

Ulfah Amalia

**Faculty of Fisheries and Marine Science
Diponegoro University, Semarang, Indonesia.**



**Badan Penerbit
Universitas Diponegoro**

Tri
She
Fis
com
Jap
Tec
on
Fell
on t
to fi
She
Inst

Ak
He
peri
reta
join
Facu
dev
dev

Ulf
She
the f
Con
Indu
lectu
Scien

National Library

Diversification of Fisheries Product

by: Tri Winarni Agustini, A. Suhaeli Fahmi, Ulfah Amalia
Faculty of Fisheries and Marine Science Diponegoro University, Semarang
Indonesia.

page: viii + 136 page. size: 15,5 x 23 cm.

ISBN : 978 979 704 841-9

Title:

DIVERSIFICATION OF FISHERIES PRODUCT

Author:

~ Tri Winarni Agustini
~ A. Suhaeli Fahmi
~ Ulfah Amalia

Cover Design:

Dwi Haryanti

First Printing, December 2009

Publisher:

BP UNDIP, Semarang

Copyright ©2009 by BP UNDIP, Semarang

All rights reserved (including those of translation into other languages). No part of book may be reproduced in any form – by photoprinting, microfilm, or any other means nor transmitted or translated into a machine language without written permission of the publishers. Registered names, trademarks, etc. used in this book, even when specifically marked as such, are not to be considered unprotected by law.. Duplication of this publication or parts thereof is permitted only under the provisions of the Indonesian Copyright Law of Section 72 Undang-undang No. 19 Year 2002, in its current version and permission for use must always be obtained from Badan Penerbit Undip.



PREFACE

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, shelfish 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.

We would like to thank Allah SWT for all of His mercy and giving. We say thanks to world class university project at Diponegoro University that make this book possible to be published.

Semarang, November 2009

The Authors

Diversification of Fisheries Product

Tr
Sh
Fi
co
Ja
Te
or
Fe
on
to
Sh
In

Al
He
pe
ret
jo
Fa
de
de

UL
Sh
the
Co
In
lec
Sci



CONTENTS

	Page
Preface	iii
Contents	v
Chapter I. Introduction	1
1.1 Introduction to food diversification	1
1.2 Diversification of fisheries products	4
Chapter II. Development on Fish-Based Value Added Products	5
2.1. Fish ball	5
2.2. Fishekado	7
2.3. Fish nugget	8
2.4. Fish stick/ fish finger	10
2.5. Aji furai	11
2.6. Fish burger	12
2.7. Fish sausage	14
2.8. Shrimp roll	16
2.9. 'Otak-otak	17
2.10. Pempek	18
Chapter III. Surimi and Surimi Based Products	27
3.1. Surimi	27
3.2. Surimi based products	38
Chapter IV. MilkFish Based Products	45
4.1. Softed-bone milkfish product	47
4.2. Smoked fish	63
4.3. Milkfish floss	71
Chapter V. Development of Value Added and Breaded Product for Sea Scallop	81
5.1. Developed fresh sea scallop products	82

Tr
Sh
Fi
co
Jap
Te
on
Fe
on
to
Sh
Ins

Ak
He
pe
ret
join
Fac
dev
dev

Ul
She
the
Co
Ind
lect
Sci

5.2. Dried sea scallop
5.3. Sea scallop nugget
5.4. Breaded sea scallop
5.5. Cookies fortification using sea scallop'
shell flour

Chapter VI. Tuna Based Products

6.1. Handling process of tuna sashimi and
sushi
6.2. Sashimi
6.3. Sushi
6.4. Tuna Loin and Steak.....

Chapter VII. Modified Frozen Products

7.1. Frozen fish product
7.2. Frozen shellfish products

Chapter VIII. Fish Processing Methods Related To

Diversification Product
8.1. Freezing
8.2. Freezing process
8.3. Thawing
8.4. Freeze drying

References



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 (OFCE, 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 the 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 been studied and applied on production process of frozen minced fish (Surimi) from non-economic value fishes and produced several 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 fish product such as fish nugget, fish ball, fish sausage, "pempel", "siomay", etc. Recently, through development of traditional market or modern outlet, people can easily find value-added and 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 and a very rare was utilized pelagic (red meat fishes) fishes such as sardine, Indian scad, mackerel, whereas in fact they are very promising and abundant especially during their season, to be utilized as raw material for surimi.

Maximizing utilization of 87% harvested fish that could not meet export standard is a challenge for fisheries industry.

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,

- 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 is 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 and condiment like onion, garlic, and spices. Raw material and other component are mixed into a dough and shaped to form certain products with specific shape, flavor and aroma. Value added 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 scale 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 global market.

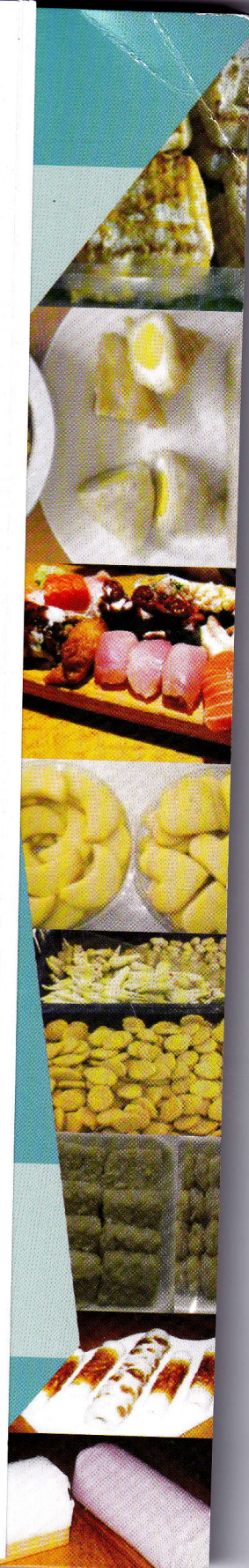
Many countries like Japan, Singapore and Thailand have produced fish based value added products in industrial scale. Value added products are produced after market assessment to define market development, market demand and market growth. Market assessment leads food producer to get successful product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

- _____. 1988. *Penanganan Ikan Tuna Segar*. Balai Bimbingan dan Pengujian Mutu Hasil Perikanan. Jakarta.
- Agustini, TW, Masaki Suzuki, Toru Suzuki, Tomoaki Hagiwara, and Rikuo Takai. 2001. The possibility of using oxidation-reduction potential to evaluate fish freshness. *Journal of Fisheries Science* :67 (3):547-549
- Almatsier, S. 2003. *Basic principles of nutritional science*. PT Gramedia Pustaka Utama. Jakarta.
- Apple, James M. 1990. *Tata Letak Pabrik dan Pemindahan Bahan*. Georgia Institute of Technology. ITB. Bandung.
- Arifudin, R. 1983. *Bandeng Presto dalam Kumpulan Hasil Penelitian Teknologi Pasca Panen Perikanan*. BPTP. Jakarta.
- Astawan, M. 2003. *Softed-bone milkfish ('Bandeng Presto'). Future Food Material*.
- Darwanto and Murniyati, A.S. 2003. *Program Manajemen Mutu Terpadu*. Departemen Kelautan dan Perikanan. Jakarta.
- Direktorat Jendral Perikanan. 2000. *Konsepsi Dasar Pedoman Penerapan Manajemen Mutu Terpadu (PMMT) berdasarkan Konsepsi HACCP Modul I*. Direktorat Usaha Tani dan Pengolahan Hasil Dirjen Perikanan. Jakarta.
- Direktorat Jendral Perikanan. 2000. *Penerapan PMMT Pada Industri Hasil Perikanan Modul II*. Direktorat Usaha TANI dan Pengolahan Hasil. Dirjen Perikanan. Jakarta.
- Hall, T. 2005. *Bandeng Presto (Ikan Duri Lunak)*. <http://www.dev.p3internasional.org/groups/content/ind/tpa-1-2-8.html>
- Hasbullah. 2001. *Teknologi Tepat Guna Agro Industri Kecil Sumatera Barat*, Dewan Ilmu Pengetahuan, Teknologi dan Industri, Sumatera Barat. Dicitak oleh Kantor Deputi Menegristek Bidang Pemberdayaan dan Pemasarakatan



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

12. <http://bisnisukm.com/>
13. http://eng.foods1.com/product/Products_particular.jsp?productid=10160
14. <http://en.wikipedia.org/wiki/Tuna#column-one>
15. http://hymancai88.en.ec21.com/product_list.jsp?group_id=GC00831790&group_nm=Frozen_Food_Products
16. <http://www.alphasea.net/catalog.0.html.0.html>
17. http://www.bob-an.com/recipe/English/index_e.html
18. <http://www.dharmasamudera.com>
19. <http://www.eatwell.gov.uk>
20. <http://www.fao.org/wairdocs/tan/x5941E/x5941e01.htm#Freezing>
21. <http://www.fis.com/nhuttrienco/index.html>
22. <http://www.foodproductdesign.com>
23. <http://www.kqed.org/w/weircookinginthecity/book.html>
24. <http://www.paksoon-seafood.com/3.htm>
25. <http://www.starkist.com>
26. <http://www.starkist.com>
27. <http://www.xirong.net.cn/.../200771317365155782.jpg>
28. http://yvonnecn.en.ec21.com/product_list.
29. Joko, Sri. 2004. Manajemen Produksi dan Operasi. Universitas Muhammadiyah Malang. Malang.
30. Mudjiman, R. 1983. Budidaya Bandeng di Tambak. Penebar Swadaya. Jakarta. 78 hlm.
31. Murniyati, A.S. dan Soenarman, 2000. *Pendinginan Pembekuan dan Pengawetan Ikan*. Penerbit Kanisius. Yogyakarta.
32. Muther, R. 1955. *Practical Plant Lay out*. New York. Mc Graw - Hill Book Co.
33. Nuraida, L. 2005. Sistem Manajemen Keamanan Pangan : pendekatan HACCP, GMP dan SSOP. Makalah pada training HACCP Fateta IPB. Bogor.

- Park, P.W. and R.E. Goins. 1994. In Situ Preparation of Fatty Acid Methyl Ester For Analysis of Fatty Acids Composition in Foods. *J.of Food Sci.* 59(6):1262-1266.
- Peleg. K. 1985. Produce Handling Packaging and Distribution. The AVI Publishing. Co. Inc. Westport. Connecticut.
- Purnomowati, Ida. 2006. Bandeng Duri Lunak. Kanisius. Yogyakarta
- Syarief, Rizal, *et al.* 1989. Teknologi Pengemasan Pangan. Laboratorium Rekayasa Proses Pangan. Pusat Antar Universitas Pangan dan Gizi, Institut Pertanian Bogor. Bogor.
- Sofyan Ilyas, 1983. *Teknik Pendinginan Ikan*. Seri Teknologi Refrigerasi Hasil Perikanan Jilid I. CV Paripurna. Jakarta.
- Suzuki T, 1981. Fish and Krill Protein : Processing Technology. Applied Science Publishers Ltd. London.
- Tanaka, Munehiko (2003). Surimi and Surimi Products. Department of Food Science and Technology, Tokyo University of Fisheries Japan
- Thaheer, H. 2005. Sistem Manajemen Mutu HACCP (Hazard Analysis Critical Control Points). PT. Bumi Aksara. Jakarta.
- Ulberth, F. dan M. Henninger. 1992. One Step Extraction/Methylation Method for Determining the Fatty Acids Composition of Processed Foods. *JAOCs* 69(2) :174-177.
- Wibowo, S. 1996. Industri Pemindangan Ikan. Penebar Swadya. Jakarta.
- Wignjosoebroto, Sritomo. 2003. Ergonomi, Studi Gerak dan Waktu. Guna Widya. Surabaya.
- Winarno, F.G. and Surono. 2002. GMP Cara Pengolahan Pangan Yang Baik, M-Brio Press, Bogor
- Winarno, FG and Surono. 2002. HCCP dan Penerapannya dalam Industri Pangan, M-Brio Press, Bogor

