

1.2.1 Raw Materials for Surimi

Surimi is an intermediate product made from minced fish meat that has been washed, refined, and mixed with cryo-protectants. It has become one of the most dynamic commodities in the Asian seafood industry because of innovations in production and utilization. Japan is known as the world's leading surimi producer, and its frozen surimi provided the impetus for expanding the industry and surimi markets based on the vast resources of Alaska pollock (*Gadus chalcogrammus*) since 1950. In Southeast Asia, surimi production started to pick up in the late 1960s, by making use of the aforementioned fisheries by-catch. Caught from the EEZs of the five main producing Southeast Asian countries, namely: Indonesia, Malaysia, Philippines, Singapore, and Thailand, these demersal fishers' production trend indicated to be considerably increasing from 1980 to 2014 (Figure 61).

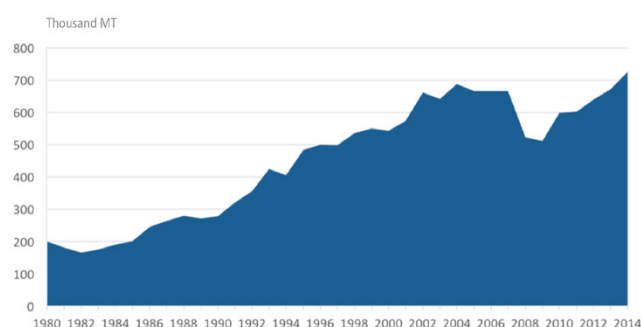


Figure 61. Production trend of raw materials for surimi production from Southeast Asian waters by quantity

While the production quantity of demersal fishes used as raw materials for surimi production had drastically increased from 165,700 metric tons in 1982 to 687,300 metric tons in 2004, it slightly decreased from 2005 to 2007. In 2008 and 2009, the quantity had reduced to 511,400 metric tons but production increased to 726,000 metric tons in 2010 until 2014. In 2014, the threadfin bream (*Nemipterus* spp.) belonging to Family Nemipteridae and goatfish (*Upeneus* spp.) of Family Mullidae were the dominant fishes caught representing 28% and 24%, respectively, of the total capture fisheries production of Southeast Asia. These were followed by croakers (*Johnius* spp., *Pennahia* spp.) of Family Sciaenidae, big-eye snappers (*Priacanthus* spp.), lizardfishes (*Saurida* spp.) of Family Synodontidae and Mullidae (Figure 62).

The appreciation of the Japanese yen and the exclusion of Japan from the US and Russia Alaska pollock resources led to a shift from the pollock of the US and Russia, especially in the high sea region of the Bering Sea, the raw materials for surimi shifted to the New Zealand's hoki or Southern blue whiting (*Macruronus novaezelandiae*) which had become one of the most promising alternative sources of

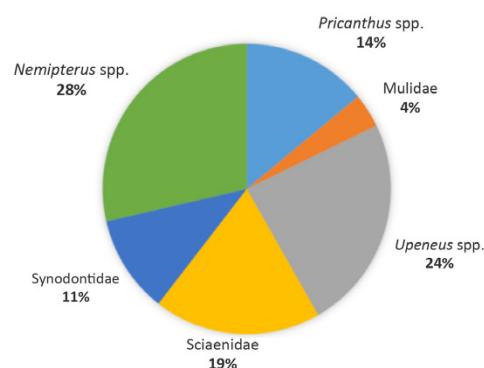


Figure 62. Contribution of the economically important demersal fishes used as raw materials for surimi to the capture fisheries production of Southeast Asia in 2014

raw materials because of its abundance and high quality. However, when New Zealand reduced its hoki catch allocation in 1989, independent fishing support to the surimi industry changed to targeting the Canadian Pacific hake (*Merluccius productus*), Chilean jack mackerel (*Trachurus murphyi*), and various Argentine demersal fish species. This also led to the decline of the surimi production of Japan from its peak in 1984 at 418,000 metric tons down to 310,000 metric tons in 1989 and to 132,000 metric tons in 1994.

The production trend of the raw materials for surimi production from the five major producing Southeast Asian countries (Figure 63) indicated that the quantity of catch in Thailand dropped drastically from 350,000 metric tons in 2004 to 128,000 metric tons in 2008. While that of Indonesia had increased from 157,000 metric tons to 196,000 metric tons in the same period, it experienced a decrease in 2009 then a significant increase to 350,000 metric tons in 2010 until 2014. For Malaysia, its production had slightly increased from 53,200 metric tons in 1991 to 162,000 metric tons in 2014. For the Philippines, the production was stable within 50,000 and 80,000 metric tons from 1982-2014. Although there is no surimi industry in the Philippines, most of the fishes

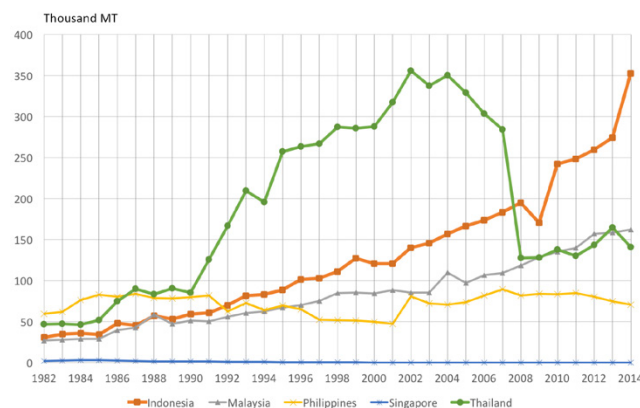


Figure 63. Production trend of surimi raw materials of the major producing Southeast Asian countries in 1982-2014 by quantity

that could be used as surimi raw materials and produced by the country are utilized for local consumption. The production of Singapore of the raw materials for surimi, although minimal, was stable.

There are many reasons that led to the drastic changes in the supply of raw materials for surimi production from the five countries. For Thailand, the change in the fisheries policy of Indonesia that disallowed the extension of licenses of fishing vessels from foreign countries had made it difficult for Thai trawlers to continue their joint ventures with Indonesia (The Nation, 2008). In the late 1970s, the fishes used as raw materials for surimi production, especially the threadfin breams and bigeye snappers were abundant in the waters of Thailand, *i.e.* in the Gulf of Thailand and Andaman Sea. The Department of Fisheries of Thailand

reported in 1963 that fishing effort for threadfin breams yielded 276 kg/hour. However, it reduced to only 80 kg/hour in 1988 and only 20 kg/hour in 2000. Considering the rapid growth of the surimi industry in Thailand as well as the depletion of the country's demersal fishery resources, raw materials had to be sourced mostly from neighboring countries such as Myanmar, Indonesia, and Malaysia. Later, the new fisheries policy of Myanmar also impacted the limited operations of Thai trawlers in the country's waters after 2010.

1.2.1.1 Surimi Production

While the surimi production of Japan had been decreasing from 310,000 metric tons in 1989 to 132,000 metric tons in 1994, that of the other four major surimi-producing

Table 57. Number of processing plants for surimi production in Indonesia as of 2015

Company	City	Type of pro-cessing	Products	Capacity (metric tons/year)
JAVA Seafood, PT.	Kab ¹ . Indramayu	Surimi	Frozen surimi	
PT. Devindo Nusantara	Kota Jakarta Utara	Freezing	Frozen fish (tuna, marlin, mahi Frozen surimi Frozen fish (small pelagic, demersal and freshwater)	1,200
PT. Blue Sea Industry	Kota Pekalongan	Freezing	Frozen surimi	21,000
Holi Mina Jaya	Kab. Rembang	Freezing	Frozen demersal fish Frozen pelagic fish Frozen shrimp Frozen cephalopods Frozen surimi	30,000
PT. Indoseafood	Kab. Rembang	Freezing	Frozen surimi	1,500
Laut Jaya Abadi	Kab. Kendal		Frozen surimi	
PT. Maya Food Indus-tries	Kota Pekalongan	Freezing Canning	Frozen surimi Canned sardines and mackerel	
PT. Nam Kyung Korea Indonesia (NKS)	Kab. Tegal	Freezing Drying	Frozen surimi Frozen fish Frozen sea cucumber Dried sea cucumber	7,500
PT. Phillips Seafood Indonesia	Kab. Pemalang	Canning	Pasteurized crab meat (in can)	1,500
PT. Sinar Bahari Agung	Kab. Kendal	Freezing	Frozen surimi	15,000
CV. Sinar Mutiara Abadi	Kab. Rembang		Surimi	6,000
PT. Andaman Delmar	Kab. Rembang		Frozen surimi	5,400
PT. Bintang Karya Laut	Kab. Rembang		Frozen surimi	1,200
PT. Alter Trade Indonesia	Kab. Sidoarjo	Freezing	Frozen surimi Frozen shrimp	1,500
PT. Istana Cipta Sembada	Kab. Banyuwangi	Freezing	Frozen value-added seafood	6,000
PT. Kelola Mina Laut Plant 1	Kab. Gresik	Freezing	Frozen cooked shrimp Frozen raw shrimp Frozen cephalopods Frozen pelagic fish Frozen value-added seafood	12,000
PT. Southern Marine Products	Kab. Probolinggo	Freezing	Frozen surimi Frozen pelagic fish	
PT. Starfood Internation-al	Kab. Lamongan	Freezing	Frozen surimi	15,000
PT. Tridaya Jaya Ma-nunggal	Kab. Pasuruan	Freezing	Frozen pelagic fish Frozen demersal fish Frozen surimi	2,400
PT. QL. Hasil Laut	Kab. Lamongan	Freezing	Frozen surimi	12,000
MITRA UTAMA, CV	Kota Surabaya	Canning	Fish nugget, fish meatball, fish sausage	

¹ Kab is short for Kabupaten which means Regency

countries, namely: Republic of Korea, Thailand, New Zealand, and the United States had increased from about 26,000 metric tons to 260,000 metric tons during the same period. The Korean surimi industry showed the greatest potential for independent growth among the Asian surimi producers with a production of 60,000 metric tons in 1989. During this period, the surimi industry in Thailand also showed considerable growth potential dependent on technical assistance from Japan. Such successes stimulated the development of the surimi industry in the Southeast Asian countries, especially in Indonesia, Malaysia, Myanmar, and Viet Nam.

As of 2005, there were eight processing plants for surimi production in Indonesia (Pangorn *et al.*, 2007) and in 2015, the number of processing plants increased to 21 with a production capacity of about 167,000 metric tons per year (Table 57).

The rapid growth of surimi industry in Southeast Asian countries as well as depletion of demersal fishery resources and emerging new fisheries policies, led to the reduction of raw materials that impacted on the supply required by the surimi producers. In order to address such concerns, SEAFDEC conducted a study on surimi industry and its raw materials in Southeast Asia during 2005-2008, and came up with recommended mitigation measures for the sustainable management of the region's demersal fishery resources (Box 4). These measures are meant to support the policy makers in promoting the proper management of demersal fishery resources particularly the raw materials for surimi production in the Southeast Asian region.

Box 4. Recommended measures to mitigate the conflicts between man and processing industries in exploiting the region's demersal fishery resources

1. Development of appropriate fisheries management systems
2. Strict enforcement of monitoring, control and surveillance (MCS)
3. Exploring the possibility of increasing the price for resource utilization, e.g. increasing price of surimi but striking a balance between price and resource management
4. Fishing operations to target only species for surimi production and avoiding the catch of juveniles of other commercially important species, e.g. promoting the use of juvenile and trash excluder devices (JTEDs)
5. Promotion of the continued use of trash fish or low-value fish for surimi production
6. Development of technology for using pelagic fishes in surimi production, e.g. horse mackerel
7. Reduction of post-harvest losses through good preservation and handling techniques onboard fishing vessels
8. Tapping of potential sources of raw materials outside the region for surimi production
9. Continued promotion of the use of trash fish mainly for surimi instead of promoting it for the production of fish meal for aquaculture and livestock
10. Maximizing the use of trash fish for human consumption in terms of fish meat or product in traditional fish products
11. Continued development of technology for the utilization of freshwater fishes for surimi production

1.2.2 Live Reef Food Fish

Live reef fishes, the most valued commodities in fishery trade, have long been traded around Southeast Asia. Wild fishes which are captured from coral reef areas or reared in marine culture facilities entered this trade since the 1960s as luxury food items because of their superior taste and texture. A combination of gears targeting spawning aggregations and juveniles is used to catch the fish, while the use of destructive fishing methods is also carried out to harvest live food fish especially in coral reef areas. The first major report on the collection of live reef fish for food was written by Johannes and Riepen (1995) based on their research that involved extensive interviews with government officials, industry representatives, fishers, village leaders, university researchers, divers, dive tour operators, and NGOs. Personal visits to countries involved in the trade were also conducted. Barber and Pratt (1997) described the trading of marine ornamental and live reef food fishes, and emphasized that the use of cyanide is commonly practiced in catching these commodities throughout Southeast Asia and proposed to use possible environmentally-sound alternatives that are promoted by the Destructive Fishing Reform Initiative. Lau and Parry-Jones (1999) produced a detailed and comprehensive analysis of the Hong Kong live food fish market, the first quantitative research to be carried out using analyzed data from the Hong Kong Department of Census and Statistics (HK CSD).

1.2.2.1 Trading of live reef food fishes in Sulu-Sulawesi Sub-region

Reef fishes are particularly sought-after delicacy, and thus, the Chinese consumers have in recent years, turned to trading this commodity with countries well-endowed with coral reefs, such as the Philippines, Malaysia (notably Sabah), and Indonesia (Sulawesi Provinces). Hong Kong, the largest consumer of live reef food fish in Asia, has a largely urbanized population of 6.3 million and is a major center for live reef food fish trade in the region. As the demand has continuously increased in recent years, Hong Kong now imports live reef fish for food from many Southeast Asian countries as well as from Seychelles in the Indian Ocean.

Johannes and Riepen (1995) reported that the live reef food fish trade started in the late 1960s in Hong Kong. The most popular fish species traded at that time was the red grouper, *Epinephelus akaari*. Overexploitation of this species in Hong Kong and Chinese inshore waters forced fishers to move farther to Pratas Reef which is about 200 miles southeast of Hong Kong as well as to Spratlys and Paracel Islands in the South China Sea and Philippine waters. Trading of this species was so remunerative that by the mid-1980s premium live reef fish was being