FOOD-SYSTEM OF TUNA INDUSTRY: MARKET DISTORTIONS IN CANNING AND SASHIMI MARKETS

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ABSTRACT

In this paper, we illustrate characteristics of food system of tuna by making a bird's-eye view of tuna trade and global distribution. Tuna resources are primarily consumed as caned tuna or Sashimi (=raw fish). The fishing methods and species predetermine the food system of the caught fish. Among seven tuna species that FAO Fishstat identifies, Bluefin, Southern Bluefin and Bigeye tunas are solely consumed as Sashimi, and therefore mostly exported to Japan. These tuna species are not worth fishing commercial resources unless they are purchased by Japanese. If we view Japanese consumers as a unique buyer, the market structure is characterized as a monopsony. Moreover, if the tuna is frozen, the product will be rocked in the closed distribution channel where the temperature of the cold-chain is not a standard one, minus 20 degree, but rather an extreme cold, minus 60 degree: such storage does not exist anywhere else. Despite such monopsonistic structure, the export prices of these species are not low compared with other marine products. We will further examine market structure and degree of concentration of world sashimi market. Other two species, Yellowfin and Albacore, are consumed both as canned product and Sashimi. Export price of Sashimi tuna is more than twice as high as that for canned material. Nevertheless, the supply of tuna to canning sector has not been ended off nor had the resource been depleted yet as a result of competitive catch. It is expected that the difference of fishing/ distribution costs, demanded size, and the risk-return composition influenced the behavior of world tuna fishers and allowed some diversity in fishing methods and distribution. In fact, some fishing enterprises in Taiwan and the Philippines supply to both Sashimi and canning markets. While in Japan, there is no such example. We will examine the rational and sustainability of such co-existence of different distribution channels that share the same tuna resource. <P>

Keywords: tuna, canned tuna, sashimi, monopsony, Japan, marketing

INTRODUCTION: CATCH AND USAGE BY SPECIES

Tuna fish is a popular material caught and utilized worldwide. Despite the popularity and availability of the fish, however, attentions paid to the nature of the market have been limited[i]. In this paper, we will identify two types of the market; sashimi and canned tuna market, and examine the market conditions as well as the responsibilities of the stakeholders in the market. To start with, let us make an overview of the usage of tuna.

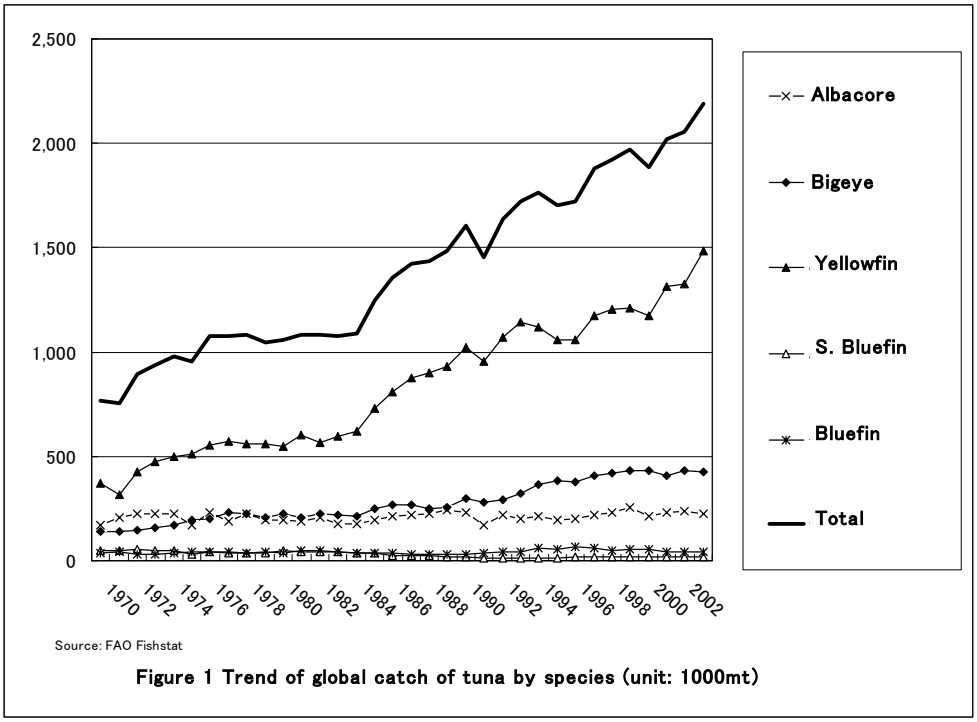
Seven tuna species are identified by FAO. As we see in **Table I,** three species, bluefin tuna, bigeye and southern bluefin tuna, are supplied for sashimi and two species, yellowfin and albacore, are supplied for both sashimi and canning. We will focus on these five species thereafter. The trends of catch of these five species are shown in **Figure 1. Y**ellowfin comprises the largest catch, 1.5 mil. MT in 2002, and also it is the main source of the increase in catch in the last two decades. **Table II** describes the distribution and marketing of tuna by species and usages, sashimi and canning. The fishing methods and market prices differ according to the usage. On the volume of tuna consumption, as we see in **Table III,** 30% of catch is

consumed in EU, namely as canned tuna, another 30% is in Japan, namely as sashimi, 20% is in North America and 15% is left for the rest of the world.

Table I Tuna species and attributes

English name Japanese name (Scientific name)	Length, Weight	Habitat	Usage	Attributes
Bluefin tuna Kuromaguro Thunnus thynnus)	2.5m, 300kg	Mainly in Northern Pacific and Atlantic	Middle fatty and very fatty area (Toro) around abdomen. Back meat blackish red. Premium sashimi material.	Habitat in the highest latitude among tuna
Bigeye tuna Mebachi Thunnus obesus)	2m, 150kg	Widespread in tropical and temperate zone. Major catch in Pacific.	Color of meat is dark crimson. Contain some fatty meat. Semipremium sashimi material.	Thick body with big head and eyes.
Yellowfin tuna Kihada (Thunnus albacores)	1-2m, 100kg	Widespread in tropical and temperate zones. Major catch in Western Pacific tropical equatorial zone.	Color of meat is vivid crimson. No fatty meat. Sashimi material for home use. Light meat for canning.	Vivid yellow fins.
Albacore Bin'naga (Thunnus alalunga)	1m, 15-30kg	Temperate water all over the world	Color of meat is pale peach. Soft meat not suitable for sashimi. White meat or Sea Chicken for canning.	Spindle-shape body is scaly.
Southern bluefin tuna Minamimaguro (Thunnus maccoyii)	2m, 150kg	Only in Southern Hemisphere	Premium sashimi material equivalent to Bluefin tuna.	Eyes are bigger than Bluefin tuna.
Blackfin tuna Taiseiyo maguro (Thunnus atlanticus)	80-90cm	Tropical zone of Western Atlantic.	—	The smallest among tuna.
Longtail tuna Koshinaga (Thunnus tonggol)	80-100cm	From Indian ocean to coastal area of Australia	—	Figure resembles with Yellowfin tuna but longer tail.

Source: Chapters 1,3,7,9 of Ono (ed.) (1998)



Source: FAO Fishstat

Figure 1 Trend of global catch of tuna by species (unit: 1000mt)

Table II Distribution and marketing of tuna by species and usage

	Canning		Sashimi
Species	(skipjack)	Yellowfin, Albacore	Bluefin, Southern bluefin, Bigeye
Major fishing methods	Purse-seine fishing		Long line, Hook & line
Post harvest processing	Block frozen, either in the vessel or after unloading, at the temperature -20℃ and thaw out at the time of production. Heated and sealed until the time of consumption		Individual quick frozen at the temperature -50℃, thaw out at retail store and consumed raw. Alternatively, kept chilled from the time of harvest to the consumption.
Prices of frozen yellowfin(2002 average, unit JPY/kg)	At Yaizu:167 Export:142		Unloading site: 442 Wholesale: 511 Retail: 741
Supplying countries	Canning material supplied and traded in the world market by various producers all over the world.		Tuna caught in the sea all over the world. Frozen tuna is suppliers are in Japan, Taiwan, Korea and Indonesia. Fresh/chilled tuna suppliers are in all over the world.
Demanding countries	Consumed 40% in EU、30% in North America, 10% in Japan, and 20% in the rest of the world.		Majority consumed in Japan. Some consumed in sushi bars all over the world including North America.

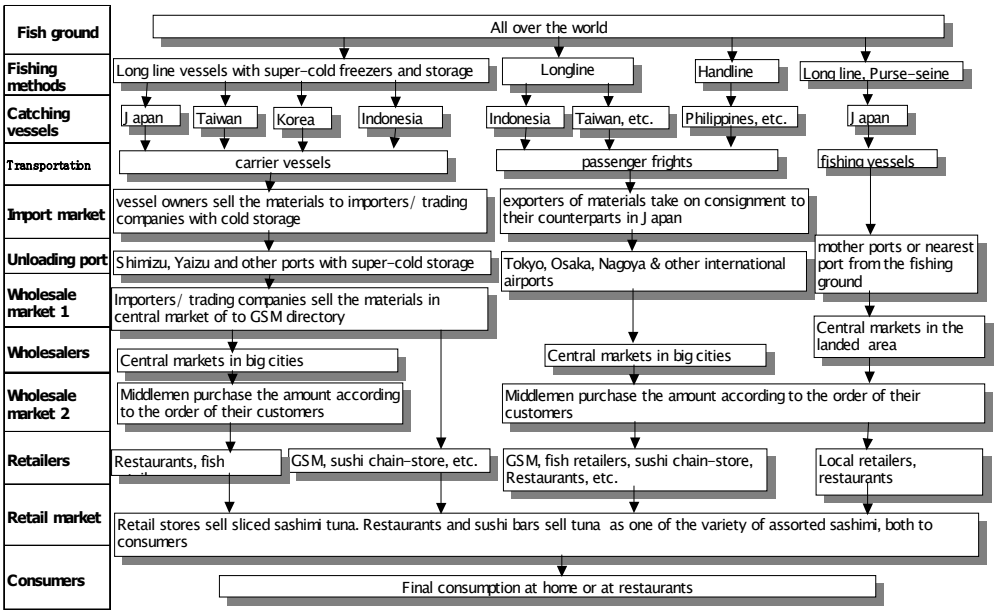
Source: Yamashita(2005)

Table III The volume of tuna consumption worldwide and Japan (Estimation: 2001)

Country	Type of consumption	Volume (t)	Proportion to the world total
EU	Canned tuna	634	31.4%
N. America	Canned tuna	475	23.6%
Japan	All types	591	29.3%
	Sashimi	520	21.5%
	Canned tuna	158	7.9%
Rest of the world		317	15.7%
World total	All types	2,017	100.0%

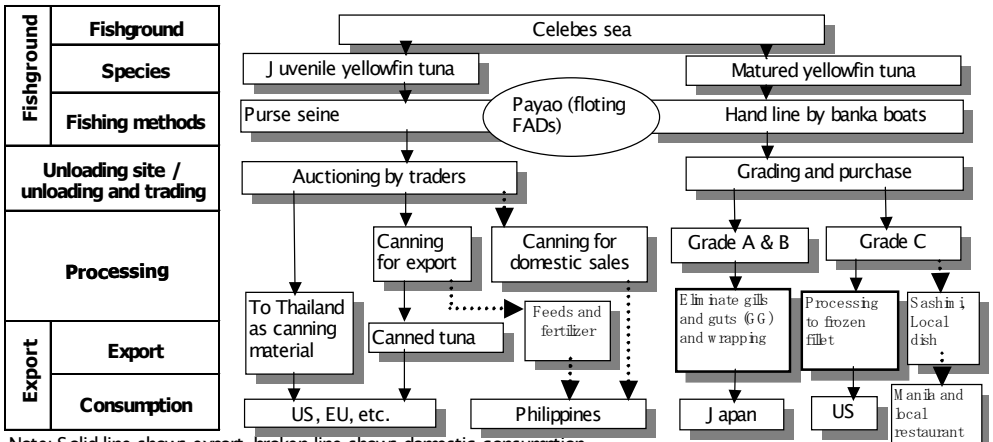
Source: Volume of sashimi consumption is an estimate by Tuna Supply & Demand Estimating Committee (Japan), total volume is the total of five species of FAO Fishstat, consumption in the form of can is an estimation of various sources.

Figure 2 and **Figure 3** illustrates food systems of tuna industry from the catch in the fishing ground to the final consumption. Figure 2 is that for sashimi. It is a premium market for tuna in the sense that it is caught by long line or hand line fishing methods, harvests are handled individually with care, the fish sometimes stay alive and kept in cage for fattening, and delivered in the form of fresh or frozen. The final consumption mostly occurs in Japan. As long as the three species dedicated to sashimi concerned, the food system described in the figure represent most of the cases. On the other hand, the food system of two species for both sashimi and canning, there are some varieties. **Figure 3** describes the example of yellowfin tuna caught in the Celebes sea, a Southern part of the Philippines where the fisher use Payao, a floating FADs, to catch yellowfin tuna for both sashimi and canning purpose harmoniously.



Source: Yamashita from various sources

Figure 2 A food system of Tuna for Sashimi



Note: Solid line shows export, broken line shows domestic consumption.
Source: Yamashita (2005) amended.

Figure 3 A food system of tuna utilized for both sashimi and canning: A case of the Philippines

EXAMINATION OF THE MARKET DISTORTION OF TUNA SOLELY USED FOR SASHIMI: BLUEFIN TUNA, SOUTHERN BLUEFIN TUNA AND BIGEYE

The nature of these three kinds of tunas is unique in the sense that they are not utilized as commercial resources except for Japan[ii]. The reasons are in the color of meat, fat and the size of fish (see Table I) where the Japanese tastes are ironically opposite to that of the others. Bluefin and Southern bluefin tuna is highly appreciated product as delicacy and a necessary menu in a feast.

Since Japanese are the only buyer of the three kinds of tunas, can we say that Japan is a monopsony? And if so, is it dampening of the price of the product while limiting the volume of supply? Before preceding the discussion, let us illustrate the characteristics of monopsony in contrast to monopoly. **Figure 4** shows the monopoly and monopsony equilibrium. In the monopoly market, a single supplier will supply only Qm of amount, instead of Qc, so that it can charge a unit price of Pm, which is higher than the price at the competitive market equilibrium, Pc. As a result, the supplier will obtain the monopoly profit of Pm-Cm per unit of sales. In the monopsony market where a single demander will try to maximize the demander's surplus by limiting the purchase of the quantity at Qm and only pay the price of Pm to the supplier provided that there are many suppliers competing each other. As a result, the demander can enjoy the demander's surplus of Um-Pm per unit of purchase. Although such gain does not prevail at the time of purchase, it does at the time of reselling the product to a purchaser in the following market. The price that suppliers can charge is even lower and the amount they supply is less than that of competitive equilibrium.

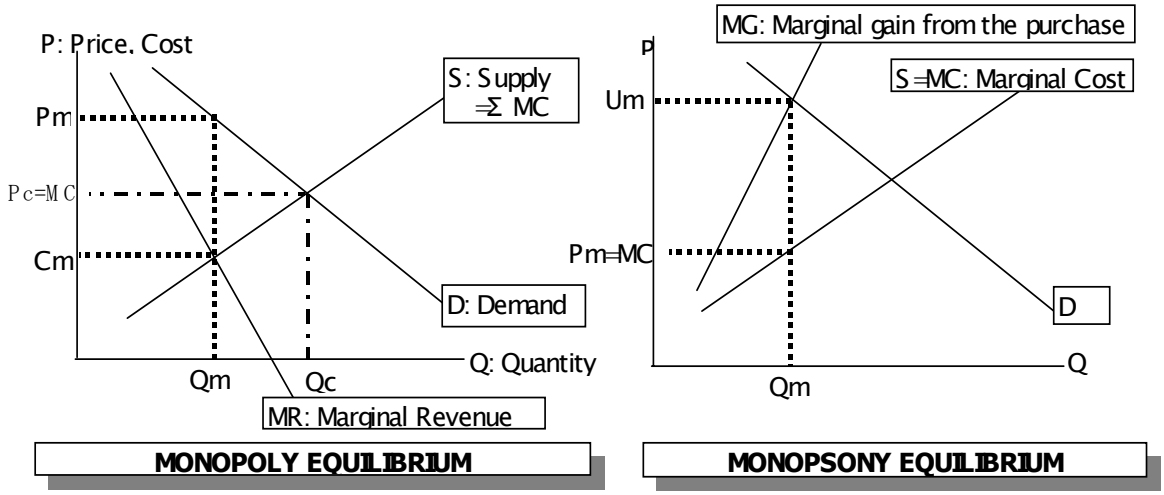


Figure 4 Equilibrium in Monopsony in contrast to that in Monopoly

There are, at least, the following reasons why we observe a monopsony power of Japan over the purchase of tuna. First, Japan can impose voluntary quota on the volume of exports of Taiwan to Japan. It has been done to date since 1994. Second, all the regional management bodies of tuna fishery allow Japan to participate despite the fact that Japan is not located within the territorial waters of the these countries (e.g. Mediterranean) **(see Table IV).** Third, the wholesale price of imported tuna is generally lower than the domestically produced tuna although the fishing ground and species are the same, which suggests that there is some kind of price discrimination. **Table V** shows both production and import prices of fresh and frozen tunas. Domestic prices are higher than imported price for fresh and frozen bigeye and frozen yellowfin[iii].

Table Ⅳ Outline and Participants of Regional Management Bodies

Abbreviated name, Formal name, Japanese Name	Managed area	Managed species	Effective as of	Participants
ICCAT International Commission for the Conservation of Atlantic Tunas	All Atlantic (including. Mediterranean)	Highly migratory species (Skipjack, Tuna and Albacore) and related species	1969	34 countries and EU (Japan, US, Canada, Korea, etc)
IOTC Indian Ocean Tuna Commission	Indian Ocean	Highly migratory species (Skipjack, Tuna and Albacore)	1996	20 countries and EU (Japan, India, Korea Australia) (a FAO's branch)
IATTC Inter-American Tropical Tuna Commission	Eastern Pacific	Highly migratory species (Skipjack, Tuna and Albacore) and other species caught as by-catch	1950	13 countries (Japan, US, Latin American courtiers)
WCPFC Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific	Western and Central Pacific	Highly migratory species (Excerpt saury) Skipjack, Tuna and Albacore)	2004	19 countries and regions (note)
CCSBT Commission for the Conservation of Southern Bluefin Tuna	All waters where Southern bluefin migrates (Area of high latitudes in Southern Hemisphere)	Southern bluefin tuna	1994	4 countries (Japan, Australia, NZ, Korea)
GFCM General Fisheries Commission for the Mediterranean	Mediterranean, Black sea	Marine resources	1952	23 countries and EU (Japan, Morocco, Turkey) (a FAO's branch)

Note: According to the website of WCPFC (http://www.wcpfc.org/), 19 countries and regions participate as of March 2005, including Australia, China, EU, Korea, NZ, PNG, Taiwan. Japan was an observer until July 2005.
Source: Yamashita(2005). Original data from various sources

Table V Prices of tuna imported/domestic production (2002, Unit JPY / kg)

	Domestic	Imported	Domestic	Imported	Domestic	Imported
	Fresh Bluefin		Fresh Bigeye		Fresh Yellowfin	
Production/import price	1,640	2,548	1,085	854	661	803
Auctioned price (Tsukiji)	3,308	3,487	2,236	1,509	1,878	1,339
	Frozen Bluefin		Frozen Bigeye		Frozen Yellowfin	
Production/import price	1,776	2,409	649	575	442	263

Source: Suisan Shincho Sha (2005). Original source of domestic production price from Fishery Product Distribution Statistics by Fisherys Agency and imported price from Japan Trade Statistics by Ministry of Finance. Auctioned price from the unpublished market statistics.

On the other hand, there are three reasons that deny the existence of monopsony power. First, the buyers do not / cannot manipulate total volume of import to Japan even though it does for Taiwanese vessels. As we see in **Table VI,** the volume of import is constantly increasing from 187k MT in 1988 to 282k MT in

2002. Second, the prices of three kinds of tuna for sashimi are significantly higher than the other two tunas utilized for both sashimi and canning (see **Table II).** If the country had a monopsony power, the price of the three species should rather be suppressed, at least at the importing stage. Third, at the retailing stage, the prices of the three kinds of tunas are higher than other delicacy fish. **Table VII** shows the volume and the price of purchase of fish by Japanese consumers. The retail price of tuna, JPY2, 271/kg is the highest among fresh marine products.

Table VI Total supply of tuna and albacore for sashimi in Japan (unit:1000MT, %)

Year	Domestic Production			Imported			Total supply	Import ratio 1	Fresh ratio 2	Frozen import ratio 3	Fresh import ratio 4
	Frozen	Fresh	Subtotal	Frozen	Fresh	Subtotal					
1988	222	68	290	155	32	187	477	39.2	21.0	41.1	32.0
1989	223	74	297	144	39	183	480	38.1	23.5	39.2	34.5
1990	224	66	290	176	43	219	509	43.0	21.4	44.0	39.4
1991	212	64	276	176	48	224	500	44.8	22.4	45.4	42.9
1992	196	69	265	170	57	227	492	46.1	25.6	46.4	45.2
1993	208	67	275	190	63	253	528	47.9	24.6	47.7	48.5
1994	214	65	279	166	72	238	517	46.0	26.5	43.7	52.6
1995	206	64	270	176	73	249	519	48.0	26.4	46.1	53.3
1996	170	56	226	172	71	243	469	51.8	27.1	50.3	55.9
1997	179	61	240	154	69	223	463	48.2	28.1	46.2	53.1
1998	177	61	235	198	71	268	503	53.3	26.2	52.8	53.8
1999	133	74	207	174	70	244	451	54.1	31.9	56.7	48.6
2000	149	66	215	180	71	251	466	53.9	29.4	54.7	51.8
2001	136	58	194	198	72	270	464	58.2	28.0	59.3	55.4
2002	122	60	182	217	65	282	464	60.8	26.9	64.0	52.0

Note1: Import ratio=volume of import/total supply
2: Fresh ratio=volume of domestic fresh + Imported fresh/ total supply
3: Frozen import ratio= frozen import/total frozen supply
4: Fresh import ratio= volume of fresh import/ fresh supply
Source: Yamashita (2005), original source is Tuna Supply & Demand Estimation Committee, data taken from Suisan Shincho-sha (various years)

Table VII Japanese household consumption of major fish products (2003)

Item	Expenditure (JPY)	Volume (g)	Price/kg (JPY)
Tuna	2,387	1,051	2,271
Salmon	1,241	967	1,283
Yellowtail	1,079	601	1,795
Squid	1,027	1,104	930
Shrimp/Prawn	1,306	650	2,009
Total fresh fish	18,766	11,660	1,609
Salted Salmon	722	586	1,232
Cod's roe	1,054	259	4,069
Total salted fish	5,596	3,281	1,706

Source: Yamashita (2005). Original data from the Survey of Household Expenditure (Japan)

So far, we discussed whether or not sashimi tuna market has a symptom of monopsony. Although further study is needed in order to measure the degree of market distortions, we will tentatively conclude the section with the following statements. Japanese tuna producers hold and use market power when they act as if they are a large(est) supplier of tuna, particularly in the frozen tuna market as it influenced the volume of supply of Taiwan as we discussed above[iv]. Otherwise, the number of actors, both sellers and buyers, in the market is enough to generate competition among them. Both competition and cooperation between Japanese and foreign suppliers exist in several stages of the markets. For instance, wholesale and retail. Regarding the domestic price differentials that do not only exist in tuna but also in many fish products can be explained by the theory of asymmetric information. The more detailed explanation is found in Yamashita (2003).

The reasons for the market distortion in frozen tuna market can be explained by the so-called 'lock-in' effect in the context of industrial organization where the product stream is vertically integrated into one and cannot escape from a distribution channel once it is incorporated. Unlike a standard 'cold-chain' that maintains freezer temperature at minus 20℃ throughout the distribution, frozen tuna's distribution channel is operated at the temperature under minus 50℃ from the catching vessel up to the delivery to the retail store. Once a tuna is frozen, it is being 'lock –in' in the 'super-cold chain' that does not exist elsewhere but Japan. It calls for a certain amount of fixed investment, too, which is 'sunk' if it is not used for tuna marketing and distribution. As a result, barriers to entry and exit exist. The effect of such barrier to the market price is indeterminate.

EXAMINATION OF THE MARKET DISTORTION OF TUNA USED FOR BOTH SASHIMI AND CANNING: YELLOWFIN AND ALBACORE IN THE WORLDWIDE MARKET

There are at least two different sources of demand for tuna, sashimi and canning material, as we have seen in the first section. It was also discussed in the first section that it was notable to observe the co-existence of the supply for both usages despite the large price differentials, more than twice, according to the Table II. The question arises as to why suppliers do not concentrate on supplying for sashimi that commands higher price? Although no empirical evidence yet to support my hypothesis, there are candidates for answers as follows.

One hypothesis is that further decreases in prices will not increase the quantity of demand beyond the point that it reaches at the level of saturation. It is an application of 'Kinked Demand Curve'. **Figure 6** describes the situation where the supply curve will shift out (S1⇒S2) as the number of suppliers increases. However, when the supplier increases beyond S2 level (S2⇒S3), it will not increase in the volume of supply if there is a level of saturation exists. Excessive suppliers will then rather shift to the supply of canning material.

An alternative hypothesis is that sashimi and the canning markets for tuna are regarded as two different markets where the costs of supply and the prices for demand differ. It is the equilibrium prices that prevail in the market where the price of sashimi market is higher than that of canning. It is described in **Figure 7.** In the case of A of the figure, the market equilibrium of both sashimi and canning are shown in separate figures. In sashimi market, since the tuna caught in the sea are the same 'product' in nature, homogeneous in other word, we might be able to draw two equilibriums in one figure instead of drawing two figures separately as we tried in Case A. Case B of Figure 7 would explain well the coexistence of the two market equilibriums. In Sashimi market, consumers demand less amount at a higher price, compare to that of canning materials. Similarly, the supply of Sashimi is more costly than that of canning due to the fact that

it requires less effective fishing method, individual wrapping and handling, and fast transportation. As a result, at the 'competitive' equilibriums, the price of Sashimi is higher and the volume is lesser than that of the canning material.

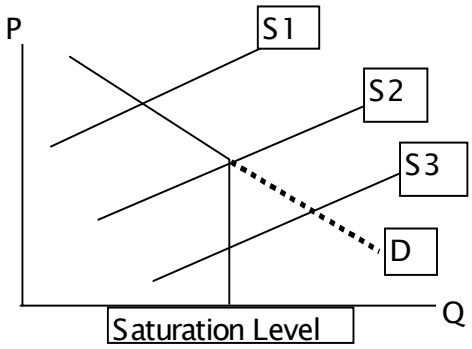
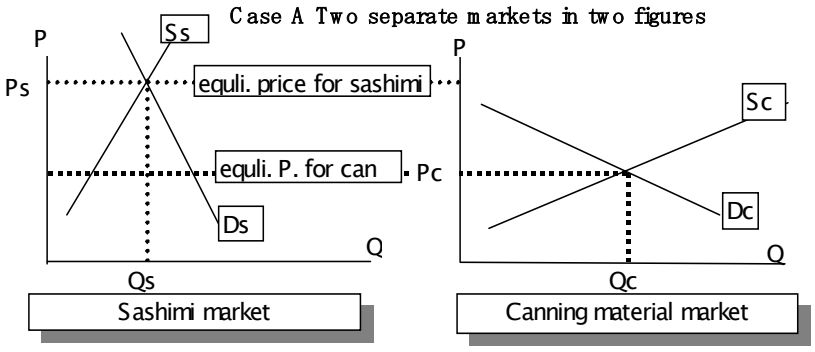


Figure 6 A saturation of the demand for Sashimi: A hypothesis



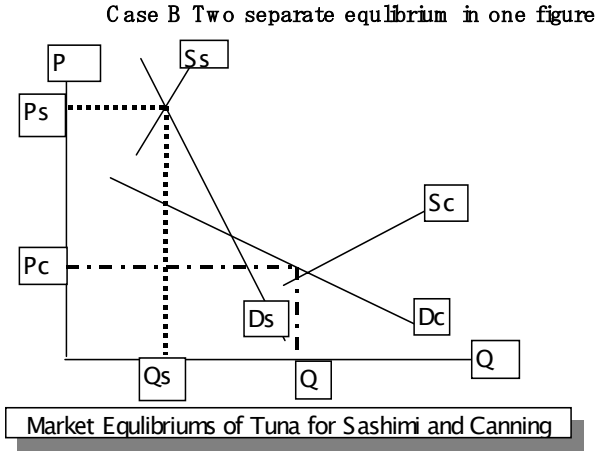


Figure 7 Equilibriums in both sashimi and canninng market: A hypothesis

Although **Figure 7** does not implicitly define whether or not tuna fishing operators for sashimi and canning are the same or not, there are actually exist such enterprises that engage in horizontal integration where they operate fisheries for both sashimi and canning. In the Philippines, for example, we observe a variety in fishing and processing operation, as it is shown in **Table VIII**. DTFI is a typical example of horizontal integration in the sense that it operates fishing for both canning and sashimi. SAFRII is an example of vertical integration in addition to horizontal integration in the sense that it does not only go fishing but also does processing and exporting. **Figure 8** shows a conceptual equilibrium of an individual company that operates fishing for both sashimi and canning. A company that supplies tuna in the competitive market will take the prevailing market price as given. They are Ps and Pc. The company then decides the amount of supply by consulting with its marginal costs, S1and S2.

Table VIII Companies that make both canninng and sashimi operation in General Santos City, Philippiens

Company		DTFI[1]	Pescarich[2]	MGTR[3]	RFM-SWIFT[4]	SAFRII[5]	Seatrade	SMFI[6]
Canning	Fishing	○		○		○		○
	Market at landing site			○	○	○		
	Processing				○	○	○	
	Exporting			○		○		
Sashimi	Fishing	○		○		○		○
	Market at landing site			○		○		
	Processing		○		○	○		○
	Exporting		○	○	○	○		○

Note As of September 1999. ○shows the operating business

1: Domingo Teng Fishing Industry.Fishing companies are two: DTSI and TSP. Headquarter is a local department store.

2: Japanese invested company that process frozen sashimi fillet from Grade C yellowfin to expor

3: Mommy Gina Tuna Resources

4: Rivera Fishing Management. In 1999, it is incorporated into SWIFT. Carries domestic cannin

5: San Andrew Fishing Resources and Industries.Headquarter is a local bank.

6: St. Mary Fishing Industry

Source: Yamashita(2005). Original source for Case A is various and Case B include Aprieto(1995, p.86), Gladysingco-Evans(1995, p.13), Thomas(1999, pp. 167-169), and intervies (Mr.S, Manila Branch, C. Ito(1999. 9.6)、D.Teng (1997.9.2)、Mr. A, a manager of MGTR.

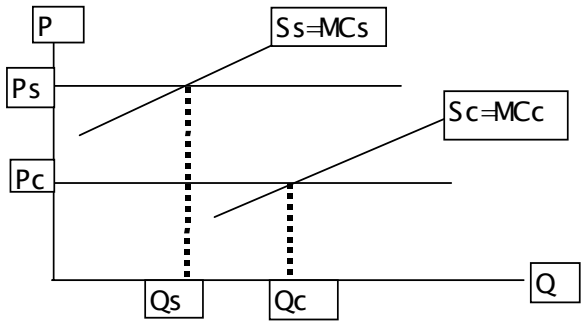
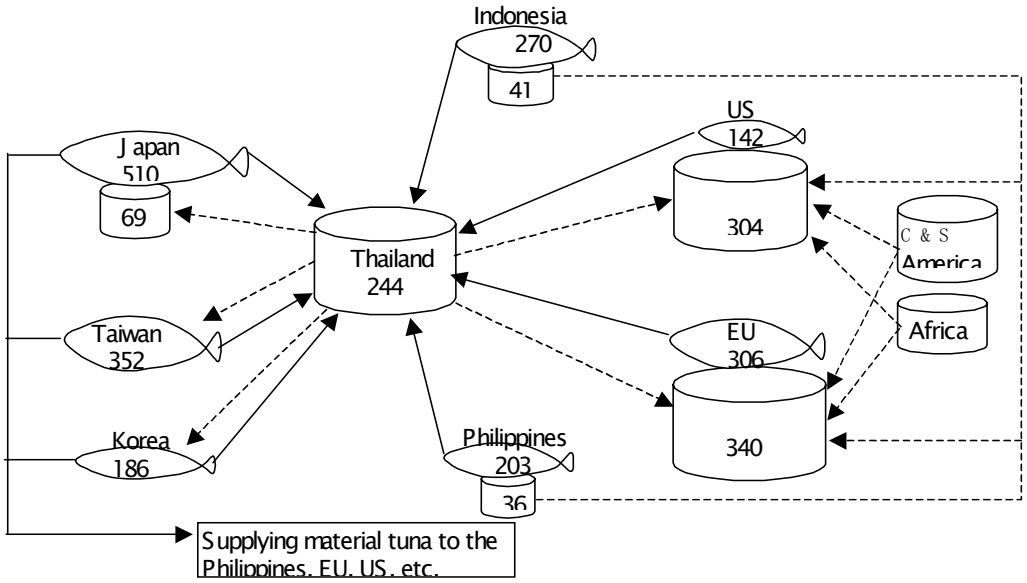


Figure 8 An equilibrium of an indigvidual company that operates both cannning and sashimi production: A hypothesis

Figure 8 does not reflect the true status of the market in the sense that canned tuna market as well as sashimi tuna market will not be able to achieve competitive equilibrium. The nature of the canned tuna market is really oligopolistic where the numbers of countries that demand raw materials as well as that of canned products are concentrated. **Figure 9** visualizes the flow of material tuna and canned tuna. As we see in the figure, Thailand collects canning material from all over the world, and redistribute, i.e. export, its product toward the world. EU and US are the big canned tuna producers as well as importers of the can. In that sense, two markets sharing one resource are both oligopolistic. Further study needs to be done to explain exact nature of the market.



Note: Numbers inside the fish shape are the amount of catch of skipjack, albacore and yellowfin. Not all of them are processed as can (Unit 1000MT). Numbers inside the can are the amount of domestic tuna can production (Unit: 1000MT). Solid array denotes the import of raw material, and the broken array denotes tuna can export.
Source: Yamashita (2005). Original source is FAO Fishstat

Figure 9 Trade flow of Material Tuna and Canned Tuna (2000、Unit:1000MT)

The last hypothesis is that tuna for canning and sashimi may be different products. It is because market demands mature tuna (40kg and up) while canning market requests juvenile tuna. How would the interaction of the two markets affect the availability of future resources? If there is the over-harvesting of juvenile tuna, it will lead to the scarcity of mature tuna, or vice versa. Whose responsibility is it to safeguard the future fish-stocks?

POLICY CONSIDERATION OF TUNA MARKET FROM THE VIEWPOINT OF RESPONSIBLE FISHERY

Among questions arises from the previous section, we will discuss the last question, the responsibility, while leaving other question as the subjects for the future. Reference to the Code of Conduct for Responsible Fishery by FAO (hereafter, we call it as COC) will be the most plausible way to start with. However, there is a limitation in appreciation of COC to the tuna market. This is because the COC emphasizes the role of the government and fishers of resource holding/catching country (e.g., the Philippines). It assumes that fishers are under the jurisdiction of the government that owns the resource. However, in the case of tuna, the fish stock is a common property of the region and the third countries

(e.g., Taiwan or Japan) catch them with and/or without the permission of regional management bodies. Moreover, it does not have oversight on the distribution or marketing and does not mention about the responsibility of consumer. However, in the case of tuna, majority of catch is exported. The volume of catch is influenced by demand of importing countries (e.g., U. S. and EU) where the government of the resource holding country cannot control.

Therefore, the coverage of COC needs to be expanded so as to include the rights and duties of parties in the global food system of such industry as tuna. For example, the government and consumers of consuming country (e.g. Japan) should be incorporated into the resource management system, particularly if the government of the sustainable and the development of resource owning country (e.g. the Philippines) set low priority in the management and development of tuna resource[v].

When we pay attention to the importing side, Japanese government as well as Japanese consumers should pay particular attention to the world stock of tuna resources, especially that of the three species, bluefin, southern bluefin, and albacore, because of the monopsonistic nature of the market for sashimi. With the cooperation of the Japanese consumers, sustainable resource management is easier to enforce. In the case of the other two species, yellowfin and albacore, the degree of responsibilities of consumers and the governments of consuming countries (e.g., U.S., EU and Japan), though equally important, may appear less important than the case we discussed in ii) due to the lack of a monitoring mechanism, considering the number of countries and consumers involved throughout the world.

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[i] Yamashita (2005) states that a limited number of research have been made on the production and marketing of canned tuna. As to the study of marketing of tuna delivered to Japanese market rather concentrated on catch by Japanese vessels while the import had been taken as residuals.

[ii] We can observe the parallel situations for other fish, too, where the nation of a country appreciates a particular fish that the rest of the world does not at all. Whales (Japan), sharks (fin) and sea cucumbers (China) are the examples.

[iii] In the case of bluefin, however, imported price is higher than domestic price as a result of the culture fattening process made to add value after the harvest to shipment.

[iv] Market distortions in the frozen tuna market are discussed in the end of the section.

[v] The reason for those countries to set lower priorities on tuna fishery is not because it is unimportant sector. Rather, the government has to pay more attention to the other social issues, poverty, overpopulation and depletion of coastal resources, associated with fisheries. Tuna fishery, the self-supporting and developing industry without government support, is naturally being regarded as less keen agenda.