



**UNIVERSITI PUTRA MALAYSIA**

**AN ECONOMIC ANALYSIS OF THAILAND'S  
CEPHALOPOD EXPORT MARKET**

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**AN ECONOMIC ANALYSIS OF THAILAND'S CEPHALOPOD EXPORT MARKET**

by

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requirements for the degree of Master of Science  
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by

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June, 1986

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This study attempts to provide information and evaluation of factors affecting the Thai export market of cephalopod to Japan. This was accomplished by estimating simultaneous export demand and supply equations using quarterly data from 1975 through 1983. The commodities are grouped into two, i.e. cephalopod salted in brine dried and cephalopod fresh, chilled and frozen. Export supply is explained by weighted average export price of cephalopod, lagged export quantity of cephalopod, and dummy variables while export demand is hypothesized to be a function of cephalopod weighted average export price, lagged weighted average export price, price of substitute good, Japanese's real income and dummy variables. A log linear form was selected as the function to be estimated. The estimation procedure is three stage least squares.



The results for salted cephalopod indicate that supply and demand for export is price elastic while demand is income elastic. In the case of fresh cephalopod both export demand and supply are price inelastic while demand is also income elastic. Cross price elasticities of demand as compensated to substitution products (shrimps, prawns and lobsters) are found to be highly inelastic. The results also indicate that Japanese's real income has the strongest effect on both salted and fresh cephalopod demand. The seasonal effect is found to be insignificant.



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Kajian ini bertujuan untuk memberi maklumat dan menilai faktor-faktor yang mempengaruhi pasaran eksport selfalopoda ke Jepun. Ini didapati dengan anggaran serentak persamaan eksport bagi permintaan dan penawaran dengan menggunakan data suku tahun daripada 1975 hingga 1983. Komoditi-komoditi di bahagi kepada dua iaitu selfalopoda kering serta masin dan selfalopoda segar, sejuk dan beku. Eksport penawaran diterangkan oleh harga purata eksport selfalopoda, kuantiti eksport selfalopoda suku tahunan lepas dan pembolehubah patung manakala eksport permintaan dianggap berfungsi kepada harga purata eksport selfalopoda harga purata eksport suku tahunan lepas, harga barang pengganti benar negara Jepun dan pembolehubah patung. Fungsi berbentuk logaritma linier digunakan dan anggaran dibuat dengan menggunakan kaedah kuasa dua terkecil tiga peringkat (3SLS).



Keputusan bagi selfalopoda masin menunjukkan bahawa penawaran dan permintaan untuk eksport adalah anjal harga. Selfalopoda segar adalah tidak anjal harga untuk kedua-dua permintaan dan penawaran eksport. Walaubagaimanapun, keanjalan pendapatan bagi permintaan terhadap selfalopoda segar adalah tidak anjal. Keanjalan harga bagi permintaan terhadap keluaran-keluaran gantian (udang putih, udang merah dan udang baring) adalah sangat tidak anjal. Keputusan juga menunjukkan bahawa pendapatan benar negara Jepun mempunyai kesan yang kuat terhadap kedua-dua permintaan terhadap selfalopoda masin dan segar, dan musim yang wakilkan oleh pembolehubah patung tidak memberi apa-apa kesan terhadap kuantiti eksport.



**CHAPTER I**  
**INTRODUCTION**

WORLD CEPHALOPOD SUPPLIES, RESOURCE AND TRENDS

Cephalopod is a small group of highly organized invertebrates. They derived their name from the close union of their head with their feet. They are distinguished from other classes of phylum *Mollusca* in that most other molluscs are unable to swim, while cephalopod is a relatively fast moving animal. Cephalopod may be classified in three general groups, namely, squid, cuttlefish, and octopus. Squid is wholly pelagic, cuttlefish is pelagic but spend much of their time close to the sea-bed while octopus is totally bottom living (Menasreta et. al 1973). Cuttlefish are in many respects similar to squids. They are generally categorized separately from squids as they are heritic and have an internal shell. Both squid and cuttlefish have ten tentacles in contrast to octopus with eight.

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1

Marine fish resources fall into two basic groups: demersal or bottom-dwelling fish, and pelagic fish which live in the water column. The demersal fish include those living in the soft, living seafloors (and which thus can be captured in trawls) and those living on hard, rocky or corraline (and thus untrawlable) seafloors. The pelagic fish include the neritic type living over the continental shelf, and the oceanic type such as the larger tuna, flying fish and marlin. In practical term, however the distinction between pelagic and demersal type inhabiting shallow water area such as the Gulf tends to become blurred as many species living in the water column will be captured by the high-opening trawl nets which are commonly used by Thai fishermen.



Cephalopod fisheries increasingly play an important economic and nutritional role. The establishment of national Exclusive Economic Zone<sup>2</sup> and rapidly increasing fuel costs provided many countries with the impetus to exploit cephalopod resources within their waters in order to increase export earning. Recent increases in world-wide demand for cephalopod products has stimulated exploitation to procure this animal protein for local consumption. Another factor is that demersal fish are fully exploited in several major areas e.g. Gulf of Thailand and Strait of Malacca. Also some pelagic species such as Chub Mackerel were over exploited in many areas in South China Sea. These factors have partly contributed to the increase landing of world cephalopod over the last decade.

Table 1.1 presents data on the world catch of cephalopod during 1970-1982. The world catch of cephalopod has increased during the last decade and in 1982 it amounted to over 1.5 million tons live weight, compared to about 1 million tons in 1970. This presents an increase of 65.29 percent. It should be noted, however, that the increasing trend is not continuous. The world catch of cephalopod gradually increased from 1970 to 1980. However in 1981 the output dropped slightly before increasing again in 1982. Squid is the main product landed and the proportion of squid

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2

The Exclusive Economic Zone is a zone extending two hundred miles (about 320 km.) from the coastline. A number of coastal nations have made claim on the sovereign rights to explore and exploit the living resources of the sea (fish). Among all the Thailand's neighbouring countries India was the first to claim for these rights in 1976, followed by Burma in 1977, and Indonesia and Malaysia in 1980. Thailand placed her claims in 1981.



TABLE 1.1  
WORLD CATCH OF CEPHALOPOD BY SPECIES, 1970-1982

Q: '000 TONS

YEAR	WORLD TOTAL	SQUID		CUTTLEFISH		OCTOPUS	
		Q	percentage of worldtotal	Q	percentage of world total	Q	percentage of world total
1970	974	700.0	77.87	87.5	8.98	186.2	19.12
1971	906	648.9	71.62	100.6	11.10	156.5	17.27
1972	1109	797.1	71.87	109.0	9.83	203.1	18.30
1973	1055	751.5	71.23	128.4	12.13	175.1	16.59
1974	1058	728.9	68.89	136.8	12.93	213.5	20.18
1975	1187	773.2	65.12	184.5	15.54	308.6	26.00
1976	1173	772.1	65.81	196.6	16.79	209.2	17.82
1977	1195	781.4	65.36	222.7	18.64	190.3	15.90
1978	1330	842.5	63.31	201.1	15.11	192.7	14.51
1979	1522	1058.0	69.51	208.1	13.67	173.1	11.37
1980	1530	1140.5	74.51	188.7	12.35	191.0	12.48
1981	1354	965.4	71.27	180.0	13.29	208.8	15.42
1982	1567	1193.8	76.18	182.1	11.61	208.9	13.34
average growth 1970-82	3.6	3.07	n.a.	2.5	n.a.	-1.1	n.a.

SOURCE : FAO YEARBOOK OF FISHERY STATISTIC, FISHERY COMMODITY

N.A. = Not applicable.

landing was consistently over 60 percent of the world total during the 13 year period. In fact in 1982 over 75 percent of the world catch of cephalopod was squids. Thus the decline in world production of cephalopods in 1981 was mainly caused by the decline in squid landings. Cuttlefish and octopus, on the other hand, contributed an average of 13 and 17 percent respectively of the world total catch over the 13-year period. The growth of these two commodities have always been erratic, and no increasing trend could be clearly discerned from the data. This is in contrast to the generally upward growth trend for squid.

Currently the world's largest cephalopod producing country is Japan, which contributes an average of 42 percent of the world's catch since 1978. Other major producing countries are Italy, Republic of Korea, Spain, and Thailand. These countries together with Japan, produce about 70 percent of the world's cephalopod. (Table 1.2)

Although fishery resources in general have been over exploited, world cephalopod resources are in abundant compared to present catch and demand levels. According to the South China Sea Fisheries Development and Coordinating programme (1976)

"The supplies of cephalopod resources are thought to offer no constraint to anticipated demand growth in the major market countries during the coming decade. In fact, world cephalopod resources are conservatively estimated to be able to support catches several time heavier than current levels. Squid alone is considered as one of the largest untapped resources of marine protein."

It is thus very likely that the availability and catch of world cephalopod can be increased in the future.





TABLE 1.2

WORLD CATCH OF CEPHALOPOD BY MAJOR LANDING COUNTRIES, 1970-1982

Q: '000 TONS

YEAR	WORLD TOTAL	ITALY		JAPAN		KOREA		SPAIN		THAILAND	
		Q	%	Q	%	Q	%	Q	%	Q	%
1970	948	26.8	2.8	203.4	21.4	75.1	7.9	44.9	4.9	59.9	6.3
1971	906	28.1	3.1	204.2	22.5	43.0	4.7	44.8	4.9	50.6	5.6
1972	1109	32.1	2.9	203.1	18.3	56.7	5.1	62.2	5.6	65.2	5.9
1973	1055	32.9	3.1	214.3	20.3	49.4	4.6	86.1	8.2	81.4	7.7
1974	1058	33.9	3.2	229.1	21.6	37.8	3.5	54.6	5.2	69.4	6.5
1975	1187	37.9	3.2	608.2	51.2	72.4	6.1	159.1	13.4	65.8	5.5
1976	1173	35.8	3.1	301.2	25.7	117.5	10.1	126.5	10.8	65.0	5.5
1977	1195	43.7	3.7	352.6	29.5	81.2	6.8	106.2	8.9	93.4	7.8
1978	1330	37.5	2.8	586.8	44.1	89.2	6.7	147.8	11.1	95.9	7.2
1979	1522	36.6	2.4	543.4	35.7	68.3	4.5	103.3	6.8	53.8	4.8
1980	1530	49.3	3.2	731.9	47.8	126.6	8.3	74.7	4.9	72.3	4.8
1981	1354	38.8	2.9	566.5	41.8	145.1	10.7	132.2	9.7	80.8	6.0
1982	1567	43.3	2.7	593.5	37.9	150.1	9.6	143.8	9.2	75.5	4.8

SOURCE : FAO YEARBOOK OF FISHERY STATISTIC, FISHERY COMMODITY

### WORLD TRADE PATTERNS OF FRESH AND FROZEN CEPHALOPOD PRODUCT

World trade in fresh and frozen cephalopod has increased very rapidly over the last decade. This is evident in Table 1.3 where the total increased from 64,000 tons in 1970 to over 250,000 tons in 1976 and 360,000 tons in 1979. This trade increase was due mainly to a large increase in demand from Japan.

Table 1.3 presents the import quantity of fresh and frozen cephalopod product by main countries. Japan's imports of this product increased sharply from 42,800 tons in 1969 to 162,900 tons in 1976 and 218,300 tons in 1979. Imports of Italy also grew rapidly during 1969-1970. The strong market demand may have stimulated exports from Spain, (37,000 tons in 1970 to 66,000 tons in 1979), Thailand (3,000 tons in 1970 to 41,000 tons in 1980) and Korea (6,000 tons in 1970 to 15,000 tons in 1980) (Table 1.4).

### WORLD CEPHALOPOD DEMAND AND CONSUMPTION PATTERNS

According to FAO estimates (FAO, 1984), total world requirements for cephalopod product are expected to expand to two million tons by 1990, an increase of over one third of the 1980 consumption level. While such marked increase may arise principally from Japan (Table 1.3), the demand for cephalopod products is likely to increase considerably in other countries such as Spain, Italy, The Republic of Korea and Thailand. The consumption of cephalopods, like that of other fishery products, depends largely upon traditional consumers' habits and tastes. For instance, in some countries like Japan which has the most



TABLE 1.3

IMPORTS OF FRESH AND FROZEN CEPHALOPOD IN THOUSAND TONS PRODUCT WEIGHT  
BY MAIN IMPORTING COUNTRIES, 1969-1980.

Year	France	Greece	Italy	Japan	Portugal	Spain	Others	World Total
1969	N.A.	2.5	10.4	42.8	N.A.	N.A.	2.9	48.2
1970	N.A.	2.5	18.0	51.1	N.A.	6.7	3.2	63.9
1971	2.9	3.1	16.7	83.9	1.2	10.6	4.6	123.0
1973	3.4	3.0	15.5	91.9	1.8	20.0	10.4	146.9
1973	6.0	3.1	25.8	83.9	1.8	28.4	5.6	161.9
1974	5.8	3.4	14.5	113.0	1.8	33.6	9.5	181.6
1975	5.8	4.2	27.3	129.6	1.7	27.2	14.7	210.3
1976	6.5	5.2	32.2	162.9	3.5	34.4	12.5	251.3
1977	7.8	4.9	28.7	138.1	1.9	23.2	14.0	281.1
1978	9.7	5.1	40.9	196.6	-	42.8	23.3	318.6
1979	11.5	N.A.	45.4	218.3	1.4	41.1	41.9	359.6
1980	10.6	N.A.	43.6	157.8	1.7	49.5	23.3	286.5

Source : FAO Yearbook of Fishery Statistic, Fishery Commodity.

N.A. = Not available.

TABLE 1.4  
 EXPORTS OF FRESH AND FROZEN CEPHALOPOD IN THOUSAND TONS PRODUCT WEIGHT,  
 1970-1980

Year	France	Italy	Japan	Korea	Spain	Thailand	World Total
1970	N.A.	0.9	23.6	6.3	36.9	2.6	84.8
1971	4.8	1.7	23.9	8.6	67.1	2.9	125.1
1972	2.3	2.9	33.7	11.9	73.3	6.9	149.1
1973	5.0	2.2	35.7	15.9	49.2	15.6	139.9
1974	3.5	4.7	25.9	24.9	62.3	15.6	161.1
1975	4.8	3.3	23.9	14.0	56.8	22.6	170.3
1976	5.3	1.4	25.0	20.3	76.1	22.3	178.5
1977	9.9	2.9	12.5	13.3	47.0	27.7	128.5
1978	6.3	1.8	9.0	15.3	64.5	36.0	208.5
1979	3.8	2.1	27.6	24.0	66.2	32.4	318.1
1980	3.3	2.4	16.4	14.6	38.8	41.0	208.6

Source : FAO Yearbook of Fishery Statistic, Fishery Commodity

N.A. = Not available

varied pattern of utilization, cuttlefish is regarded as a luxury food product. Conversely, demand for squid has tended to decline because it is regarded as a less desirable species by the Japanese (South China Sea Fisheries Development and Coordinating Programme 1976).

Table 1.5 presents world utilization pattern of cephalopod products based upon data from 12 major countries, i.e. Japan, Spain, Republic of Korea, China, Thailand, USSR, Italy, Canada, Argentina, Philippines, USA, and Mexico. These countries together account for 90 percent of the world cephalopod catch. As much as 75 percent of cephalopod was subjected to curing, fresh and frozen, 1 to 2 percent was used in canning, 14 percent was used in preparation and some 4 percent was used for reduction to meal. During the period between 1970 and 1980 utilization of fresh and frozen products had gradually increased. Preparation product and quantity cured had also shown a steady increase. Production of canned cephalopod, however, had shown considerable decline i.e. from 3.73 percent (of 46,000 tons) in 1975 to 1.66 percent (25,000 tons) in 1980. It is thus very likely under the present trend that there will be no let up in the increase in world consumption of cephalopod. It can also be deduced from the present trend that consumption of cephalopod other than in fresh and frozen forms will not receive tremendous boost in the future.

#### IMPORTANCE OF CEPHALOPOD FISHERIES IN THAILAND

Fishery has been generally recognized as an economically important industry in Thailand, generating income and employment to



TABLE 1.5  
UTILIZATION OF CEPHALOPOD PRODUCTS 1970-1980

Q : '000 tons live weight

Year	Fresh		Frozen		Curing		Canning		Preparation		Reduction		World Total
	Q	%	Q	%	Q	%	Q	%	Q	%	Q	%	
1970	343.0	13.63	246.0	29.73	133.0	13.81	21.0	2.60	193.0	19.62	39.0	3.60	976.0
1971	392.0	39.10	294.0	29.24	93.0	9.30	17.0	1.73	166.0	16.57	41.0	4.40	1,004.0
1972	320.0	28.25	446.0	39.81	109.0	9.68	21.1	1.85	186.0	16.57	40.0	3.57	1,121.0
1973	357.0	33.23	324.0	30.23	119.0	11.10	14.0	1.28	219.0	20.45	39.0	3.67	1,070.0
1974	349.0	32.59	336.0	31.38	109.0	10.18	15.0	1.36	222.0	20.72	40.0	3.74	1,070.0
1975	522.0	42.37	335.0	27.19	127.0	10.31	46.0	3.73	161.0	13.07	41.0	3.33	1,232.0
1976	503.0	41.53	345.0	28.49	109.0	9.00	34.0	2.81	170.0	14.04	50.0	4.13	1,211.0
1977	479.0	38.00	341.0	27.68	114.0	9.25	35.0	2.84	198.0	16.07	65.0	5.28	1,232.0
1978	406.0	30.35	489.0	36.77	129.0	9.70	39.0	2.18	204.0	15.34	73.0	5.49	1,330.0
1979	518.0	34.17	567.0	37.40	129.0	8.51	24.0	1.58	224.0	14.78	97.0	6.40	1,516.0
1980	656.0	43.63	501.0	33.31	137.0	9.11	25.0	1.66	224.0	13.76	46.0	3.06	1,504.0

Source : FAO Yearbook of Fishery Statistic, Fishery Commodity.

the Thai people. It was estimated that the number of people employed in the fishery sector in 1981 was more than 150,000 (Reintrirut 1983). In 1978 exports of fishery products contributed 5.2 percent of Thai foreign earnings. Fish is the most important protein food in Thailand compared with all other kinds of meats as indicated by the much higher per capita consumption of fish than any other protein food (Ministry of Agriculture and Cooperative, 1984). Thus fishery industry serves at least three main functions in Thailand, cheap protein food, foreign exchange earning, employment and income for a considerable portion of the country's population.

Throughout the history of Thailand, fisheries has been a subsistence industry with stationary entrapment as a dominant method of fishing. Major developments of the country's fishing methods only occurred in the early 1960's, when technological cooperation with The Government of the Republic of Germany had succeeded in the adoption of moveable gears by the fishermen. This has helped to increase Thailand's marine fish landing to more than two million tons in 1977, and consequently has made Thailand one of the major fishing nations in the world (Jitsanguang 1983). In terms of quantity exported, it increased from less than 10,000 tons in 1960 to over 17,000 tons in 1965 (Department of Custom 1966) and 300,306 tons in 1981 (Department of Custom 1982). In 1980 fishery industry contributed approximately three percent to the country's Gross National Product (Kumpa 1981).

Among fishery commodities, cephalopod is the second most important export earner. During the three decades (1940-60),

