



CHAPTER 1

INTRODUCTION

1.1 History of Thai fishing vessels

A lot of historic evidences have told people about life, culture, politics, etc, as long before thousand of years in this country, but the amaizing thing is that there are very fews to show on boat building development.

Existing techniques used in present wooden fishing boats eg. sharp stern and stem, twin rudder blades etc, can not yield correct answer as far as history is concerned. It is, just, a believe that tradition has something to do with, like the other aspects of arts. Some modification may be done due to the influence of overseas maritime nations.

About the year 1000, sea communication was widely done between India and China. In the middle east, Islamic kingdom was supposed to be a marketing centre of the trades. New sea lanes were established to India, the Far East and China by passing through Malaka Strait.

It is strongly believed that Thai ships should have something to do with the trades. During the period 1400 to 1800, the trades were declining because modernised Chinese junks were bigger and sailed to the West up to the Red sea. New main ports by that time were developed along Indochin a coast, Thai Gulf and Malaya Penninsula.

About the year 1500, the Portuguese arrived South East Asia, followed by Spanish, Dutch, French and the British. The trades were put ahead by the Westerns while colonisation came later on.

In the year 1900, earliest age of Thai fishing boats were mainly "Rua Ped"* and "Rua Chalom"**. Followed by "Rua Kao"***; "Rua Ta"+; "Rua Poa"++ and "Rua Sumpun"+++

Influence from oversea communication had modified traditional Thai style boats in many ways. It may be concluded that Thai boats were different styles, according to [77] are :-

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- * Rua Ped : the name implies the under water portion of the boat which is similar to that of a duck.
- ** Rua Chalom : is a name given to any kind of sailed boats.
- *** Rua Kao : is a Chinese style barge used in main rivers such as Chao Phraya.
- + Rua Ta : is a small kind of junk, first developed in Cambodia.
- ++ Rua Poa : is a combination of western style hull and Chinese sails
- +++ Rua Sumpun : is a traditional Thai digging canoe.

A) A combination style of Arab and India

Ancient Egypt sailing boats were tapered, sharp stem and stern. Square hanging sails were commonly used by that time. It was supposed to be the earliest type of ships using along Merditeranian coastlines. Pursian, Greek and the Roman also adopted the square hanging sails later on.

The Indian invented triangular sails but the Arab applied to use them on their boats in the Arab sea along with Indian ocean and the Red sea.

Thai seamen adopted both single and multi-triangular sails for their uses. The hull had sharp stem with fine angle of entrance. Stern was similar in shape to the bow. This type of vessel was mainly used in the Indian route and also the Chinese route.

B) Malaya style

It was found that along the Malaya peninsula and Indo-Pacific islands, sailing ships used strange and elaborate hull forms.

Malayan hull forms were, in general, similar in the shape of bow and stern. The hull was moderately fine with spoon-shape bow and stern. Deckhouse was made from simple bamboo mat.

Hanging sails were the main characteristics of the

boat. They were used throughout Indonesia and the west part of Indian ocean. The Thai and Vietnamese adopted this type of sails for their uses. It is not exactly known about the origin of triangular sails, but archaeologists widely believed that they were adapted from square Egyptian sails. A scription found in Java confirmed the world that triangular sails were used, at least, since the year 775.

Another thing to notice is the rudder. Most vessels had twin rudders ie. port and starboard. Some vessels may have only one. Very tall and narrow rudder blade was used in cooperate with long rudder handle. The upper end was clinged with a rudder post which was fixed at centreline of the vessel. This is the earliest type of steering gear ever used on board.

C) Chinese junk* style

Normal ancient chinese junks had high aft freeboard, wide sails and jibs. Crew accommodation was placed in the aft. Two major types of junks may be

* junk : It is believed that the English word of "junk" came from the Protuguese word "junco" which was derived from a Java word "Jon" ; a full-form vessel with high aft freeboard, may or may not have a keel, high mast with hanging sails and jibs.

described as junks that were used in the northern and southern parts of China. In the northern part of China, most rivers were shallow with sandy bottom. This led to spoon-shape bow and flat bottom shape of junks. Down to the south, the rivers were quite deep with stony banks ; resulting in sharp bow, high draft and very curved shape of the hulls. Ref. [51] describe some detail on Chinese junks.

As it was earlier stated that there was no historic records of the development of Thai fishing vessels. Anyhow, some characteristics of the above described styles appear in the traditional Thai fishing vessels which could be classified as follow :-

A) Rua Chalom

Among various types of Thai fishing vessels, Rua Chalom is one of a very few type that has not been changed in the hull shape. Main characteristics are long and narrow hull, shallow draft, high freeboard, straight-raked bow and stern, twin rudders.

B) Rua Ped

This type of vessel was very popular among Thai fishermen for some seventy years ago, but surprisingly it could be rarely found at present. The vessel was high speed with double main masts and hanging sails. Sharp and raked bow/stern. High depth helped the vessel to have good seakeeping quality in rough sea. It was similar in

shape with Arab/India vessel except that the stern is raked, not a transom.

C) Rua Sumpao (Thai junk)

Thai junks were mainly derived from the Chinese. It had high aft freeboard, square rudder blades that could be lift up. The main difference lies in the keel and frame construction process rather than the arrangement.

Very few Thai junks with big sails exist today. They were mainly used to transport sand, log etc. across the gulf.

Forty years ago there was no motor fishing boat in the Thai gulf. The biggest fishing vessel had, at that time, gross tonnage not more than 10. There were some 30-40 GT. Chinese junks from China catching mackerel (*Rastrelliger Neglectus*) in the Thai gulf. By 1935, the Thai government announced the first fishery regulation that only Thai-nationality fishing vessels could be allowed to catch marine animals in the Thai fishing territory. By the mid 40's. Thai fishermen first installed engines in their boats. In 1947, new types of fishing vessels came into uses, incorporated with new fishing techniques. In 1967, Thai fishermen started to do fishing outside Thai water. By 1972, Thailand became one of the top-ten countries that fishing volume was recorded in the world fishery statistics. In 1985, this author asked himself "What's wrong with our bloody fishing vessels-today?"

He's still wondering.

1.2 Traditional Fishing Boat Construction Methods

At present, there are only two kinds of materials involving hull construction namely wood and steel.

Wooden boatbuilding

Teak (*Tectona Grandis*) is the world famous wood for Thailand. Old boats were normally built from this hard, heavy durable wood. Teak is now progressively less available and consequently too expensive for building. Other suitable woods that are currently being used for the construction of fishing boats are described in Table (1.1) The quantities of timber required for boatbuilding purposes are also listed in Table (1.2)

Surprisingly that most Thai fishing boats are built without the benefits of blueprints. In some case, halfblock model may be used for the agreement on hull shape between builders and owners.

Normal hand tools are used for Thai boatbuilder or boat repairer apart from some peculiar tools to his own trade such as adze, shell anger, caulking mallet, caulking irons, rake gimlet etc.

Fastening of wood workpieces is by means a rough round wooden stick called "Treenail". Sometimes, hot-dipped galvanised bolts and bronze screws are required and increasingly being popular due to economic reasons.

Boatbuilding in Thailand is mainly conducted on a

cottage-industry basis. There are about 170 boatyards in major provinces along the coast of both Gulf of Thailand and the Indian Ocean. In average a boatyard can produce two to three fishing vessels annually. Six to nine months may be expected for hull construction. Table (1.3) gives more detail on hull construction periods.



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Table (1.1) Properties of timber for boat construction [39]

No.	Species	Trade name	Weight (air dry)	
			lb/ft ³	kg/m ³
1	<i>Takrieta</i> sp.	Chumprak	45	721
2	<i>Logerstroemia speciosa</i>	Intanil	42	673
3	<i>Cotylelobium lanceolatum</i>	Kiam	58	929
4	<i>Anisoptera</i> sp.	Krobak	36	576
5	<i>Azclia xylocarpa</i>	Makamong	61	977
6	<i>Pterocarpus macrocarpus</i>	Pradu	52	833
7	<i>Tectona grandis</i>	Teak (Sak)	42	673
8	<i>Hopea odorata</i>	Takien-Tong	47	753
9	<i>Hopea ferrea</i>	Takien-Ilin	42	673
10	<i>Anogeissus acuminata</i>	Takien-Nu	52	833
11	<i>Cassia gattelliana</i>	Smasarn	56	897
12	<i>Delbergia dongnaiensis</i>	Getdang	70	1,121

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Table (1.2) Quantity of timber required for boatbuilding
[39]

Boat Meters.	Feet	Quantity of timber cu. ft.	Cost (US\$)	
			1980	1981
10	32.81	500	6,250	7,000
11	36.10	600	7,500	8,400
12	39.37	700	8,700	9,800
13	42.65	810	10,125	11,340
14	45.93	920	11,500	12,880
15	49.22	1,130	14,125	15,820
16	52.50	1,250	15,625	17,500
17	55.78	1,430	17,875	20,020
18	59.06	1,700	21,250	23,800
19	62.34	1,950	24,375	27,300
20	65.62	2,200	27,500	30,800
21	68.90	2,500	31,250	35,000
22	72.18	2,900	36,250	40,600
23	75.46	3,300	41,250	46,200
24	78.74	3,700	46,250	51,800
25	82.03	4,200	52,500	58,800
26	85.31	4,800	60,000	67,200
27	88.59	5,400	67,500	75,600
28	91.87	6,100	76,250	85,400
29	95.15	6,900	86,250	96,600
30	98.43	7,700	96,250	107,800
31	101.71	8,500	106,250	119,000
32	104.99	9,300	116,250	130,200
33	108.27	10,200	127,500	142,800
34	111.55	11,000	137,500	154,000
35	114.84	11,800	147,500	165,200
36	118.12	12,600	157,500	176,400
37	121.40	13,400	167,500	187,600
38	124.68	14,300	178,750	200,200
39	127.96	15,150	189,375	212,100
40	131.24	16,000	200,000	224,000
41	134.52	16,800	210,000	235,200
42	137.80	17,400	217,500	243,600
43	141.08	18,400	230,000	257,600

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Table (1.3) Labour requirement for hull construction [39]

Meters	Boat (LOA)		Man-hours (100 hr)
	Feet	CUNO m ³	
10	32.81	35.25	32
11	36.10	47.38	38
12	39.37	61.44	46
13	42.65	78.04	51
14	45.93	97.66	63
16	49.22	120.00	72
16	52.50	145.52	80
17	55.78	174.81	92
18	59.06	207.36	104
19	62.34	243.71	116
20	65.62	284.62	128
21	68.90	329.28	144
22	72.18	378.38	160
23	75.46	432.84	175
24	78.74	491.52	192
25	82.03	555.28	210
26	85.31	625.22	228
27	88.59	699.84	248
28	91.87	780.17	268
29	95.15	867.54	290
30	98.43	960.00	312
31	101.71	1,060.00	336
32	104.99	1,170.00	364
33	108.27	1,280.00	390
34	111.55	1,380.00	416
35	114.84	1,490.00	440
36	118.12	1,590.00	468
37	121.40	1,690.00	496
38	124.68	1,800.00	520
39	127.96	1,900.00	545
40	131.24	2,000.00	568

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Analysis of newly built wooden fishing boats shows that the boat's proportions has been changed. Old boats are quite long and narrow ie :-

length/breadth ratio approx. 4 : 1

breadth/depth ratio approx. 2.5 : 1

low power and low gross tonnage. Compare to newly-built boats,

length/breadth ratio approx. 3.20-2.75 : 1

breadth/depth ratio approx. 1.80-2.20 : 1

higher power and fully equipped with modern electronic equipments. Further information on vessel's proportions may be seen in Fig. (1.1) and Fig. (1.2). Table (1.4) also shows costs of hull and superstructure in relation to the length.

Steel boatbuilding

It would be true to say that steel boatbuilding in Thailand gave birth to the steel shipbuilding industry in this country. At present fishing vessel of approximately greater than 22 meters will be cheaper to build in steel. This is due to the fact that woods' prices are rapidly increasing. In general, steel and wooden fishing boats of the same size do not have any differences in shape as far as vessels' main characteristics are concerned.

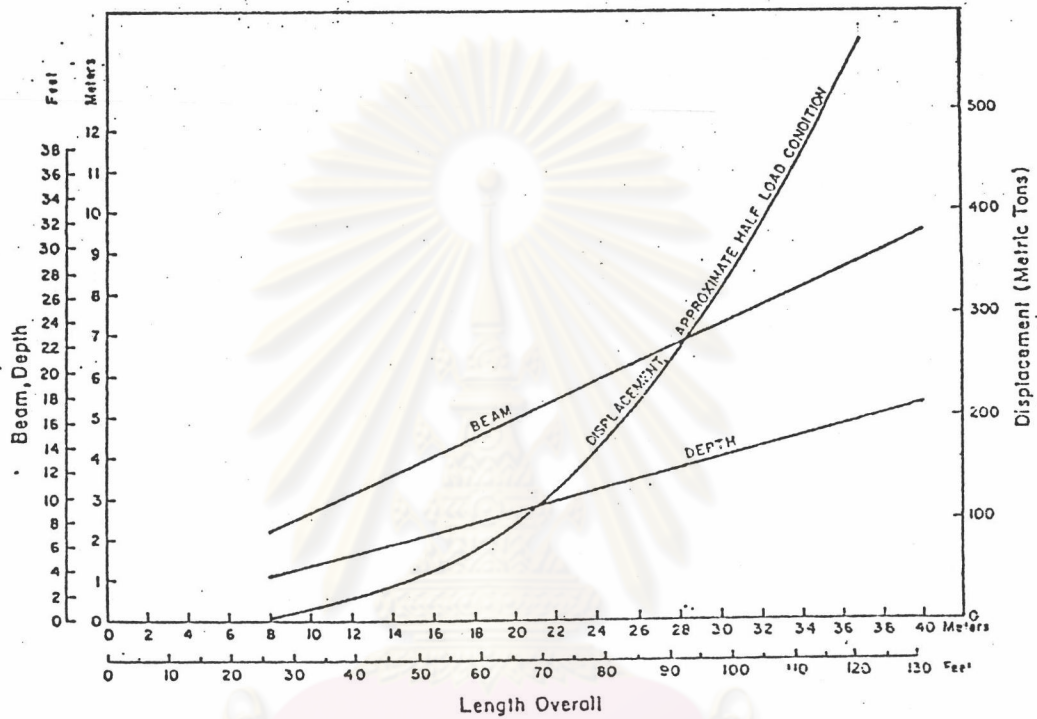
For the near future, Thailand shall need much larger fishing boats, made of steel instead of wood, in order to operate in distant fishing grounds. This will result in higher deadweight and block coefficient with a

new design system of heat insulation for fish-holds. The techniques used in boatbuilding are in an infant stage. Like the wooden-boatbuilding industry.



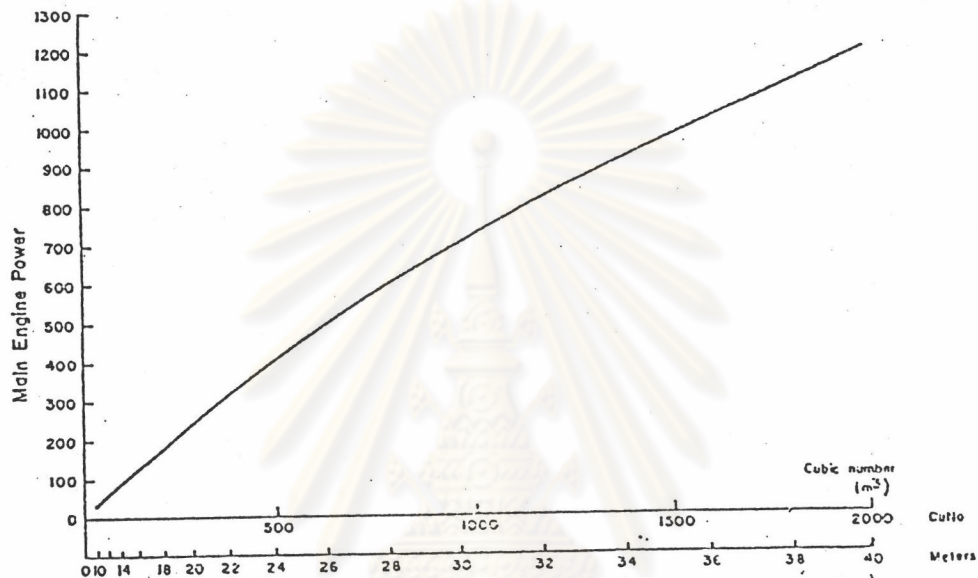
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Fig. (1.1) Relation between length overall, beam, depth and displacement of Thai fishing vessels [40].



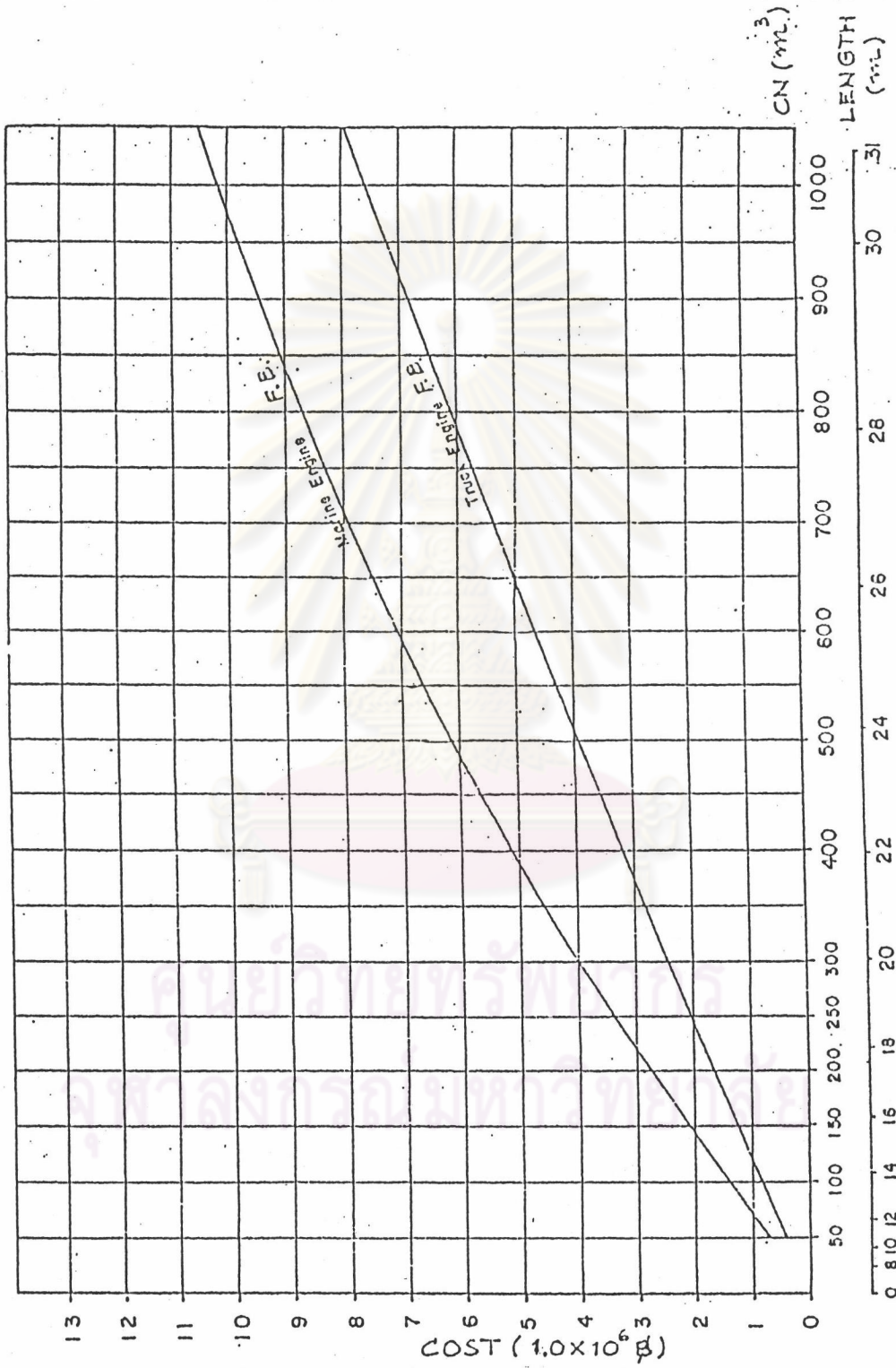
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Fig. (1.2) Relation between power of main engine and cubic number (LOA x B x D) obtained from a sample of Thai fishing vessels [40].



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Table (1.4) Costs of hull and superstructure [40].



boatbuilders are mostly learned from their own experiences. No qualified naval architect or marine engineer works on this field of industry at present eventhough high demand of steel boats are queing. There are much more to be learnt for local boatbuilders about modern techniques of steel boatbuilding and many problems left for them to be solved. Further detail on this subject may be found in [1]; [47].

The future of Thai fishing vessels will depend on many factors but it is certain that larger size and endurance radius will be needed. A global view on fishing industry can be found in [76] which describes various important factors likely to cause impact on fishing vessels. [22]; [39]; [40] describe general information on Thai fishing vessels.

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1.3 Present status of Thai fishing boatbuilding

Fishing boatbuilding industry is rapidly developing in Thailand. A number of fishing vessels are increasing despite of higher efficiency achieved. More remote fishing grounds are being explored by the Thai fleet. There is a strongly needs to have a guidance for the country on the developing of national fishing program, since national economic is, at least one part, based on this type of industry.

A variety of types and sizes of vessels are constructed in this country for use in trawling, purse-seining, gill-netting and other forms of fishing. By far the largest number of boats are used for otterboard trawling [78]. See Table (1.5).

Thai fishing fleet is comprised mostly of wooden boats of various sizes and shapes ranging from 14 to 40 meters. They are all simple design with round bilge, displacement hull, flat stern and relatively high deepmass. Superstructure is normally aft of midship with crew accommodation placed inside. Engine room is located beneath the superstructure. Fish holds are placed in front of engine room. Aft area of maindeck is usually provided for cooking facility. Fish boxes and nets are deposited on main deck. It will be clearly seen that, with this arrangement, how quality of seaworthiness may be induced.

Five most important hull types formerly used by Thai fishermen are described below :-

Table (1.5) Number of fishing vessels registered,
classified by fishing techniques [78]

SHIP CAPACITY		TRAWLER	PURSE-SEINER	GILL-NET	MOLLUS GILL- NET	SCOOP-NET	MISCELLENEOUS	TOTAL
LENGTH (m)	GROSS TONNAGE							
< 10	< 5 GT.	7	-	6	2	-	6	21
10 - 12	5 - 10 GT.	30	3	3	9	-	18	63
12 - 14	10 - 20 GT.	35	3	2	14	1	15	76
14 - 16	20 - 30 GT.	44	6	3	16	-	25	94
16 - 20	30 - 60 GT.	277	44	14	2	-	142	479
20 - 24	60 - 100GT.	80	33	2	-	-	29	144
24 - 28	100 - 150GT.	4	1	-	-	-	-	5
> 28	> 150GT.	-	-	-	-	-	-	-
	TOTAL	477	90	30	43	1	235	882

Type 1

In Fig.(1.4), it will be seen that this type has a full rounded midship section, narrow beam, relatively short draft and heavily pronounced rubbing streak. The vessel has a straight raking stem, good amount of sheer, high bow, low-overhauling stern with high cabin aft or amidships. Lengths are between 12 to 40 meters, the most common being 16 to 25 meters. They are used as trawlers and purse-seiners.

Type 2

For this type, a full midship section with narrow beam is also presented. A stem is raked which is quite similar to Type 1. Major difference lies in the stern which is flat and wedged shaped. Counter stern of Type 1 is replaced by transom in Type 2. The vessels are used as gill-netters, beam trawlers, anchovy purse-seiners and push-net boats. See Fig. (1.5).

Type 3

This type has a double-ended, broad-beamed, full-bodied hull with sharply raked high, straight stem which is broad and flat at the top, tapering to a typical V at waterline. Stern post is high and nearly-vertical. Fig. (1.6). Lengths are between 6 to 16 meters. They are used as purse-seiners and gillnetters.

Type 4

The hull is double-ended which is different from Type 3 in the narrower beam and shape of stem and stern post. Two principal variations, the first with attractive crescentshaped bow and stern post, the second with a straight stem and higher bow with a similar but lower straight-stern post.



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Fig. (1.4) Traditional fishing vessel Type 1

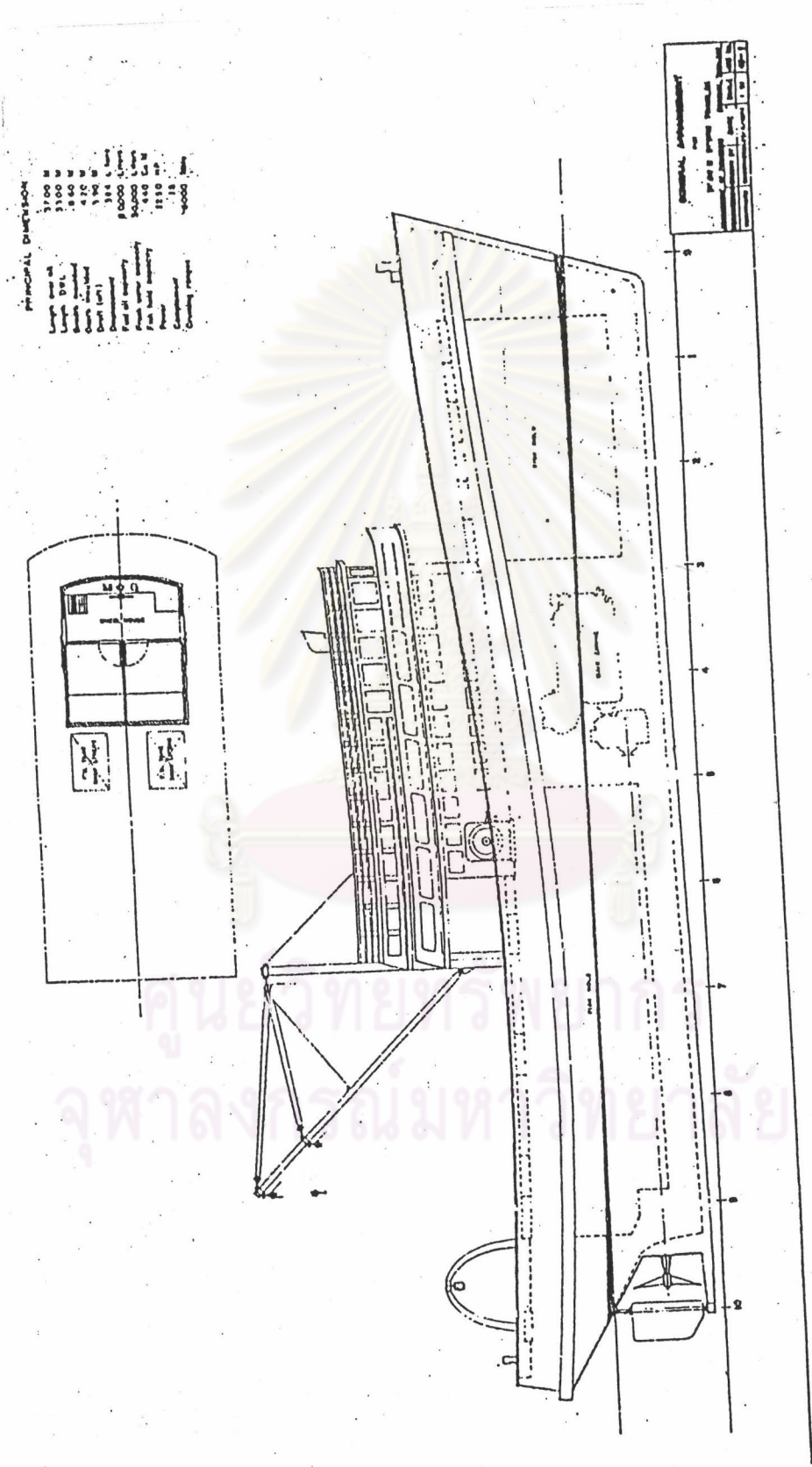


Fig. (1.5) Traditional fishing vessel Type 2

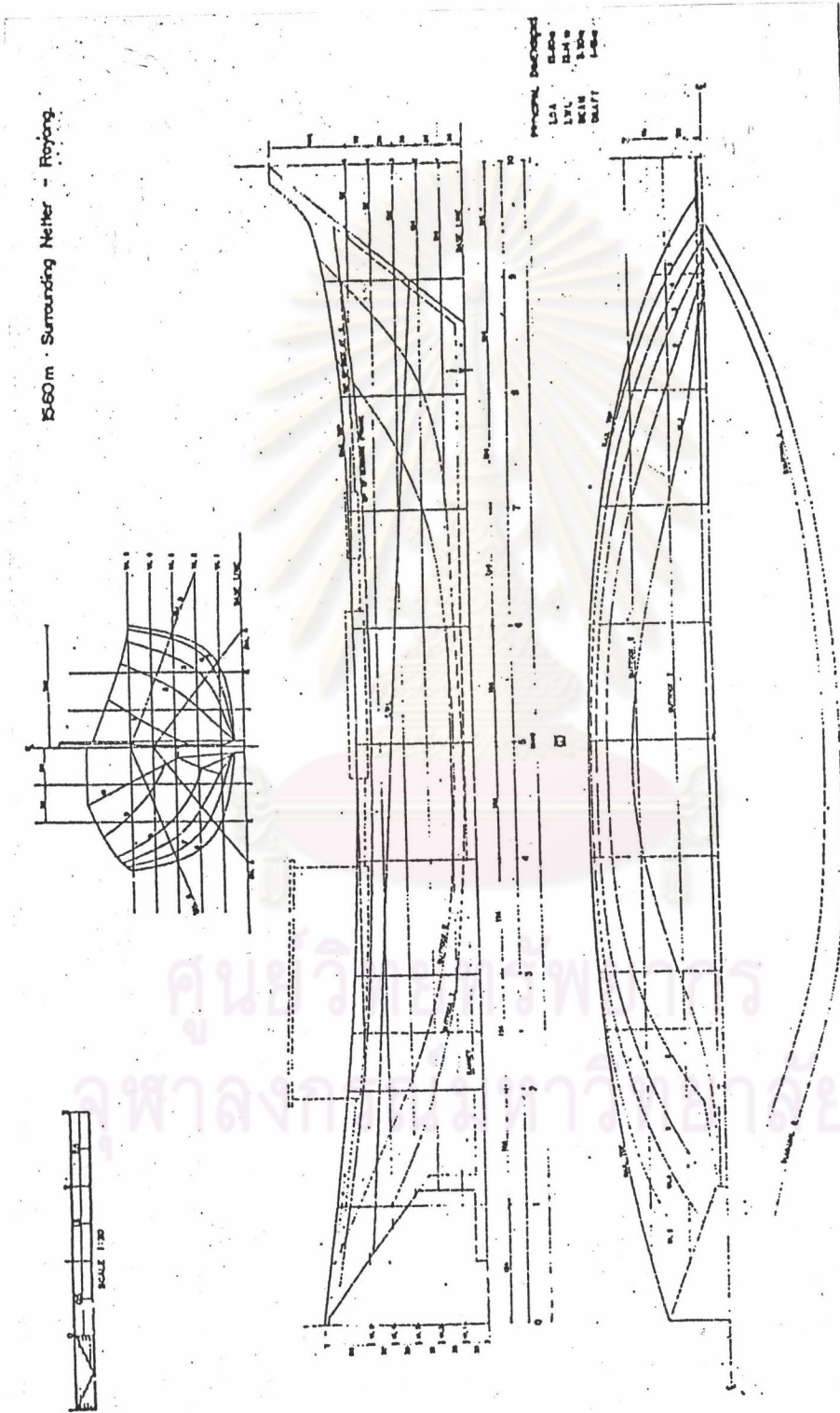


Fig. (1.6) Traditional fishing vessel Type 3

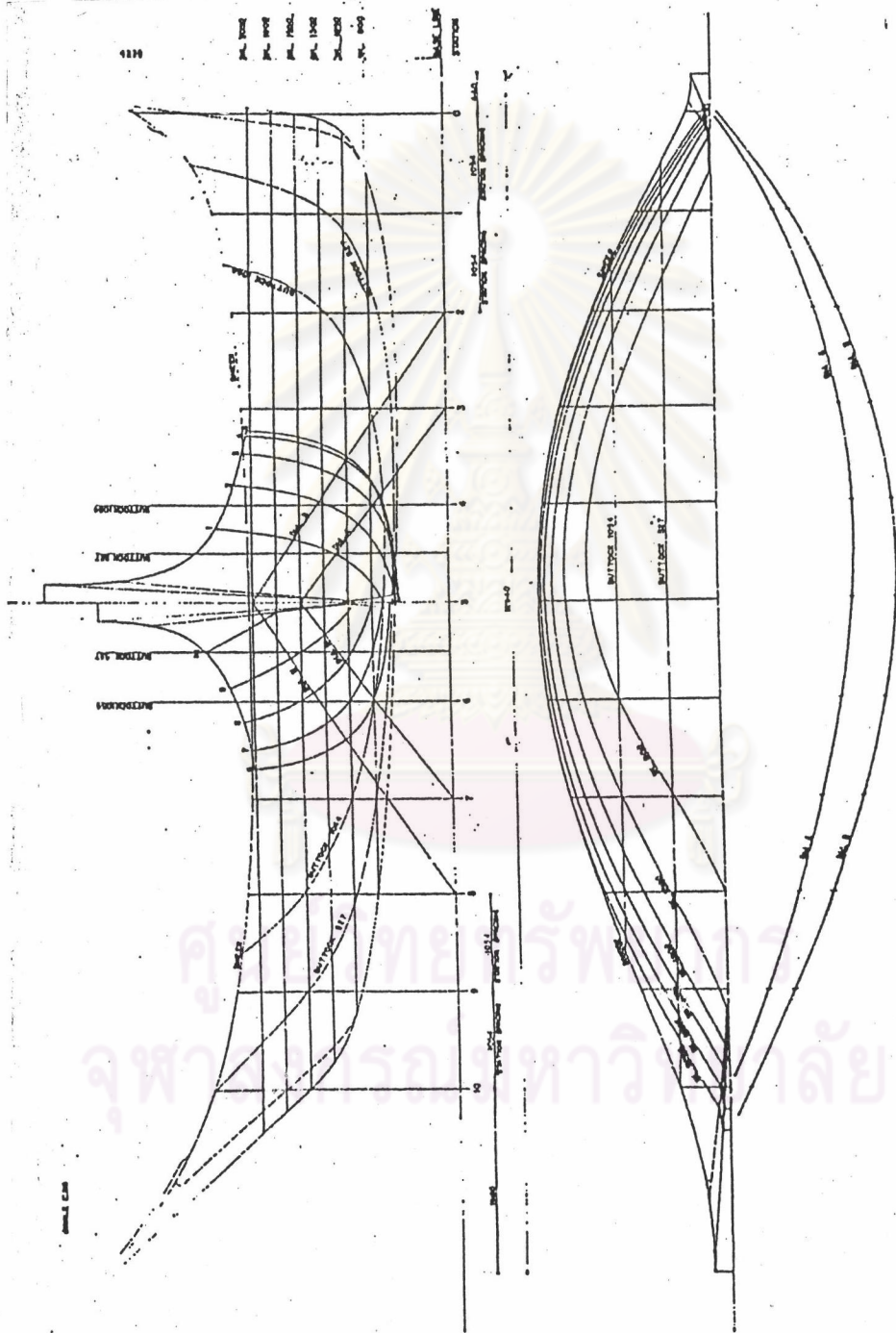


Fig. (1.7) Traditional fishing vessel Type 4

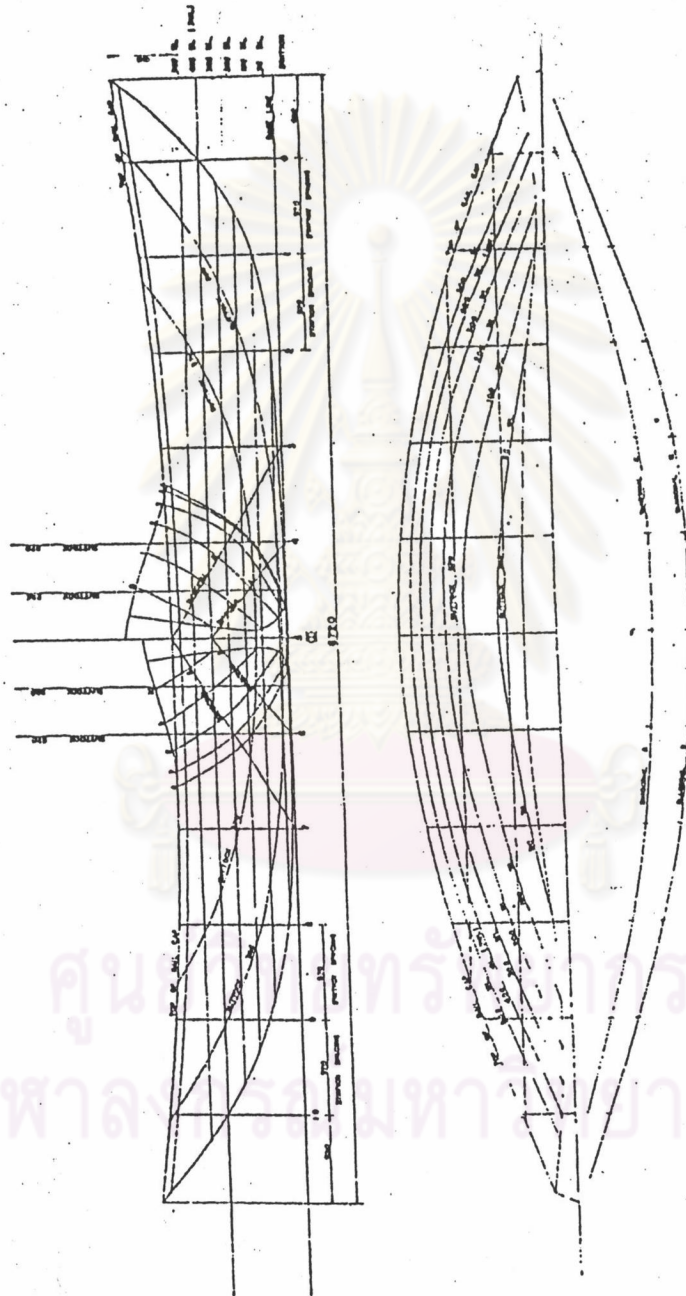


Fig (1.7). Length are between 5 to 10 meters. They are commonly used for gill-netting, long-lining and hand-lining.

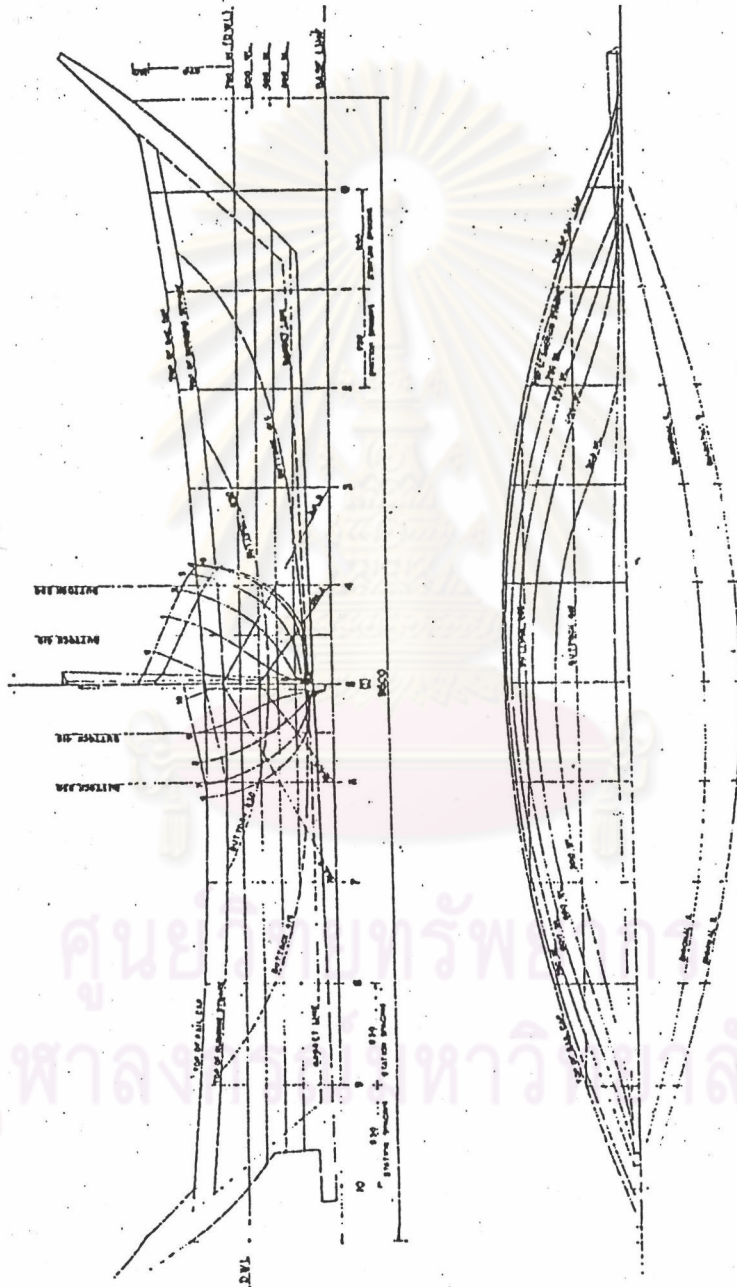
Type 5

This type has double-ended with narrow beam and shallow draft. Fig. (1.8). The shapes of the stem and stern are characteristic, as is the curving sheer line and ornately carved and painted decoration. They are regional and open type found only in Songkla, Pattani and Narathiwat. Lengths are between 6 to 15 meters. The vessels are commonly used as gill-netters.



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Fig. (1.8) Traditional fishing vessel Type 5



1.4 Present situation of Thai fishing industry

In 1960, the catching volume of marine animals was 146,471 tonnes and in 1985 the figure was 1,579,885 tonnes. At present, the catching volume is slightly more than 2,000,000 tonnes. One can imagine what marine animal resources in the Thai Gulf look like ! It will not be far from the truth that the situation is rapidly deteriorate. The Gulf is in extreme crisis. Most fishermen solve the problem by changing their fishing grounds to be outside the Thai territory.

Before 1974, there was no much problem of fishing in the international seas. According to the Montogo Bay Contract(1974), which comprises of 320 titles and 17 parts including 9 parts of annexs, the seas become the common heritage of mankind. Thailand's fishing industry has faced the problem of 12 NM in the territorial sea (previously- 3 NM) and the extension of 200 NM beyond the territorial sea is considered to be exclusive economic zone (EEZ).

Due to the geographical topology of Thailand as a shelf-locked state, declaration of EEZ does not give any advantage to the country. The Thai Gulf is bounded by Cambodia, Vietnam and Malaysia territories. Table (1.6) shows a comparision. EEZ for various states near by Thailand.

TABLE (1.6) EXCLUSIVE ECONOMIC ZONES

STATE	DECLARATION DATE	EEZ (NM) ²	COASTAL LENGTH (KM)
India	15 Jan. 77	-	-
Burma	9 Apr. 77	148,600	1,968
Vietnum	12 May 77	210,600	1,996
Cambo	15 Jan. 78	16,200	336
Philippines	11 June.78	551,400	11,195
Indonisia	21 Mar. 80	1,577,300	31,654
Malaysia	25 Apr. 80	138,700	2,965
Singapore	15 Sep. 80	100	45
Thailand	23 Feb. 81	94,700	2,349

Most of Thai fishing boats are small to medium sizes, as may be seen from this study. These fishing vessels could not be operated in deep sea of international water and hence invading into coastal area of neighboring countries is inevitably from the fishermen's point of view. The conflict starts from this point. Table (1.7) shows the statistics of captured Thai fishing vessels.

TABLE (1.7) STATISTICS OF CAPTURED FISHING VESSELS

YEAR	NUMBER OF CAPTURED VESSELS	DAMAGE COST (Million Baths)
1977-1980	116	522
1981	53	336.5
1982	55	297
1983	118	531
1984	40	180
1985	89	400.5
1986	109	490.5
1987	73	828.5
	TOTAL	<u>3,986.0</u>

It should be noted that more than 80% of catching volumes come from fishing grounds outside Thai water. Approximately 3,000 Thai Fishing vessels are, at present, operating outside Thai water. This is partly due to the acceptance of the Montego Bay Contract by Thailand who immediately loose 300,000 square miles of fishing area in international sea. The damage cost, up to present, is considered to be no less than 4,000 million baths, quite an extremely high figures for the country.

What ever the solution might be in the future on this conflict, Thai fishing industry must be existing as

one kind of industries to support the country. It is definitely that fishing vessels are being forced to operate outside the Thai Gulf whether international sea or EEZ. The operating condition would be more servier than in a shealter area like the Gulf. Fishing vessel need better stability performance for the safety of her crews, but, first of all, it needs to have a method to determine her stability in various sea conditions expected to meet.



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