

# Dramatic Development of Shrimp Culture in Asian Countries with Particular Reference to Thailand

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**Abstract:** Due to the development and change in shrimp culture technology during a period from 1985 to 1995, Thailand has made an impressive success in shrimp aquaculture development, which resulted in the dramatic increase in the number of intensive black tiger shrimp farms all along the coastal area of the country as well as their production. This paper reviews its development and particularly discusses on the structural changes in Thai shrimp culture based on the results of 1985 and 1995 Thai Marine Fishery Census. It shows the dramatic changes in the total culture area, the location of potential farms, employment, the source of seeds and the method of aquaculture.

**Keywords:** Shrimp culture technology: extensive, semi-intensive and intensive system

## 1. INTRODUCTION

There are two major areas in the world, where shrimp culture has been well developed. One is Asia, particularly Southeast Asia, and the other Latin America particularly the middle America and the northern part of South America. However, in terms of production, Asia is far bigger than Latin America.

There has been a dramatic development of shrimp culture due particularly to

(1) technical evolution of tiger shrimp seed production, which was developed in China (Taiwan) in the late 1970s.

(2) availability of ample brackish water area in the Southeast and South Asia, which are suitable for shrimp culture.

(3) development of shrimp culture technology from extensive to intensive culture.

## 2. SHRIMP CULTURE IN ASIA

Countries, which farmed shrimp are, in the order of the production, Thailand, Indonesia, China, India, Philippines, Bangladesh, Vietnam, China (Taiwan), Malaysia, Sri Lanka, Japan, South Korea, Cambodia, Brunei and Singapore, of which in terms of the production Japan, South Korea, Cambodia, Brunei and Singapore are minor.

Thailand was the largest country out of the above group of countries, producing 240 thousand metric tons of farmed shrimp in 1998. The main species under culture is Giant black tiger shrimp (Table 1). However, there are some production of Banana shrimp and Giant river shrimp, the latter being famous for making famous Thai soup "Tom yam kung".

**Table 1 General status of shrimp culture of asian countries, 1998**

Name of country	Farmed shrimp production (MT)	%	Main species under culture
<b>Grand Total</b>	<b>766,185</b>	<b>100.0</b>	
<b>A Group</b>	<b>632,000</b>	<b>82.5</b>	
Thailand	240,000	31.3	Mainly black tiger
Indonesia	210,000	27.4	Black tiger followed by white
China	100,000	13.1	Fleshy prawn
India	82,000	10.7	Black tiger followed by white
<b>B Group</b>	<b>124,100</b>	<b>16.2</b>	
Philippines	37,000	4.8	Black tiger followed by white
Bangladesh	34,000	4.5	Black tiger
Vietnam	30,000	3.9	Black tiger followed by white
China (Taiwan)	13,000	1.7	Black tiger followed by Kuruma prawn
Malaysia	10,100	1.3	
<b>C Group</b>	<b>10,085</b>	<b>1.3</b>	
Sri Lanka	6,900	0.9	Black tiger
Japan	2,007	0.3	Kuruma prawn only
South Korea	846	0.1	Fleshy prawn
Cambodia	197	0.0	
Brunei	69	0.0	
Singapore	66	0.0	

Source : FAO Fishstat plus , 1998 and world shrimp farming 1997 report.

Note : The table was compiled by Dr Tadashi Yamamoto with his courtesy.

## 3. DRAMATIC DEVELOPMENT OF SHRIMP CULTURE IN THAILAND

During a period from 1985 to 1995 National Statistical Office of Thailand took three fishery censuses, i.e., 1985 Fishery Census under the guidance of Tadashi Yamamoto, a former FAO Senior Fishery Statistician, 1990 Inter Fishery Census (Sample Census) and 1995 Fishery Census. These Censuses covered marine capture, marine aquaculture and shrimp culture in brackishwater pond. Analyses hereunder are based on the results of these three censuses limiting to shrimp culture in brackishwater ponds.

### 3.1 Change in Number of Farms, Area under Culture, Persons engaged and Production

#### (1) Number of Shrimp Farms and Its Geographical Distribution

During a period from 1985 to 1995, Thailand achieved an impressive growth in shrimp culture development, which resulted in the dramatic increase in the number of shrimp farms for the entire coast of the country. As shown in Figure 1.1 the number of brackish water shrimp culture farms in the country (24 coastal provinces) increased by 4.5 times from 4,544 in 1985 to 15,060 in 1990 and further increased to 25,210 farms in 1995 or annual increase rate 27.1% in the first five years and 10.9% in the second five years. The main species for aquaculture is Giant black tiger shrimp (*Peneaus Monodon*).

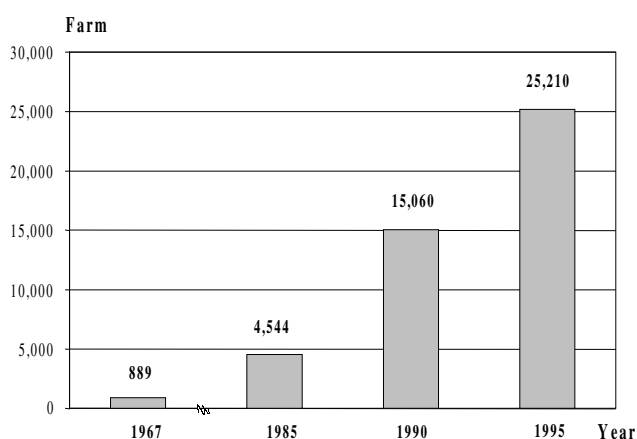
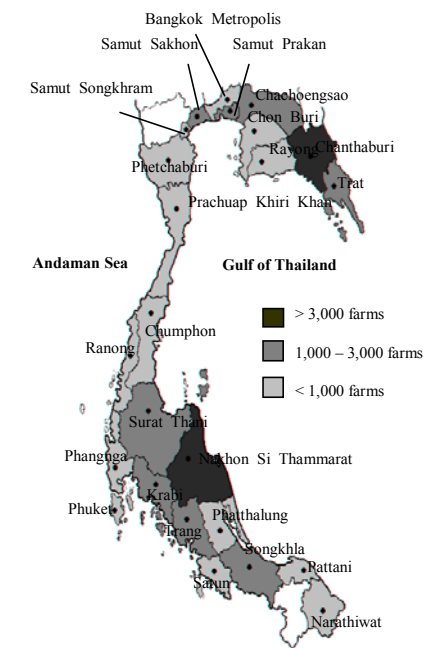


Figure 1.1 Number of shrimp farms

The dramatic increase in the number of brackish water shrimp culture farms created a great change in the location of shrimp farm area with high density. In 1985, 76.9% of shrimp farms located along the coast of the Inner Gulf near to Bangkok, viz., Samut Sakhon and Samut Prakan. However, in 1995, owing to a marked increase in the number of shrimp farms such densely developed area moved to Southern Thai Gulf, especially in Nakhon Si Thammarat province, and Eastern Thai Gulf close to Cambodian border; Chanthaburi and Trat in 1995. (See Map 1)

Map 1 Geographical distribution of shrimp farms in Thailand : 1995



#### (2) Area of Shrimp Ponds

Shrimp culture area also significantly increased from 34,718 hectares in 1985 to 50,855 hectares in 1990 with annual increasing rate of 7.9 % and further increased to 67,405 hectares in 1995 with annual increasing rate of 5.8 %. In comparison with the annual increasing rate in the number of shrimp farms, that of area of shrimp pond is less. This is due to a marked increase in the number of small size shrimp farms during the survey period. (See Figure 1.2).

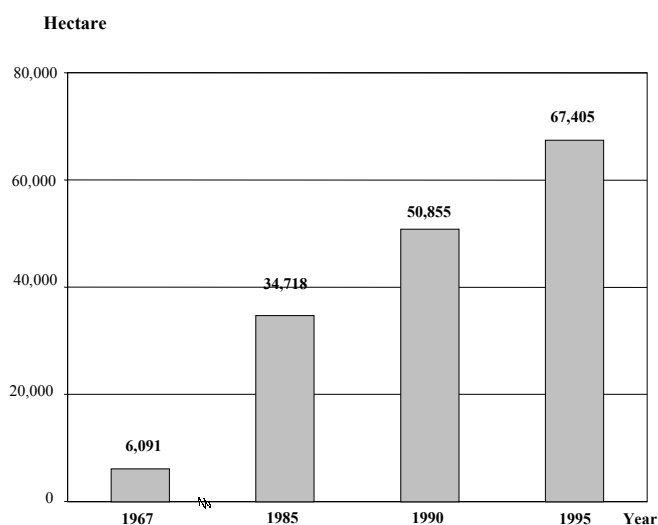


Figure 1.2 Total area of shrimp ponds

### (3) Number of Persons Engaged in Shrimp Culture

During the same period from 1985 to 1995, the number of persons engaged in shrimp culture also increased 4 times from 14,749 persons in 1985 to 72,074 persons in 1995 with annual increasing rate of 17.2 %

(See Figure 1.3).

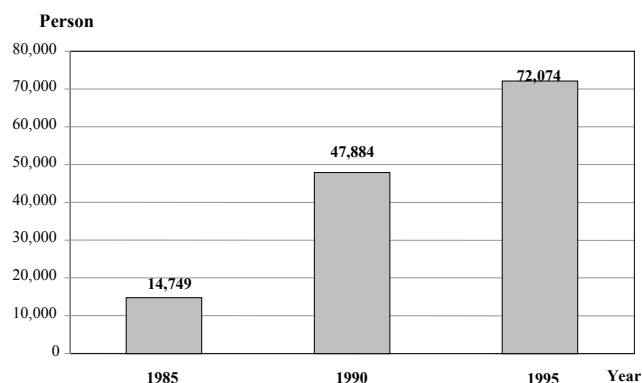


Figure 1.3 Number of persons engaged in shrimp culture

### (4) Shrimp Production

Owing to the application of higher technology of intensive shrimp farming, the production increased sharply in a linear upward trend. In 1985, the farmed marine shrimp production was 15,841 metric tons or 14.7 percent of the total marine shrimp production (capture and culture). Since then, the figures continually increased every year and reach the highest peak in 1994 of 263,466 metric tons or 72.9% of the total shrimp production (See Figure 1.4).

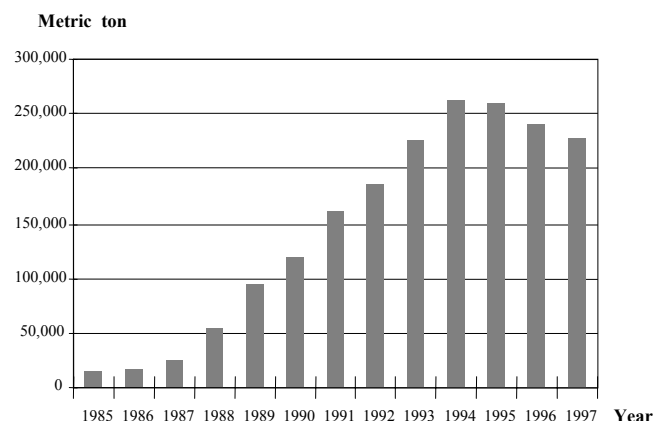


Figure 1.4 Shrimp culture production : 1985 - 1997

## 3.2 Analyses Based on Basic Data

### (1) Average Water Area per Farm

It was worthwhile to note that the average water area per farm decreased dramatically from 7.6 hectares in 1985 to 3.4 and 2.7 hectares in 1990 and 1995 respectively. This was due to the fact that the majority of shrimp farms in 1985 were those, which were converted from salt yards to shrimp farms without any change in size. In contrast, the majority of shrimp farms, which emerged after 1985 were those, which were newly constructed for the purpose of shrimp farming, and hence the size of pond is smaller the former (See Figure 2.1).

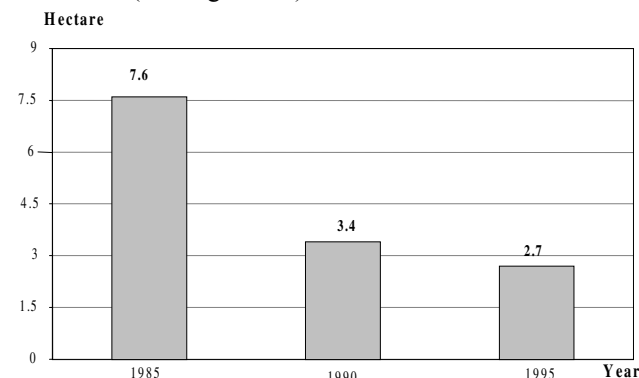


Figure 2.1 Average water area per farm

### (2) Average Number of Persons Per Farms

The average number of persons engaged in shrimp culture per farm was around 3 persons in 1985, 1990 and 1995 (See Figure 2.2).



Figure 2.2 Average number of persons per farm

### (2) Average Production Per Hectare

The average production of farmed shrimp per Hectare dramatically increased from only 456 kilograms to 2,325 and 3,850 kilograms in 1985, 1990

and 1995 respectively. This was due to an extensive application of intensive shrimp farming. (See Figure 2.3)

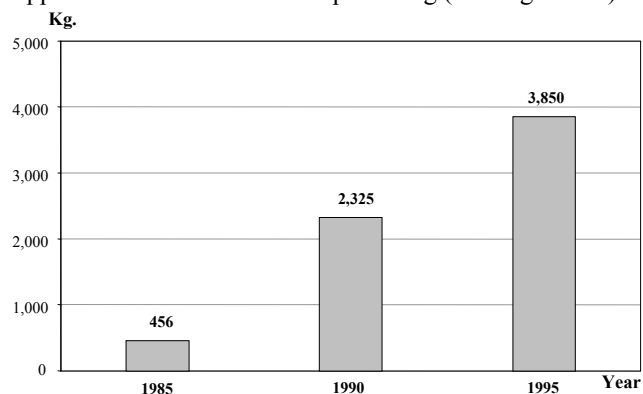


Figure 2.3 Average shrimp production per hectare and per year

#### 4. STRUCTURE CHANGE IN SHRIMP FARMS

During a period from 1985 to 1995 there was a marked change in the area size composition of shrimp farms from larger ones to smaller ones. As seen in Figure 3, in 1985, the most dominant size class in terms of the number of shrimp farms was “0.8 - 7.9 ha”, though those which are smaller ones and those which are larger ones were existed. Conversely, the most dominant size class for 1995 was the smallest size class of “below 0.8 hectare”, and the number of shrimp farms decreased with the enlargement of area sizes. This change will clearly indicate the progress of intensive culture, as the intensive culture is applicable only to smaller shrimp ponds.

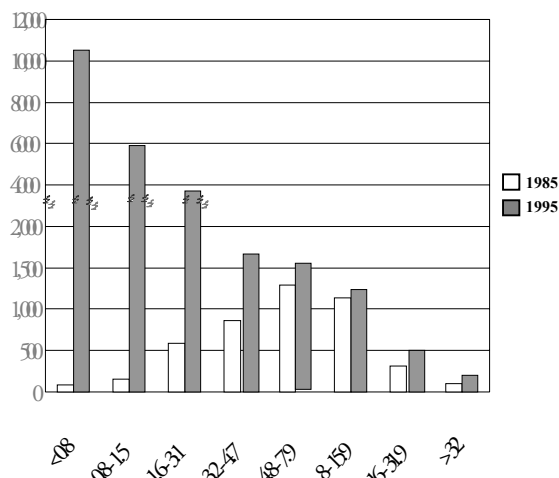


Figure 3 Number of shrimp farms by area size : 1985 and 1995

#### 5. DEVELOPMENT OF SHRIMP CULTURE METHOD

Shrimp culture technology is classified into 3 methods; extensive, semi-intensive and intensive. Before 1972, shrimp farming in Thailand was traditional or extensive culture practice, using wild shrimp seeds and natural food that came with the tide into the shrimp ponds or transformed salt or rice field locating in coastal and mangrove area or river delta. Most shrimp farms were originally located along the inner Gulf of Thailand.

Since 1977, the research study of hatching and breeding of marine shrimp was undergone and succeeded in hatchery production, especially for *Peneaus monodon* (Giant black tiger shrimp). Then Thai government encouraged farmers additional stocking of hatchery shrimp fries into traditional ponds and occasionally giving supplementary foods, which is called semi-intensive culture. Thereafter, in around 1987 the shrimp culture practice was further developed with higher technology to intensive culture, i.e. constructing small pond (0.16-1.6 ha.), eliminating shrimp enemy before releasing shrimp fries, stocking density over 16 fries per square meter, feeding frequently 3-5 times a day, using aerator sufficiently, monitoring appropriate water quality and good farm management. The intensive culture farm practice needs high investment but vice versa it also bring high benefit, making it rapidly growth and spread along the coastal provinces in the southern and eastern region of Thailand.

Therefore, the popularity of intensive shrimp farming made dramatic change in the composition of culture method. As seen in Figure 4, in 1985 most shrimp farms were with extensive, being at 94.9%, and the remaining was either semi-intensive or intensive, being only 5.1% for both. Five year afterwards in 1990, the proportion of intensive and semi-intensive shrimp culture farms highly increased, being 61.7% and 20.5% respectively. Five years later, in 1995, intensive culture increased to the top at 78.5%, whereas semi-intensive culture decreased much, being at only 7%. In contrast, the proportion of extensive culture farms decreased drastically from 94.9% in 1985 to 17.8% and 14.5% in 1990 and 1995 respectively.

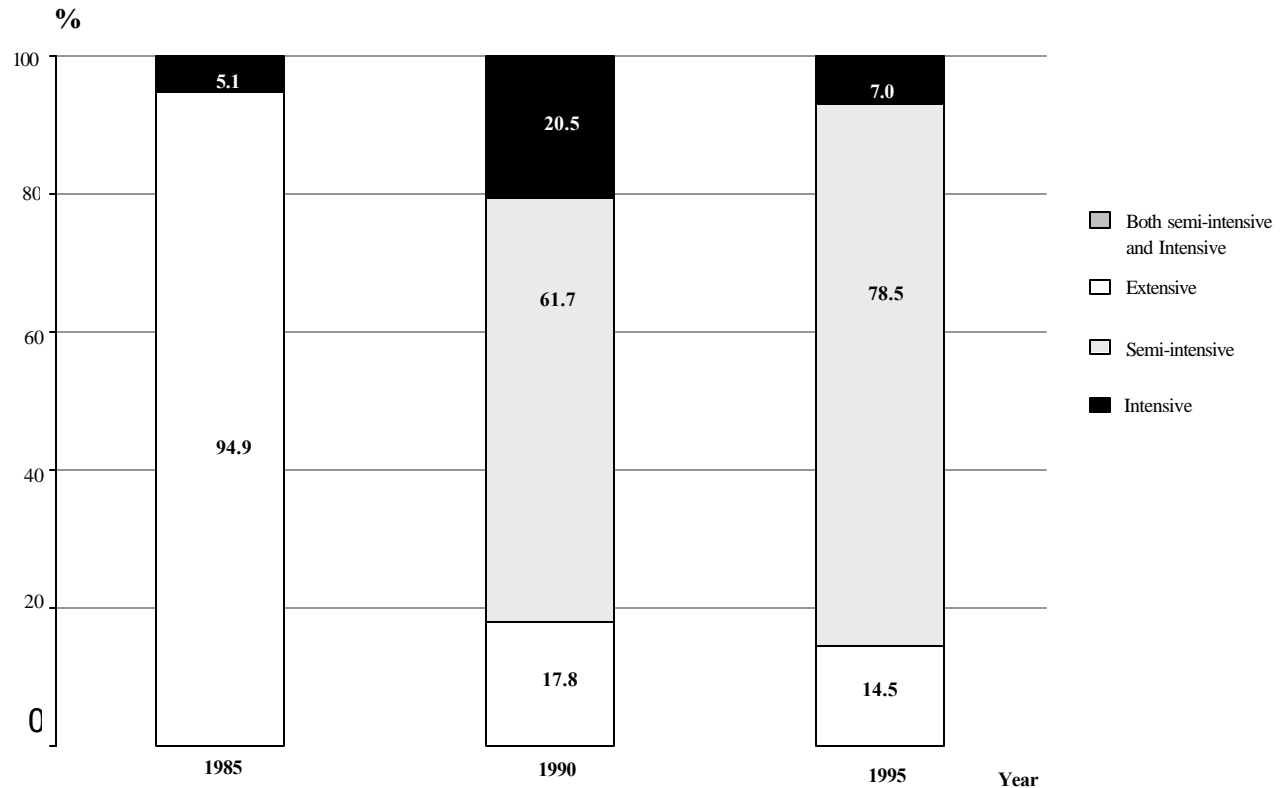


Figure 4 Intensification of shrimp farming ; 1985, 1990 and 1995

## 6. SOURCE OF SHRIMP FRIES

In 1985, there were 4,544 shrimp farms. Of which, most of them (94.9%) practice extensive culture using only wild shrimp seeds came with natural tide. Only a few farms (5.1%) cultivated in semi-intensive and intensive method that bought black tiger shrimps fries from private or government hatchery in almost the same

portion to be released in the shrimp ponds. Since 1987, the intensive culture method was widely practiced, as the result of which, in 1995 the most brackish water shrimp culture farms, 85.5% of all sought black tiger shrimp fries from hatchery. These farms bought those fries from private hatchery the most, at 83.8%, a few farms bought from government hatchery at 1.1% and individually hatched their own, at 0.6% (See Figure 5).

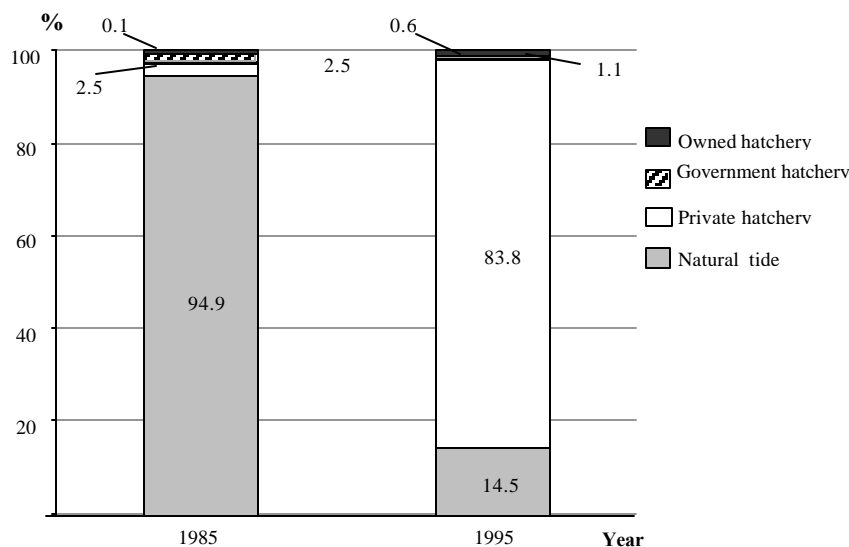
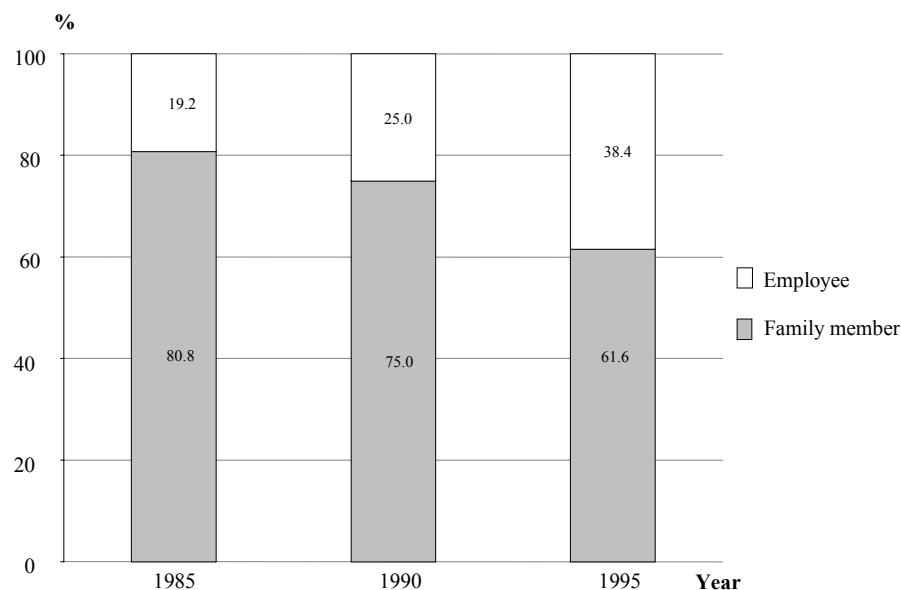


Figure 5 Number of shrimp farms by source of shrimp:  
1985 and 1995 ( % Composition )

## 7. EMPLOYMENT

Intensive shrimp farming needs full time workers monitoring daily shrimp feeding and care. Therefore, the development of intensive shrimp culture creates more

employment than extensive culture method using mostly family members. As seen in Figure 6, the proportion of shrimp farms with employment to total shrimp farm increased from 19.2% in 1985 to 25.0% and 38.4% in 1990 and 1995 respectively.



**Figure 6 Number of persons engaged shrimp culture  
: 1985, 1990 and 1995 ( % Composition )**

## 8. CONCLUSIONS

Analyses made in the present paper are summarized as follows:

(1) During a period from 1985 to 1995 for only 10 years, shrimp culture in Thailand markedly developed in terms of the number of farms and area distribution. As a result, by 1995 shrimp culture of Thailand spread to almost all sea coast of Thailand.

(2) During the same period, with the intensification of shrimp culture method from extensive to intensive, the area size of Shrimp farm has become smaller.

This is the first kind of a report to analyze the structure change in Thai shrimp culture industry over 10 years from 1985 to 1995. It is therefore envisaged that the author will do more in-depth study on a similar subject in due course.

## 9. REFERENCE

- Department of Fisheries, *Statistics of Shrimp Culture in Thailand*, 8 - 13, 1997
- National Statistical Office, *1985 Marine Fishery Census of Thailand*, 110 - 125, 1987.
- National Statistical Office, *1990 Intercensal Survey of Marine Fishery of Thailand*, 210 - 217, 1991.
- National Statistical Office, *1995 Marine Fishery Census of Thailand : Shrimp Culture*, 6 -33, 1997.