COMPETENCY OF SMALL SCALE AQUACULTURE FARMERS TOWARDS INCREASING PRODUCTION OF EXTENSIVE MANAGEMENT SYSTEM: CASE STUDY IN PHANTAI NORASING DISTRICT, SAMUT SAKHON PROVINCE, THAILAND

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Introduction

Phantai Norasing sub district is located in Samut Sakhon province with area of 24,694 rais or approximate 39.51 km^2 Community Development Department: CDD . Various aquatic animals were farmed in this sub district both in extensive and semi-intensive culture pattern. There are about 37 farmers with ca 11,868 rais of culture areas DOF, 2552 where they farm black tiger shrimp, cockle, mud crab, white leg shrimp and sea bass. Productions from aquaculture were not only from seed stocking but also from nature which enter to the pond when exchanging water. The successful of extensive aquaculture depends on the environment and the ability of farmers. The environmental factors were changeable and out of control which require high ability of farmers in appropriate aquaculture management which be in line with natural environment. The objectives of this research were to study aquaculture patterns and competency of farmers on aquaculture management in order to propose the most effective aquaculture management which would result in high production and sustain the extensive culture system along line with the life style of farmers and eco-system friendly.

Materials

Closed-ended questionnaire and open-ended questionnaire which composed of 4 parts; shrimp aquaculture pattern, competency of farmer on extensive aquaculture, knowledge of extensive aquaculture and expectation of farmers to extensive aquaculture were used to collect data from aquaculture farmers.

Methods

Questionnaire were used to collect data from 30 aquaculture farmers 10 in Phantai Norasing sub district which was covered area of coastal zone Figure 1 Data was descriptive analyzed with frequency and percentage, and inferential analyzed by Spearman rank correlation coefficient.

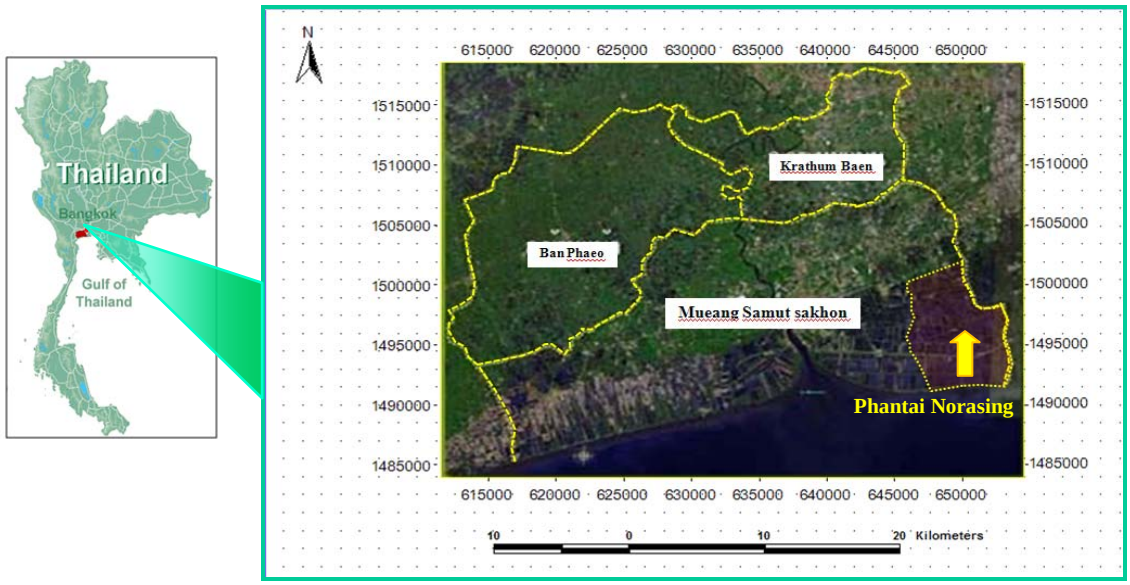

Figure 1 Study area in Phantai Norasing sub district, Samut Sakhon province

Result

1. Shrimp aquaculture pattern

Most of farmers in Phantai Norasing sub district were small-scaled farmers. An average size of pond was 50.8±32.9 rais minimum 13 rais and maximum 160 rais with 1-2 ponds/farmer.

Most aquaculture patterns was extensive culture with additional fry stocking 97 (fry stocking 1 type = 30%, 2 types = 47%, and >2types = 20%) when pure extensive culture was only 3% (Figure 2)

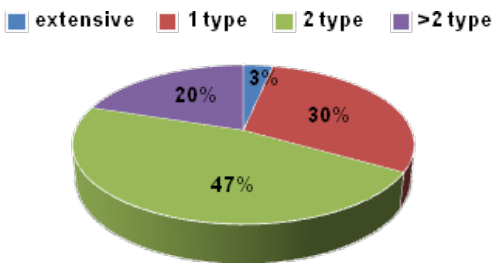

Figure 2 Number of fish species in farm

Main additional fry stocks were black tiger shrimp (76.7%), mud crab (43.3%), cockle (43.3%), vannamie shrimp and sea bass (Figure 3).

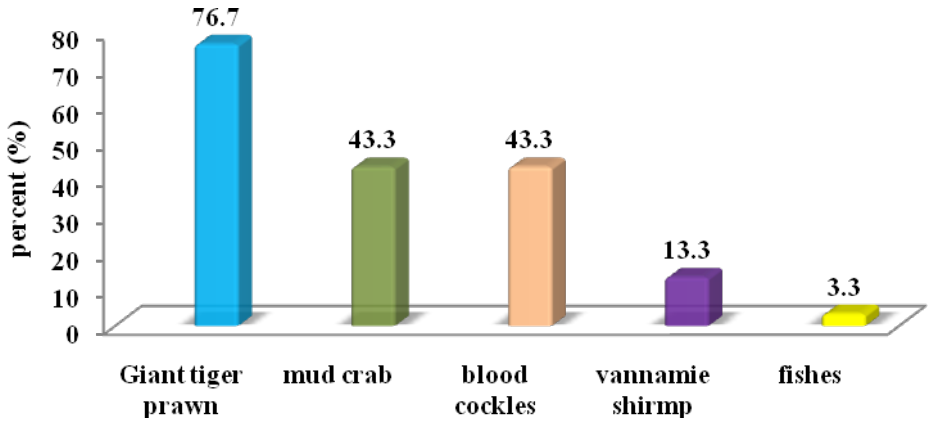

Figure 3 Fish species in the farm

Seventy four percent of shrimp farmers stocked shrimp larvae 3-4 times/year with the density of less than 10,000 unit/rai when stocked crab 1-4 times/year. Sixty five percent of farmers stocked crab with density of less than 25 unit/rai. For cockle culture, farmers stocked cockle only one time a year with size of ca 400-450 unit/kg and about half of farmers (53.8%) stocked cockle with density of 10,000-50,000 unit/rai (Table 1).

Simple management was applied such as pond preparing by dredging up mud, exchanging water during spring tide in order to trap aquatic animal from natural waters to the pond, no additional feeding and harvesting by trapping at water gate when draining water out in low tide. The average frequency of water exchange was 19±9 times/month with took about 3-4 hours/time.

Table 1 Density rate of fish stocking

Density unit/rai	**minimum**	**maximum**	**percentage**
Black tiger shrimp **n=23**	1,250	30,000	
< 10,000			73.9
10,001-20,000			21.7
20,001-30,000			4.4
Mud crab **n=13**	2	2,700	
<25			61.5
26-50			15.4
51-100			15.4
>100			7.7
Blood cockle **n=13**	3,750	140,00	
< 10,000			15.4
10,001- 50,000			53.8
50,001-100,000			15.4
>100,000			15.4

Main products were black tiger shrimp, other natural shrimps and crabs. More than half of farmers (51.7%) had production of less than 5 kg/day when one third of farmers (31.0%) had production of black tiger shrimp and other natural shrimps 6-10 kg/day (Table 2).

Table 2 Farmed fish production

product kg/day	Natural shrimp n=29	Giant tiger shrimp n=23	Mud crab n=13
< 5	51.7	54.5	76.9
6-10	31	31.8	15.4
11-15	10.3	4.6	7.7
>15	7	9.1	0

Farmers had harvest cockle one time each year with the production of less than 5,000 kg/time (33.0%) and 5,001-10,000 kg/time (45.0%) (Figure 4).

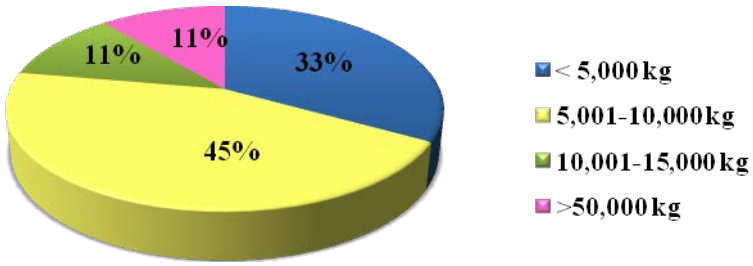

Figure 4 Blood cockle product

2. Competency and skill in extensive shrimp culture

Farmers had competency and skill in extensive shrimp culture at low, medium, and high level (6.7%, 40.0%, and 53.3%, respectively). Most of farmers (more than 80%) had competency and skill in pond preparing, water system, and culture system at medium and high level when 53.3% of farmers had competency in product assessment and data record at medium level (Figure 5).

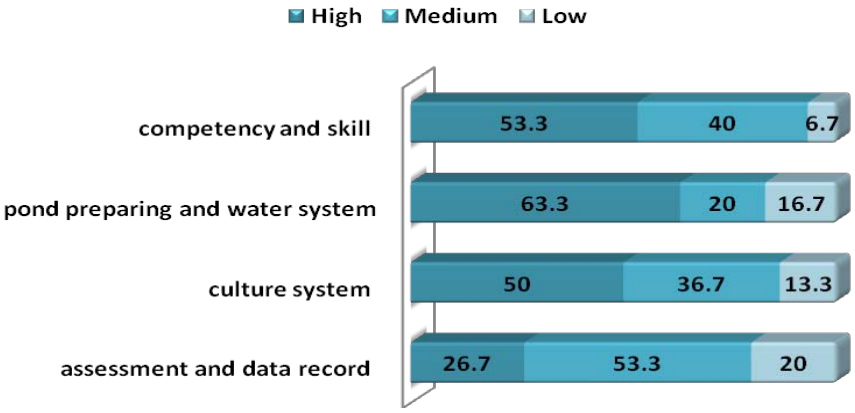

Figure 5 Competency and skill of farmers in shrimp culturet

3. Knowledge in extensive aquaculture

Most of farmers had knowledge in extensive aquaculture at low and medium level with average score of 62.4±2.16. Three forth of farmers (76.6%) had knowledge in pond and seed preparing at low and medium level. For knowledge in aquaculture and management, farmers had knowledge in these issues at high, medium and low level (43.3%, 20%, and 36.7%, respectively) (Table 3).

Table 3 Level of knowledge of farmers on aquaculture

Issue	Percentage			Mean ± SD	Min	Max
	Low	Medium	High			
Overall knowledge on aquaculture	30	50	20	62.4±21.6	21.4	100
Pond and seed preparation	26.7	50	23.3	64.4±23.0	22.2	100
Culture and management	36.7	20	43.3	58.7±32.8	0	100

4. Expectation in extensive and group establishment for sustainable aquaculture

About two third of farmers (60.6%) had expectation in extensive aquaculture at medium level when 23% and 17% of them had expectation at low and high level (Figure 6).

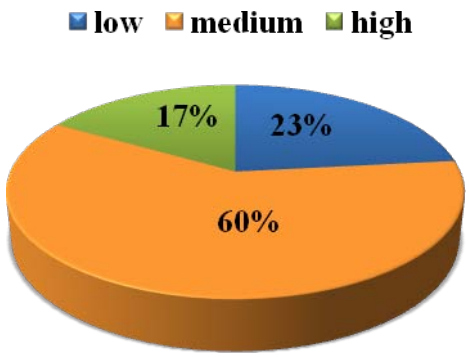

Figure 6 Level of expectation of farmers on sustainable extensive aquaculture

For the important and successful opportunity for sustainable aquaculture practice following sufficiency economy principle, half of farmers had agreed that the successful opportunity in sustainable aquaculture practice is at medium level (Figure 7).

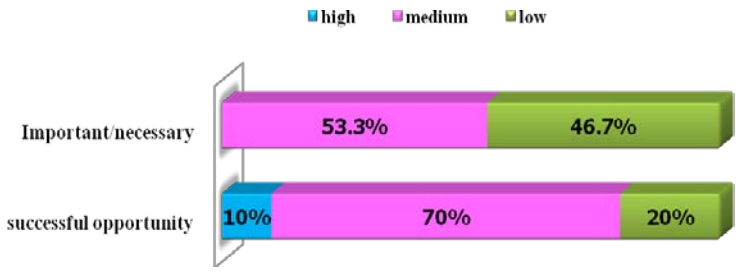

Figure 7 Important/necessary and successful opportunity in sustainable extensive aquaculture

5. Test of relationship between competency in extensive aquaculture and other factors

For the analysis of factors which affect the competency of extensive aquaculture such as knowledge and expectation level in extensive aquaculture, the result indicated that knowledge had high significant positive relationship with competency in extensive aquaculture ($p<0.01$). The relationship was at medium level with Spearman's rank correlation coefficient (r^2) 0.588 or 58.8% which indicated that increasing knowledge of pond and seed preparation would increase competency of farmers in extensive aquaculture.

Expectation of farmers on extensive aquaculture had significant positive relationship with competency in extensive aquaculture ($p<0.05$) at medium level with correlation coefficient (r^2) 0.439 or 43.9%. Farmers should realize the important and successful opportunity in shrimp culture which would result in competency and skill development in extensive aquaculture further.

Discussion

Most of aquaculture patterns in Phantai Norasing sub district were extensive culture with low density rate of additional seed stocking. Main aquatic animals were black tiger shrimp, clam, and mud crab which had high growth rate and tolerance ability to the environment. Most farmers had stocked seed less than appropriate density due to the extensive culture which was operated without feeding and aeration and farmers also got natural seed from outside. This is result in avoidance of dissolved oxygen depletion and competitive for food in the pond and farmer could harvest fish continuously.

Most farmers had competency and skill in aquaculture in medium and high level but the ability in product assessment and information record were at low level due to the lack of interest of farmers. The production was difficult to assess since the farmers had stocked seed into the pond one after another and natural seed also got into the pond when exchanging water.

Conclusion

Most of farmers in Phantai Norasing sub district were small-scaled farmer who had average pond size of 50.8±32.9 rais for 1-2 ponds/farmer. Most of aquaculture patterns were extensive culture with additional seed stocking at low density. Main aquatic animal were black tiger shrimp, mud crab, and cockle. Water circulation was done during spring tide in order to trap natural seed to the pond at high tide and harvest product by net at water gate when draining water out of the pond. Cockle was harvested by hand picking and dredging. Most of farmers (83.4%) had harvested product less than 20 kg/time and they had managed pond by mud draining and dry the pond in the sun every 1-2 years.

Half of farmers had overall competency and skill in extensive aquaculture at medium and high level, except the ability in production assessment and data and information record which they had ability in medium and low level. This indicated that half of farmers need to be strengthening in ability and skill in sustainable extensive aquaculture by increasing expectation of farmer in realizing of important and readiness of sustainable aquaculture practice including increasing knowledge in aquaculture. Farmers, who had high expectation in extensive aquaculture with sufficient knowledge, would have chance in ability and skill development on efficiency and sustainable aquaculture. In order to strengthening the competency of farmers in extensive aquaculture management with low cost, farmers need to

be informed particularly the understanding of pond and natural water system and collaborative building on knowledge exchange in the community, including support from government in order to maintain small-scaled extensive aquaculture and balance the ecosystem further.

References

Fast, A.W. and Lester, L.J. 1992. Marine Shrimp Culture: Principles and Practices. **Developments in Aquaculture and Fisheries Science** volume 23 p.363-364 .

Kungvankij, P. 1984. **Overview of Penaeid Shrimp culture in Asia**. Network of Aquaculture Centres in Asia Regional Lead Centre in the Philippines NACA-FAO/UNDP .

Tarnchalanukit, W. 1993. **Tiger Prawn Culture in Thailand and its Impacts**. Department of Aquaculture, Faculty of Fisheries, Kasetsart University.

Tongkao, K. 2007. **Extensive Culture of Black Tiger Shrimp *Penaeus monodon* Fabricius with Low Stocking Density**. Kasetsart University.

Tookwinas,S. 1999. **Coastal Planning of Shrimp Farming: Carrying Capacity, Zoning and Integrated Planning in Thailand**. Coastal Aquaculture Division, Department of Fisheries, Bangkok, Thailand.

Smith, P.T. 1999. Coastal Shrimp Aquaculture in Thailand. Australian Centre for International Agricultural Research.