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Assessing Knowledge, Attitude,and Experience of White Shrimp FarmersinChachoengsaoProvince, Thailand

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Current production for export in fishing sectors in Thailand is growing rapidly due to the demands of international markets by the year 2017. The export value of shrimp products is one-fifth of the whole Thai fishery products.In particular, white shrimp (*Litopenaeusvannamei*) farming accountsfor more than 90percent of the total areas of shrimp. Chachoengsao province is ranked as the highest number of shrimp farming areas with 3,189 farms accounting for 18.24 percent of farm-raised shrimp throughout the country. In the last three years, Thailand had faced the disease outbreak problem as well as economic downturn resulting in the decrease in the number of white shrimp farms, yet white shrimp farming has still been widely prevalent until the present. Consequently, the study aimed to assess knowledge, attitude and experience of white shrimp farmers in Chachoengsao Province, Thailand. A simple random technique was appliedin order to select 45 farmers as samples. Descriptive statistics and chi-square test were employed to analyze the data. Pearson's chi square test was used to verify relationships between variables.The results revealed that the majority of white shrimp farmers were male (64.4%), married (57.8%) with the age range during 46-60 years old (51.1%), and graduated from primary school (40%). Regarding experience, most participants had shrimp farming experience during 5-15 years (44.4%). Farmershad a very good level of shrimp farming knowledge, and hadthe moderate level of attitude toward white shrimp farming.Chi-square test demonstrated that age of a farmer, marital status, education, knowledge, farm area, the sufficiency of water resources, high selling price, certifying and support from the government, farming interest of new generations, and the love of white shrimp farming, were related to the white shrimp farming experience of the farmers.The results from this study could provide insight information for relevant organizations to perform or support white shrimp raising knowledge, including finding appropriate management approach for shrimp farmers, so that they understand and can resolve problems occurred more effectively and sustainably.

Key words: Knowledge, Attitude, Experience, White Shrimp Farmers, Chachoengsao**.**

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Introduction

Currently, the export production in fisherysector in Thailand is growing rapidly due to the increase of international markets demands by the year 2017. The export value of shrimp products is one-fifth of the whole Thai fishery products. In particular, white shrimp (*Litopenaeusvannamei*) farming accounts for more than 90 percent of the total areas of shrimp. White shrimpscan be produced and exportedaround 75,840 ton, or 26,000 million Baht, accounting for 86.67% of export of marine shrimp (Fisheries Development Policy and Strategy Division, 2017).

The pacific white shrimp, *Litopenaeusvannamei* or *Penaeusvannamei* is a native species ofthe pacific coast of Central and South America (Perez and Kensley, 1997). This species was first introduced to Asia for experimental culture between 1978-1979, and then came to Thailand in 1998 for aquaculture in order to replace*Penaeusmonodon*, which had disease problems and grew poorly. Since then,*Litopenaeusvannamei* has been widely raisedbecause of its fast growth, tolerance to high densities and high disease resistance (Briggs *et al.,* 2004). Consequently, when considering the white shrimp production by the region of Thailand during the first 6 months of the year 2017, shrimp production in the eastern and central regions of the country (Figure 1) demonstrateda significantly increase compared to that in the same period with 28.89% and 16.54%, respectively. On the contrary, white shrimp production in the upper south, the lower south, and the lower southern Andaman coast were decreased to12.91%, 8.91% ,and 2.81%,respectively (Marine Shrimp Culture Research Institute, 2017).

The amount of shrimp production in the eastern and central regions has increased because of white shrimp producedrecovery, and problem solving on fisheries, including the traceability system. Moreover, the expanding of exports are increasingly valued. Thus its confidence to agriculture in order to further shrimp farming. (Fisheries Development Policy and Strategy Division , 2017). Literature review on white shrimp farming study in Thailand of Boonsong *et al.* (2000), who investigated the intensive shrimp farming is a classic example of resource-based production in developing economy, revealed that white shrimp farming created significant to environmental impact affecting the whole coastal eco-system. In addition, farmers had sufficient resources to shrimp farming. In order to provide more efficient shrimp farming, growers needed to develop their skills, knowledge, training, as well as; the passion for shrimp farming which was the most important factor (Yaghoubi *et al.*, 2011).

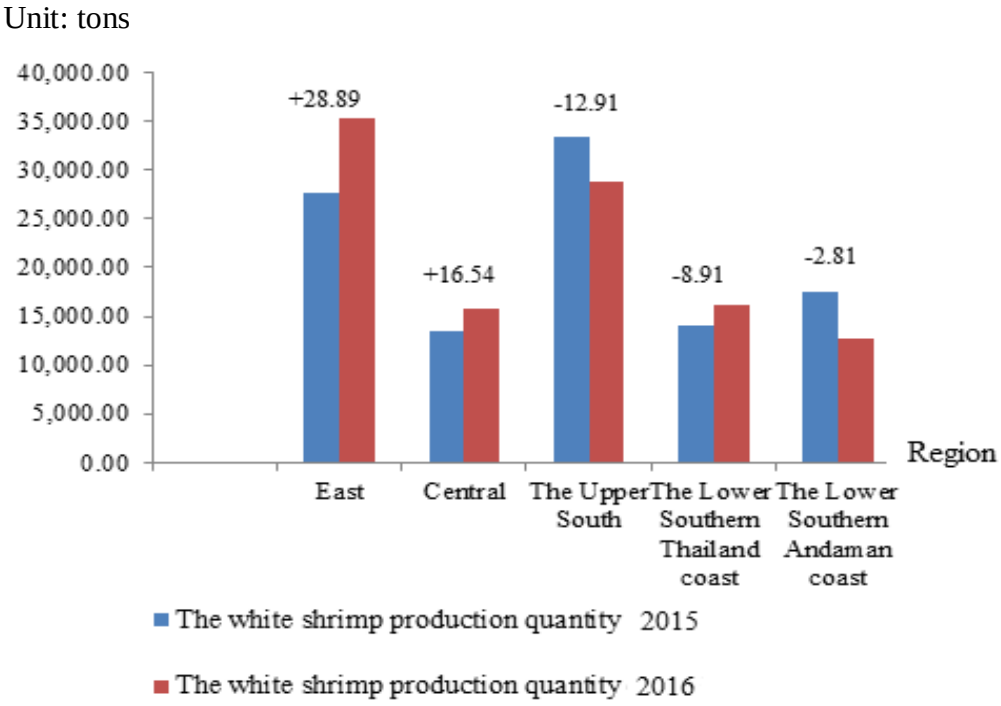

Figure 1. White shrimp production (January-June, 2016-2017) classified by the region of Thailand. Source: Marine Shrimp Culture Research Institute, 2017.

Shrimp farmers are experiencing with initiatives need based on technology developed by their own knowledge (Chowdhury and Khairun, 2014). Therefore, this study focused on assessing knowledge, attitude, and experience of white shrimp farmers. As such, Chachoengsao province, a province in the eastern region of Thailand, was selected as a study area. In Chachoengsao province,there were around 3,189 white shrimp farms accounting for 18.24 percent of farm-raised shrimp throughout the country (Fisheries Statistics Analysis and Research Group, 2017). Furthermore, this study investigated the way that farmers' knowledge, and attitudes influenced white shrimp farming experience. The results obtained from this study can provide insight information for relevant organizations to perform or support white shrimp raising knowledge, including appropriate finding management approach for shrimp farmers in order thatfarmers can understand and resolve problems occurred more effectively and sustainably.The results obtained can assist farmers to improve their understanding of farmers' behavior regarding conservation (Ashoori *et al.*, 2016).

Materials and methods

The study area

The study was carried out in Chachoengsao province, Thailand,a province in the central region of the country representing white shrimp farming.There were approximately3,189 shrimp farms, accounting for 18.24 percent of shrimp farming throughout the country (Fisheries Statistics Analysis and Research Group, 2017).

Sampling and Sample size

White shrimp farmers in Pak Nam sub-district, Bang Khla district, Chachoengsao province wereselected as the target population. There were 192 white shrimp farmers who registered with the Department of Fisheries in 2016. In order to determine a sample size, this research was adopted a sample size calculation from Boonchum and Boonsong (1992) when the finite population was at hundreds; the appropriate sample size for estimating the proportion of a population is given by 10%-30%. Therefore, in this study, 45 farmers were randomly selected by using about 20% of the total population as the study samples.

Data Collection and Data Analysis

Questionnaires were administered to 45 white shrimp farmers in Pak Nam sub-district, Bang Khla district, Chachoengsao province during February to March 2016. Descriptive statistics, namely frequency, and percentage were employed to explain the characteristics of the farmers, and Pearson's chi-square test was used to verify relationship between variables in the study area (Howell, 2010). In addition, this understanding of characteristics and relationship will provide further insights into how farmers' knowledge of farming serves as a basis for optimizing agricultural production and improving livelihoods. Farmer knowledge is measured about the management of crop and varietal diversity in cropping systems, tree (cultivated and wild useful trees) diversity on farm and livestock resources, their current farming systems and their intention to implement diversified farming systems. (Alcade, *et al.*, 2015).The level of knowledge can be indicated by index value: 1.00 - 0.80 = very good, 0.79 – 0.60 = good, 0.59 – 0.40 = satisfactory, 0.39 – 0.20 = not satisfactory,and 0.19 – 0.00 = very bad(Chowdhury and Khairun, 2014).

Farmers' attitude towards white shrimp farmingwasmeasured by the level of agreement, on a five-point Likertscale (ie. 5=Strongly Agree, 4=Agree, 3=Disagree, 2=Strongly Disagree and 1=Undecided) with fouraspects of attitude: attitude of physical factors, attitude of economic, attitude of socio and culture, and attitude of government support. The number next to each response became the value for that response, and the total score is obtained by adding the values for each responsewhich was called 'summated scales' (Dumas, 1999).

Regarding theanalysis ofthe correlation of socio-economics, knowledge, and attitude based on year of farming experience (Kaewjinda, 2012),the analysis of information related to associations among data requires specific instruments such as a Chi-Square test (χ 2). The χ 2 test was introduced by Pearson (1900). A significant modification to the Pearson's χ 2 test was introduced by Fisher (1922) the degree of freedom was decreased by one unit when applied to contingency tables.

Results

The characteristic of white shrimp farmers in the study area

The result of the characteristic of the respondents is presented in Table 1. The majority of white shrimp farmers were male (64.4%), aged between 46-60 years old (51.1%), graduated from primary school (40.0%). More than half of them (57.8%) were married and almost all participants (71.1%) had an average 3-5 family members.

Regarding the experience in doing white shrimp farming, the result revealedthat the majority of respondents (44.4%) had experience in the white shrimp farming around5-15 years. Interestingly, most respondents (62.2%) had never participatedin the training programsconcerning white shrimp farming before.

Table 1. Socio-economic characteristics of the white shrimp farmers.

Characteristics	**Frequency**	**Percentage**
Gender		
Male	29	64.4
Female	16	35.6
Total	45	100

Table 1. (cont.)

Characteristics	Frequency	Percentage
Age of farmer (Mean = 51.56 years)		
25-45	13	28.9
45-60	23	51.1
> 60	8	20.0
Total	45	100
Education level		
Primary school	18	40.0
Junior high school	10	22.2
Senior high school	9	20.0
Diploma/bachelor's degree	8	17.8
Total	45	100
Marital Status		
Single	16	35.6
Married	26	57.8
Divorced	3	6.7
Total	45	100
Household size (Mean = 3 persons)		
< 3	11	24.4
3-5	32	71.1
> 5	2	4.4
Total	45	100
Number of farming experience (Mean = 21.22 years)		
5-15	20	44.4
16-25	15	33.4
> 25	10	22.2
Total	45	100
Training program participation		
Never	17	37.8
At least 1 time	28	62.2
Total	45	100

Source: Survey data analysis, 2016

Farmers'knowledgeof white shrimp farming

Farmers' knowledge on farming practices is presented in Table 2. There were five unsatisfied components of farmer's knowledge, with average satisfactory percentage at35.2%. Only shrimp harvest that the farmers were satisfiedof their knowledge at 40.7%in pond preparation.

Table 2. Farmers'knowledge of white shrimp farmingk.

Knowledge	Index Value	Interpretation
Pond preparing	0.391	Not satisfactory
Water treatment	0.353	Not satisfactory
Shrimp handling	0.271	Not satisfactory
Shrimp management	0.364	Not satisfactory
Shrimp feed	0.327	Not satisfactory
Shrimp harvest	0.407	Satisfactory
Summary	0.352	Not satisfactory

Farmers' Attitude towards White Shrimp Farming

Table 3 shows the five-point Likert scale rating in the measurement of attitude of the shrimp farmers. The majority of attitudes were in moderate level (3), namely farm area, water resource, selling price, loan, medicine, and shrimp raft, passion in shrimp farming, new generation, vaccine, farm standard, and support from government). Following this, low price feed, labour, breeding place, cash, and shrimp partywere in high level (4). The lowlevel of attitude was plant economy as well as lavage price.

Table 3. Attitude of the shrimp farmers.

Attitude	Std.	Mean	Interpretation
1) Attitude of physical factors	**1.019**	**3.46**	**Moderate**
Farm area	.832	3.89	Moderate
Plant economy	1.325	2.71	Low
Water resource	.902	3.78	Moderate
2) Attitude of economic factors	**1.114**	**3.85**	**Moderate**
Low price feed	1.381	4.04	High
Selling price	.974	3.78	Moderate
Loan	1.160	3.71	Moderate
Labour	.869	4.49	High
Larvae price	1.411	2.09	Low
Breeding place	.694	4.53	High
Medicine	1.445	3.96	Moderate
Cash	.588	4.80	High
Shrimp raft	1.505	3.31	Moderate
3) Attitude of socio and culture factors	**.957**	**3.74**	**Moderate**
Passion in shrimp farming	.837	3.60	Moderate
Shrimp party	1.247	4.11	High
New generation	.843	3.51	Moderate
4) Attitude of government support factors	**1.117**	**3.67**	**Moderate**
Vaccine	1.570	3.89	Moderate
Farm Standard	.894	3.53	Moderate
Support of government	.889	3.60	Moderate

Relationship amongfarmers' knowledge, attitude, and farming experience

The results in Table 4 revealed that five variables hadsignificant to the numberof experience more than 15 years of white shrimp production,namelyage of farmer, education level, marital status, farming knowledge,and attitude of socio and culture.Similarly, the numberof experience less than 15 years had significant tothree variables:attitude of physical factors, attitude of economic, and attitude of support, while, three variables, namely gender, household size, and training program participation were not significant towhite shrimp production.

Table 4. Pearson's chi square test revealed the assessing knowledge, attitude, and experience of white shrimp farmers in Chachoengsao Province, Thailand

Variables	**Farming experience**			
	Less than 15 years		**15 years and more**	
	Frequency	**p-value**	**Frequency**	**p-value**
1) Gender		0.944		0.945
Male	13		16	
Female	7		9	
2) Age of farmer		0.055		0.000**
25-45	12		1	
46-60	8		15	
>60	-		9	
3) Education level		0.107		0.000**
Primary school	1		17	
Junior high school	4		6	
Senior high school	7		2	
Diploma/bachelor degree	8		-	
4) Marital status		0.080		0.000**
Single	14		2	
Married	3		23	
Divorced	3		-	
5) Household size		0.318		0.000**
< 3	4		7	
3-5	16		16	
> 5	-		2	
6) Training program participation		0.731		0.734
Never	7		10	
At least 1 time	13		16	

Table 4.(cont.)

Variables	Farming experience			
	Less than 15 years		15 years and more	
	Frequency	p-value	Frequency	p-value
7) Knowledge of the shrimp farmers		0.514		0.001**
8) Attitude of physical factors	23	0.052	22	0.085
9) Attitude of Economic factors	31	0.021*	14	0.079
10) Attitude of socio and culture factors	16	0.558	29	0.034*
11) Attitude of government support factors	25	0.043	20	0.524

**Significant at 1%, * Significant at 5%

Discussion

In terms of farmers' age, the result exposedthat age of farmerswassignificant at 1% level to white shrimp production which was consistency with the study of Alauddinand Hamid (1996) indicating that a shrimp farming is generally classified into the traditional shrimp farming with older farmers and more capable of taking proper decisions regarding farm management practices as they gainmany years of practical experience (Begum *et al*., 2015).

The majority of white shrimp farmers in the study area were married and graduated fromprimary school. Additionally, these characteristics wererelated to white shrimp production at 1% level of significance. This finding also indicated that the shrimp farming in the study was similar to the study of Akter, (2010) stating that involvement were dominant in shrimp farming.

Regardingthe attitude of physicalfactors, the result revealed that the farm area and water resource had significant relationship at 1%. This result could be explained that if farmers want to increase their white shrimp production, basically they should increase their cultured area. This result wasconfirmed by Rahman (2005) as cited in Begum *et al*. (2015).

In terms ofthe attitude of economic,the result revealed that selling price was significant to a white shrimp production at 1% . Thus, an increase in selling price will lead to an increase in a white shrimp production. This finding was confirmed with the studyofQuagrainie (2015) pointing out that the selling price was the most significant variables for a white shrimp production.

Similarly, the result of the attitude of socio and culturewas significant at 1%. This may imply that passion for shrimp farming was the most important to shrimp farming for their family income. Likewise, the increase in new generation can lead to the increase in a white shrimp production. (Thongrak *et al*., 1997) for instance farms using more family labours may lead to the increase in shrimp production.For the attitude of support, this attitude was significant with a white shrimp production. This may be explained that if a farmer has a good attitude with shrimp farming, a farmer will be attended in this farming for longer.

Conclusion

The main characteristics of the white shrimp farmers in Pak Nam sub-district, Bang Khla district, Chachoengsao province were mostly male shrimp farmers and married. Almost half of them had an age rangebetween 41-60 years old and graduated fromprimary school. Most of them hadaverage experience in shrimp farming about 5-15 years with household size about 3-5 persons.

However, almost all of them never attained the training programsrelevant to white shrimp farming. This study assessedfarmers' knowledge, attitude, and experience of white Shrimp in Chachoengsao Province, Thailand. The study revealedthat the age of farmers, education level and marital status, were significant to the productivity of the white shrimp production.Furthermore, white shrimp farmers gained farming knowledge from participating in a training program related to white shrimp production in order to access and acquire more information such as pond preparation, water treatment, and shrimp management.The most important variable in determining white shrimp production wasthe attitude of white shrimp production in various aspects, including physicalfactors, socio and culture, economic,as well assupportfrom agencies.The results from this study were related to the white shrimp farming experience which canprovide insight information for relevant organizations to perform or support farmers about white shrimp raising knowledge, including finding appropriate management approach for shrimp farmers, in order that they can understand and can resolve problems occurred more effectively and sustainably.

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