Factors Affecting Okra Farm Income in Nakhon Pathom Province, Thailand

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The study has been conducted to identify the factors influencing okra farm income by using multiple regression analysis in Nakhon Pathom Province, Thailand, consisting of 738 Rai with 140 okra growers' members. Data were collected from survey by using a semi-structured questionnaire with a sample of 58 okra growers had been taken randomly. The descriptive statistics and multiple regression analysis were employed to analyse the data. The estimated results of the regression models revealed that number of schooling year had a significant negative effect on okra farm income with the adjusted R^2 was 51.80.

Keywords: Okra, okra growers' income, regression model.

Introduction

Okra has been one of the important export vegetables cultivated in Thailand since more than ten years ago, especially in the central region of Thailand. Almost all okra farmers in Thailand are contract farmers for the export companies which the export companies largely provide inputs (especially seed) and buy back the fresh produce from farmers (FAO Vegetable IPM 2004), which is nearly 98 percent of fresh pod was exported to Japan.

According to the problem of the positive list which is the main clause affected to okra export quantity and value in 2007. Due to the chemical residues in okra higher than Japan's standard. Therefore, the objectives of this study are 1) to investigate the socio-ecnomic characteristics okra growers who are the members of okra farming network for export, and 2) identify factors influencing okra farm income in Nakhon Pathom Province, Thailand.

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Literature Review

Regression analysis is a related technique to assess the relationship between an outcome variable and one or more risk factors or confounding variables which the dependent variable is denoted "y" and the independent variables are denoted by "x".

Regression analysis is widely used for prediction and forecasting, where its use has substantial overlap with the field of machine learning. Regression analysis is also used to understand which among the independent variables are related to the dependent variable, and to explore the forms of these relationships. In restricted circumstances, regression analysis can be used to infer causal relationships between the independent and dependent variables. However, this can lead to illusions or false relationships, so caution is advisable (Armstrong, 2012) for example, correlation does not imply causation.

A review of previous research found that several studies have used regression analysis to determine famers' income such as Bassa *et al.* (2017) used regression analysis to determine factors affecting level of income earned from improved potato farming in Damot Sore Woreda, Wolaita and Southern Ethiopia. Karmini (2017) used regression analysis to determine factors affecting paddy farm income in East Kalimantan Province, Indonesia. Ibekwe (2010) used regression analysis for defining determinants of income among farm households in Orlu Agricultural Zone of Imo State, Nigeria and Sultan (2004) used regression analysis to analyze factors affecting gross income of small farmers in district Jhang-Pakistan.

Materials and methods

The study area

Mueang Nakhon Pathom and Kamphaeng Saen District of Nakhon Pathom Province, which is one province of the Central Thailand located at the north of Bangkok, Thailand (Fig.1).

Fig.1 Map of Nakhon Pathom Province, Thailand

Data collection procedure

The population of okra growers in Nakhon Pathom Province, Thailand are 140 okra households by referred the data from DOAE (Dept. of Agricultural Extension) in Bangkok, Thailand (DOAE, 2016) for January-December, 2016; a sample of 58 okra households were selected randomly by referred a list of farmers in the okra sell center by using probability proportionality size following a simplified formula provided by Yamane (Yamane, 1967).

Accordingly, the required sample size at 90% confidence level with degree of variability of 10% will be used to obtain a sample size required which represents a true population as follow:

$$n = \frac{N}{1 + N(e^2)} \tag{1}$$

Where; *n* is Sample size, *N* is Population size and *e* is Allowable error (*e* = *0.10*).

Finally, an estimated of *n* as follows equation (1) based on the intensity of okra production in Nakhon Pathom Province is equal 58.

Primary data was collected by using a semi-structured questionnaire adapted from a baseline survey Export Okra Production in Thailand conducted by the FAO Vegetable IPM. (2004)

Method of data analysis

The study was based on primary data and was confined to Nakhon Pathom Province. The land area of okra production in rai (1,600 square meters) was used to standardize of the inputs in terms of the quantities per rai.

For estimating the impact of various factors on okra farm income, regression analysis was carried out. Various inputs and agricultural practices

were considered as independent variables and the okra farm income as dependent variable.

For studying the relationship between okra farm income and the independent variables, following the multiple regression equation was used and presented below to identify factors affecting okra farm income in Nakhon Pathom Province, Thailand.

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 \qquad (3)$$

Where:
Y = Sum total income of each okra growers in Nakhon Pathom (THB/Rai)
β_0 = Intercept
$\beta_{1-}\beta_8$ = Regression coefficients of the respective input variables
X_1 = Gender of respondent (Male = 1, Female = 0)
X_2 = Age of respondent (Years)
X_3 = No. of schooling year (Years)
X_4 = Family members (Person/household)
X_5 = Experience in okra production (Year)
X_6 = Sum total of okra operating hour (Hour/Rai)
X_7 = Sum total of raw materials cost (seed, fertilizer, chemical and fuel oil) (THB. /Rai)
X_8 = Sum total of labour cost consist land cultivation cost (THB. /Rai)

Results

Socio-economic characteristics of okra growers

The socio-economic characteristics of okra growers in the study area consist gender, age, years of schooling, amount of family member, and experience in okra production were analyzed by using descriptive statistics which the result is presented in Table 1.

From gender perspective, about 51.72% were found to be male for okra production in Nakhon Pathom Province while 48.28% were found to be female.

On age classification, 37.93% were found to be within the age bracket of 40 – 49 years. While 13.79% of the respondents is older than 60 years. Contrary to findings of past studies which reported the farming population to be ageing (Idowu, 1989), the present study shows a young farming population.

Table 1. Socio-economic Characteristics of okra growers in Nakhon Pathom Province

Characteristics	%	Mean	Minimum	Maximum
Gender				
Male	51.72	n.a.	n.a.	n.a.
Female	48.28	n.a.	n.a.	n.a.
	100.00 %	**0**	**0**	**0**
Age (Year)				
30 - 39	20.69%	n.a.	n.a.	n.a.
40 - 49	37.93%	n.a.	n.a.	n.a.
50 - 59	27.59%	n.a.	n.a.	n.a.
> 60	13.79%	n.a.	n.a.	n.a.
	100.00 %	**0**	**0**	**0**
No. of schooling year (Year)				
< 1	3.45%	n.a.	n.a.	n.a.
1 - 6	60.34%	n.a.	n.a.	n.a.
7 - 9	12.07%	n.a.	n.a.	n.a.
10 - 12	24.14%	n.a.	n.a.	n.a.
	100.00 %	**0**	**0**	**0**
Experience in okra production (Year)				
1 - 5	74.14%	n.a.	n.a.	n.a.
6 - 10	12.07%	n.a.	n.a.	n.a.
11 - 15	10.34%	n.a.	n.a.	n.a.
> 15	3.45%	n.a.	n.a.	n.a.
Family members (Person/household)	n.a.	3.59	2	7
Sum total of okra operating hour (Hour/Rai)	n.a.	13.77	10.71	18.16
Sum total of okra product (KG. /Rai)	n.a.	2,691.98	1,300.00	4,500.00
Sum total of material cost (THB. /Rai)		4,139.05	3,780.00	4,205.00
Sum total of labour cost (THB. /Rai)	n.a.	2,098.97	1,230.00	3,830.00
Total income of each okra household (THB. /Rai)	n.a.	60,125.95	24,300.00	103,200.00

Number of schooling years of okra growers, from this study reveals that 60.34% of the respondents have 6-year schooling while about 24.14% are okra grower who have 12-year schooling. Thus, over than 60% of the respondents have had one form of formal education. Evidence indicates that the okra growers in Nakhon Pathom Province is an educated one similarly with Gabriel *et al.* (2006).

On experience in okra production, 74.14% were revealed to be the respondents have 1-5 years experience in okra production while 3.45% were revealed to be respondents have more than 15 years experience in okra production.

The total income of each okra grower household as revealed in the Table 1, an average income is 60,125.95 THB/Rai. While the minimum income and maximum income is 24,300.00 THB/Rai/Crop and 103,200.00 THB/Rai respectively. It is clear that okra production in Nakhon Pathom Province is highly profitable to sustain an average farm income.

Estimation of factors affecting okra farm income in Nakhon Pathom Province

The coefficient of determination (R^2) was 51.80 which states that given independent variables; explain 51.80 percent variation in the okra farm income. The Durbin Watson statistics (1.743) was also normal showing absence of autocorrelation in the data series.

Table 2 shows that only 1 out of 8 independent variables in the regression equation were significant. That is ***number of schooling year*** (t = -2.833) which the coefficient was significant at 1% level. The results indicate that an increase in amount of years of schooling by a unit decreased the output level by 3,539.95%, which is contrary with Mabe *et al.* (2010) indicated that educational level had a significant positive effect on farm income.

Table 2. Enter Regression Analysis Results of Factors Affecting[1] on the Okra Farm Income in Nakhon Pathom Province, Thailand.

Variables	B	Std. Error	Beta	t	P-Value
(Constant)	2,670.461	6,118.703		1.290	0.203
Gender	-1,836.615	5,528.673	-0.046	-0.332	0.741
Age	156.333	338.397	0.072	0.462	0.646
No. of schooling year	-3,539.951	1,249.323	-0.515	-2.833	0.007**
Family members	965.900	2,134.923	0.064	0.452	0.653
Experience in okra production	65.610	621.730	0.017	0.106	0.916
Sum total of okra operating hour	-1,255.712	1,712.455	-0.111	-0.733	0.467
Sum total of material cost	1.163	3.512	0.047	0.331	0.742
Sum total of labour cost	-17.159	25.299	-0.132	-0.678	0.501
Multiple R^2 = 0.642	*F = 5.954*				
Adjusted R^2 = 0.518	*Durbin – Watson = 1.743*				

Note: [1] ** $p \leq 0.01$

Base on all details above, the final equation of multiple regression for determining okra farm income in Nakhon Pathom Province will be:

$$Y_i = 2{,}670.461 - 1{,}836.615X_1 + 156.333X_2 - 3{,}539.951X_3 + 965.900X_4$$
$$(1.290) \quad (-0.332) \quad (0.462) \quad (-2.833^{**}) \quad (0.452)$$
$$+ 65.610X_5 - 1{,}255.712X_6 + 1.163X_7 - 17.159X_8$$
$$(0.106) \quad (-0.733) \quad (0.331) \quad (-0.678)$$

Conclusion

The regression analysis result was used to identify the determinant factors of okra farm income. The farm income regression result showed that independent variable such as number of schooling year was statistically signifcant variable that afected the okra farm income, which this parameter is known to affect their production activities according to Bembrigde (1988) stated that education is a basic human need, essential for meeting other basic needs and acceleration of overall development through training skilled workers and enable farmers to make fruitful use of existing resources which is similarly with the findings of the present study.

Moreover, this study found that okra growers in Nakhon Pathom Province should be encouraged themselves to increase their experience and decrease sum total of okra operating hour and Sum total of labour cost in okra production for increasing their income.

Acknowledgement

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