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FARMERS' ATTITUDES TOWARD RISKS IN PADDY PRODUCTION OF NORTH-WEST SELANGOR INTEGRATED AGRICULTURAL DEVELOPMENT AREA (IADA), MALAYSIA

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Abstract

The main objective of this research is to determine the reliability of the new developed instruments of farmers' attitudes toward types of risks in paddy production. The different income level groups farmers' attitude were compared. The data were collected from 286 paddy farmers at Selangor Integrated Agricultural Development Area (IADA), Malaysia. The Cronbach's alpha coefficient of 0.894 was obtained, which is above the minimum acceptable value of 0.70. One way Analysis of Variance (ANOVA) test was conducted to determine whether significant difference on the attitude toward risk exist among different income level groups farmers. The ANOVA result shows significant differences in their attitudes toward risks with respect to three categories of risks: Production risk F (2, 282) = 21.477, P = 0.001, Financial risk F (2, 283) =21. 506, P= 0.001, and Environmental risk F (2, 283) = 27.245, P = 0.001.

Keywords: Risk, attitude, income & reliability

1. INTRODUCTION

1.1. Background of the Study

Agricultural sector, as worldwide phenomena, is exposed to variety of risks which include climate variability, weather related hazards of cyclone and flood, pest and diseases, commodity price fluctuation, change in consumer demand among others (Okezie & Amin, 2012).These results in variability in production and yield and unpredictability of the output. As in the rest of the world, climate change affects Malaysian agricultural sector in terms of production, this will also have socio-economic impact on the people in the sector and nation as a whole (Najim *et al.*, 2007). The decision in environment for production activities are characterized by uncertainty or the absence of perfect or complete information or knowledge. Farmers usually make decisions now, which will affect their outputs or yield later. Farmers are not sure of the changes of some of the factors such as changes in weather, government policies, as well as the changes of new technologies which will be difficult for them to predict future with certainty.

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Climate change will affect production as well as socio economic condition of farmers and economic of the Nation at large. Changing in climatic factors, results in a year to year variability of crop production, physical damage, loss of harvest, and drop in productivity. The report of the damages of the 2006 to 2007 floods in Johor displaced 110,000 people, damaging an estimated RM0.35 billion worth of infrastructure and causing RM2.4 billion in economic losses and an estimated RM84 million worth of agricultural produce was damage or lost affecting about 7,000 farmers (Okezie & Amin, 2012). Despite continuous increase of government subsidy for paddy farmers, the paddy planting area is decreasing as the farmers often experience adverse impacts of climate variation (Alam *et al.*, 2010). Paddy like any other crops faces with similar uncertainties like adverse weather conditions such as drought and floods as well as pest and disease infestations. To the best of our knowledge, documented attitude of Malaysian paddy farmers toward different categories of risks associated with the paddy production is limited or unavailable, based on this assertion, the objective of this study is to identify and characterize different types of risks associated with paddy production and to evaluate the attitude of Malaysian paddy farmers toward different categories of risks. This study was carried out in the North West Selangor Integrated Agriculture Development Area (IADA) where paddy is the main crop of cultivation. The granary area was selected for it is one of the important paddy production areas. The IADA in North West Selangor consist of eight areas- Sawah Sempadan, Sungai Burung, Sekinchan, Sungai Leman, Pasir Panjang, Sungai Nipah, Panchang Bedena and BaganTerap. The total paddy planting area is 18,980 ha. There are total of 10,300 paddy farmers (producers) in the area. In 2011 the average yield was 5.5 tons/ ha.

In attempt to maximize rice production in Malaysia, and also to minimize or mitigate risk factors associated with production, different management strategies were adopted by both farmers and government, ranging from informal practices such as avoidance of highly risky crops and crops and incomes diversifications to formal measures such as insurance (Dadzie & Acquah, 2012). They pointed out that households whose consumption levels are close to subsistence devote a large share of land to safer, traditional varieties of rice and other cereals than riskier, high-yielding varieties. Another research conducted by Jain & Parshad (2006) point out that subsistence household spatially diversify their plots reduce the impact of weather shocks that vary by location.

2. LITERATURE REVIEW

Farmers' attitudes to risks are the major determinants of the rate of diffusion of new technologies among them and of the outcome of rural development programs (Dadzie & Acquah, 2012). To make any technology or program successful or efficient, there is need to understand the farmers' decision process, to have knowledge and understanding of risk and uncertainty associated with their decision making as well as the attitude of the various farmers' groups toward risk. The degree to which farmers are willing to accept risk in production is related to their level of production technology as well as their demographic compositions of their households and hence the attitude of farmers toward risk was used as a measure of their investment behavior.

Several approaches have been used by different researchers in measuring attitude toward risk as cited by Dadzie and Acquah (2012) whose ranges from direct and indirect approaches, economic anthropology, farmer risk programming, expected utility and safety- first theory approach, an interview method eliciting certainty equivalents and experimental gambling approach among others. Dadzie and Acquah (2012) used Equally Likely Certainty Equivalent with Pure Hypothetical Risky Prospective (ELCEPH) model in measuring attitude of "Agona Duakwa" farmers towards risk in crop production. Ellis (2000) used income variance approach in measuring attitude of farmers toward risk in production. He characterizes the farmers based on their degree of taking decision involving risk as either risk- preferring/loving/taking, risk neutral and risk averse. Others researchers such as Mauro *et al.* (2009) used eleven independent variables in their research on farmers knowledge and priori risk analysis across Canadian farmers in explaining their attitudes

regarding benefits and risks of Roundup Ready Wheat (RRW). The variables include, among others, age of respondents, trust in corporations, formal education of the respondents, financial wellbeing and trust of government policies. Another study Hindi & Mahmoud (2011) measures attitudes toward risks of Jordan Valley Vegetable farmers. He used utility function model in measuring their attitudes toward risks and also examine the relationship between their demographic characteristics and their attitudes toward risks. This study and development of the likert scale was based on Bard & Berry (2000), and also Carlsson *et al.* (2005) was referred, this differentiate our work from many researchers conducted in this area.

3. METHODOLOGY

The aim of this research study is to determine the reliability of the instruments intended to measure attitudes of farmers toward various risk categories and compare the attitude of difference farmers' income level groups toward the various categories of risk associated with paddy production in the area. An instrument consisting of 47 statements or items referring to four different categories of risks designed for the study are as follows: Production Risk (PR) with 15 items, Financial Risk (FR) with 16 items, Social Risk (SR) with 10 items and Environmental Risk (ENR) with 6 items. Data were collected through an in depth survey of farmers in the area of Integrated Agricultural Development Area (IADA), North-West Selangor, Malaysia. The target group of the survey was the paddy farmers. The survey sampling technique was based on proportionate/simple random sampling procedure, with each farmer having the same opportunity (probability) of being selected. Respondents were then presented with these 47 statements which sought to measure their attitudes toward risks in rice production. A five point Likert scale was used where the respondents were requested to indicate the extent of agreement or disagreement with the statements, where 1 was "strongly disagree" to 5 "strongly agree".

3.1. Evaluation of reliability

Reliability is the extent of how reliable is the said measurement model in measuring the intended constructs. Is the items measured what it supposed to be measured? Internal consistency is possible by Cronbach's alpha, which is the most important reliability index being used in measuring reliability of the questionnaire where the values greater than 0.7 was considered acceptable (Field, 2009). The computation of alpha (α) is based on the reliability of a test relative to other test, and it estimates the proportion of variance that is systematic or consistent with a set of test scores. The value of alpha ranges from 0 (if no variance is consistent) to 1 (if all variance is consistent) and its formula is given as $\alpha = \frac{n}{n-1}[1 - \frac{n\Sigma \mathrm{Vi}}{Vtest}]$ where: 'n' is the number of questions, 'Vi' is the Variance of scores on each question and 'Vtest' is the total variance of overall scores on the entire test.

One way Analysis of Variance (ANOVA) technique was used to test the claims that there is no difference among farmers' income level groups in their attitudes toward risks in paddy production. Based on the data obtained from respondents' net income (yield value), ranges from low of RM 1106 to high RM of 69631, farmers were categorized into three categories; low income, middle income and higher income level farmers (Hindi & Mahmoud, 2011). The assumptions of the use of ANOVA for the analysis was checked and fulfilled which include the dependent variable to be normally distributed and measured at least at the interval/ratio scale (Field, 2009) homogeneity/equality of variance (Howell, 2007) and the cases represent random samples from the population and scores on the test variables are independent of each other.

4. RESULT AND DISCUSSION

Table 1 shows the median age of survey respondents is about 48 years (58%), more than ninety percent (90%) of the respondents are male while only less than 5% are female. About eighty seven percent (87%) of the respondents are married with the mean number of dependents of five (5) children and maximum number of eleven (11) children per respondent. In terms of different ethnic

groups that are involved in paddy production from Table 1, it shows that about ninety three percent (93%) of the respondents belong to a Malay ethnic group while the remaining 5.6% and 0.7% of the two ethnic groups are Chinese and India respectively. Educational level of the respondents also is portrayed in Table1. From the Table, only 3.1% of the respondents reported having never been to school. The majority of respondents (57%) attended secondary school level of education while 35.5% and 5.9% attended primary and tertiary levels of education respectively. From Table 1, on average, each respondent had 6.22 hectares of the total farmland area. The median years of experience by the respondents in the paddy production was about 21 years, and maximum of 63 years of experience. The net income of the respondents from paddy produce was also reported in Table 1. The mean net income (yield value) was RM 17, 2726.8 per season; with range of yield values from RM 1106.65 to RM 69,631.00 per season.

Table 1: Descriptive statistics of paddy farmers (N = 286)

Variable	Mean	Percent (%)	St. Deviation	Minimum	Maximum
Age	48.34	58.40	11.74	20	75
Gender					
Male		95.5			
Female		4.5			
Marital status					
Single		10.1			
Married		86.7			
Widow/Widower		3.2			
Number of dependents	5.00			1	11
Years of Experience	21.79		13.58	0	63
Ethnic group[1]					
Malay		93.7			
Chinese		5.6			
India		0.7			
Educational level[2]					
No school		3.1			
Primary School		35.5			
Secondary School		57.5			
Tertiary Schools		5.9			
Farm size	6.22		4.5	0.5	24
Total Yield value	17276.80		13217.67	1106.65	69631

[1] Ethnic group: 1 (Malay) 2 (Chinese) 3 (India)
[2]Education categories: 1 (None), 2 (Primary school), 3 (secondary School) 4 (collage/ University)

4.1. Reliability

The following Tables of reliability and statistics (Table 2) give us the value of the coefficient of Cronbach's alpha value (0.894) which is above the minimum acceptable value of 0.70. The values indicate that about 90% variance is consistent or in other words, only 10% variances are not consistent or reliable in measuring the intended constructs. Also in Table 2, score statistics give the score that is related to the scale entity that is the summary statistics for the 47 items. The summated scale ranges from a low of 47 to a high of 235 with the mean of 173.28 and standard deviation of 20.94.

Table 3 is the Item Total Statistics, comprises with 'Scale means if item deleted' which present mean of the summated remaining items by excluding individual item from the list i.e. if PR1 is deleted, the mean of the sum of the remaining items will be 169.5455 units. 'Scale variance if item deleted' is the third column of the Table 3; it gives the variance for the remaining summated items by excluding a particular individual item from the list. 'Correlated total item correlation' is the

correlation of the item in questioned with the summated score for all other items. The rule of thumbs is that these values should be at least 0.40 (Anastasiadou, 2011).

'Alpha if item deleted' this is probably the most important column in the Table. This represents the scale's Cronbach's alpha reliability coefficient for internal consistency if the individual item is removed from the scale. In Table 3, the scale's Cronbach's alpha would be 0.895 if item PR1 were removed from the scale. This value is then compared to the Alpha coefficient value of Table 2 (0.894) to see if one wants to delete the item in order to increase alpha value to 0.895. Gliem & Gliem (2003) provide the following rule of thumb: Alpha value > 0.9 is excellent, > 0.8 is good, > 0.6 is questionable, > 0.5 is poor and < 0.5 is unacceptable.

Table 2: Reliability and scale statistics

Cronbach's alpha	Mean	Variance	STD	No. of Item
0.894	173.28	438.83	20.74	47

Table 3: Item-total statistics

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PR1	169.545	431.821	.148	.895
PR2	169.758	426.394	.224	.894
PR3	170.010	416.053	.440	.891
PR4	169.709	415.245	.474	.890
PR5	169.209	427.114	.355	.892
PR6	169.786	419.270	.378	.892
PR7	169.804	414.762	.461	.890
PR8	169.174	422.699	.476	.891
PR9	169.055	423.821	.528	.891
PR10	169.213	420.947	.447	.891
PR11	169.377	426.495	.289	.893
PR12	169.318	422.716	.428	.891
PR13	169.153	430.362	.251	.893
PR14	169.440	419.412	.447	.891
PR15	170.244	413.568	.338	.893
FR1	169.727	423.869	.310	.893
FR2	170.132	421.989	.278	.893
FR3	169.909	424.651	.253	.894
FR4	169.874	424.103	.265	.893
FR5	170.178	412.793	.424	.891
FR6	169.912	419.561	.321	.893
FR7	170.286	413.096	.427	.891
FR8	169.954	419.356	.344	.892
FR9	169.933	416.118	.415	.891
FR10	170.080	421.071	.305	.893
FR11	169.318	424.211	.369	.892
FR12	169.307	425.028	.353	.892
FR13	170.087	417.343	.381	.892
FR14	169.559	418.184	.443	.891
FR15	170.136	414.034	.402	.891
FR16	169.835	425.134	.256	.893
SR1	169.538	420.902	.413	.891
SR2	169.580	415.957	.518	.890
SR3	169.230	420.262	.518	.890

SR4	169.395	422.921	.391	.892
SR5	169.451	417.694	.482	.890
SR6	169.639	418.526	.375	.892
SR7	169.139	423.840	.452	.891
SR8	169.055	422.544	.471	.891
SR9	168.965	426.062	.406	.892
SR10	169.461	417.927	.478	.890
ENR1	169.115	422.320	.526	.891
ENR2	169.087	422.768	.477	.891
ENR3	169.538	424.137	.331	.892
ENR4	169.195	426.411	.364	.892
ENR5	169.458	425.898	.315	.892
ENR6	169.975	423.042	.254	.894

One way Analysis of Variance (ANOVA) test was conducted to determine the significance difference between farmers' income level groups in their attitudes toward risks categories associated with paddy production. The ANOVA result in Table (4) shows that there were significant difference between farmers' income level groups in their attitudes toward risks with respect to three categories of risks: Production risk F (2, 282) = 21.477, P = 0.001, Financial risk F (2, 283) = 21.506, P= 0.001, and Environmental risk F (2, 283) = 27.245, P = 0.001. Only Social risk category shows statistically no difference between farmers' income level groups. From the ANOVA result (Table 4), the attitude of farmers' level income groups toward production, financial and environmental risks differs between low income level, middle income and high income level farmers, but there is no difference in their attitude toward social risk.

Table 4: One way ANOVA results of categories of risk associated with paddy production

ANOVA					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.(p)**
Production Risk					
Between Groups	18.842	2	9.421	21.477	.000
Within Groups	123.706	282	0.439		
Total	142.549	284			
Financial Risk					
Between Groups	15.561	2	7.781	21.506	.000
Within Groups	102.385	283	0.362		
Total	117.947	285			
Social Risk					
Between Groups	.362	2	0.181	0.554	0.575
Within Groups	92.419	283	0.327		
Total	92.781	285			
Environmental Risk					
Between Groups	19.124	2	9.562	27.245	.000
Within Groups	99.326	283	0.351		
Total	118.450	285			

Having confirmed from the ANOVA test, that there is a significant difference among farmers' income level in their attitudes toward risks associated with paddy production except one category, yet ANOVA test only provides us with the information that difference exists between the groups, but there is no information about which among the groups differ from the others? To solve this problem, Fisher's LSD (Least Significant Different) Post hoc pair wise multiple comparisons were used to determine which mean differs from another.

From multiple comparison Table (5) of the three groups of farmers' income level, it shows that there is difference between all the three income level groups in their attitudes toward production risk with Low income level (M = 3.34, SD = 0.736), Middle income level (M = 3.692, SD = 0.613) and High income level farmers (M = 2.34, SD = 0.236). In respect of their attitudes toward financial risk, there is a significant difference between Low income level (M = 3.647, SD = 0.615), Middle income level (M = 3.20, SD = 0.52) and High income level farmers (M = 2.95, SD = 0.44), but statistically there is no difference in the attitude of farmers toward financial risk between middle income level farmers and high income level farmers. Likewise the comparisons of the attitude of farmers' income level groups toward environmental risk shows statistical significant difference between Low income (M = 3.34, SD = 0.528), Middle (M = 3.84, SD = 0.624) and High (M = 4.08, SD = 0.84), but no significant difference between middle income and high income level farmers in their attitude toward environmental risk.

Table 5: LSD Post hoc pairwise multiple comparisons of farmers' level of income groups

Multiple Comparisons						
(I) Income category	**(J) Income category**	**Mean Difference (I-J)**	**Std. Error**	**Sig.(p)**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
Production Risk						
Low Income	Middle Income	-.23968*	.080	.003	-.3976	-.081
	Higher Income	1.11299*	.217	.000	.6845	1.541
Middle Income	Higher Income	1.35267*	.216	.000	.9269	1.778
Financial Risk						
Low Income	Middle Income	.44490*	.072	.000	.3018	.588
	Higher Income	.69782*	.197	.000	.3088	1.086
Environmental Risk						
	Middle Income	-.49915*	.071	.000	-.6401	-.358
Low Income	Higher Income	-.73360*	.194	.000	-1.1167	-.350

*. The mean difference is significant at the 0.05 level

The effect size was calculated from the ANOVA result, in order to identify the strength or magnitude of the existing differences among the farmers' income level groups in their attitudes toward different types of risks associated with paddy production. The eta square (η^2) formula was used in estimating the effect size. The formula is $\eta^2 = df_{bet}F/dfbetF + df_{wt}$ or $\eta^2 = SS_{bet}/SS_{tot}$ where: df_{bet} is degree of freedom between the group, df_{wt} is degree of freedom within the group, F is F value, SS_{bet} is sum of square between the group and SS_{tot} is sum of square total (Cohen *et al.*, 2003). The eta square (η^2) values of production, financial and environmental risk are 0.129, 0.13 and 0.161 respectively. As it was indicated from the calculated eta square (η^2) values, based on Cohen (1988) criteria (<= 0.01 to 0.05 is small effect size, 0.06 to 0.13 is medium or moderate effect size, and >= 0.14 is large effect size), it shows that the strength or magnitude of the differences in their attitude toward production and financial risks are moderate (0.13) while on the environmental risk the difference is large (0.16).

5. SUMMARY AND CONCLUSION

The main objective of this research is to determine the reliability of the new developed instruments intended to measure attitudes of farmers toward various categories or types of risks associated with paddy production. Also the study aims to compare the attitudes of different farmers' income level groups toward the various types of risks. The data used for the analysis were collected through an in depth survey from 286 farmers in the area of Integrated Agricultural Development Area (IADA), North-West Selangor, Malaysia.

Reliability test was conducted on the 47 items of the questionnaire to measure internal consistency and reliability of the measurement model in measuring the intended constructs. The value of the coefficient of Cronbach's alpha of 0.894 was obtained which is greater than the minimum acceptable value of 0.70.

One way analysis of variance (ANOVA) test was used to determine whether a significant difference exists between farmers' income level groups in their attitudes toward different types of risks associated with paddy production. Out of four types, only one (social risk) shows no significant difference between farmers' income level groups on their attitudes toward risks. Fisher's LSD Post hoc pairwise comparison was also conducted to determine which mean group among three groups of farmers differ from another. From the result of the analysis, it shows that there is difference between all the income level groups in their attitudes toward production and financial risks. The magnitude or effect size was computed using eta square (η^2) and the difference in their attitude toward production and financial risks are moderate while the difference in their attitude toward environmental risk is large.

5.1. Implication

Research on attitude toward risk is very important in any decision making process. Attitude is considered the major constraint on adoption rate of any new technology or innovations by farmers, and consequently, paddy production is affected by this attitude. Therefore, there is a need for policy makers to consider and investigate the attitude of farmers (as a priority) towards any new technology or innovations in farming practices in order to bridge the gap of rejection and hence improve acceptance rate.

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