THE ADOPTION OF ORGANIC RICE FARMING IN NORTHEASTERN THAILAND

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Abstract

The economic and environmental justification for certified organic farming could be considered strong enough to promote its adoption in the developing countries. Due to the problems facing conventional farmers, and reported benefits and opportunities derived from organic farming, questions may be asked about why organic agriculture is not adopted by a larger proportion of farmers. Contract and non-contract organic rice farms in northeastern Thailand versus their neighbouring conventional farms were used for this study. Descriptive statistics were used to investigate both organic and conventional farms and duration analysis was applied to investigate the factors affecting the adoption and diffusion of organic farming. The results reveal that important factors on decision of adoption of organic farming that were positively significant included water accessibility, farm-gate price and attitude to conventional production problems. This implies that the early organic adopter may have better access to water, the ability to seek and find higher prices, and have stronger attitudes toward conventional farming problems. This research may help to improve policy interventions by targeting policies on farmers who are most likely to remain in the sector.

Key words: adoption, Cox model, organic farming, rice, Thailand.

Introduction

Organic agriculture is one of the most dynamic and rapidly-growing sectors of the global food industry (Ellis *et al*. 2006). Furthermore, organic farming is one of several approaches to sustainable agriculture (FAO 1999b), because of its commercial viability, and it may provide solutions to the current problems in conventional agriculture (Scialabba 2000; Wheeler 2008). Organic agriculture is frequently promoted as an exit strategy from poverty for small-scale marginal producers in developing countries (Cary and Wilkinson 1997). A great deal of the literature focuses on understanding factors that motivate farmers to adopt organic farming practices. Lampkin and Padel (1994) and Padel (1994) reviewed the evidence on the motivations of organic farmers, and identified the most common factors among organic producers as concerns about their family's health, concerns about husbandry (e.g., soil degradation, animal welfare), lifestyle choice (ideological, philosophical, religious) and financial considerations. Colman (1994) has argued that the motives for economic behaviour cannot be reduced simply to profit maximisation, rather they '…may be complex, of benefit to a third party, to serve political or religious cause or reflect other motives than satisfaction in personal consumption or ownership', several other important factors could also impact the adoption of organic farming, including economic conditions, management skills, agro-climatic conditions and social considerations (Marshall 1993). The importance of information and knowledge were emphasised in several studies that examined the process of converting into organic agriculture (Aker *et al*. 2005). Mahamud (2005) mentioned significant factors affecting the acceptance of organic rice production as level of organic agriculture knowledge and extension measures received from involved agencies. It is unclear whether similar factors influence adoption of organic farming in countries such as Thailand.

In Thailand, agriculture is the most important sector for sustaining growth and reducing poverty. Approximately 50% of the total population or 5.8 million households are engaged in agricultural sector (NSO 2008). Agriculture is both a major export income source and social welfare system. Thailand is the world's largest rice exporter; peopled by connoisseurs of rice varieties and quantity (Falvey 2000). Rice farming utilises half of the agricultural land (10.2 million hectares) of the country (OAE 2008). But rice is facing the problem of low profitability mainly because of the declining demand in both international and domestic markets (Ahmad and Isvilanonda 2003). At the same time, the impacts of excessive use of agro-chemicals are apparent, with increasingly frequent health incidents among farmers and consumers reported (FAO 2004a). In addition, most chemical fertilisers, pesticides, gasoline, etc. are not the domestic reliance but are imported inputs. More importantly, the price of modern inputs (mineral fertiliser and synthetic pesticides) increases each year, negatively affecting farmers' income (Tovignan and Nuppenau 2004). The dual cost price squeeze drove farmers to the edge of bankruptcy when prices of agricultural products declined sharply while production costs rose steadily. Millions of small-scale farmers were driven to indebtedness and forced out of their farmlands (Panyakul 2003).

Organic farming re-emerged in Thailand in the early 1980's after the health and environmental effects of improper use of and heavy reliance on agrochemicals began to manifest themselves. Current organic production is predominantly of rice, with vegetables as a distant second and baby corn standing out (USDA 2006; Ratanawaraha *et al*. 2007). Green Net and the Earth Net Foundation estimate that the area under organic farming in Thailand increased from just over 2,100 ha in 2001 to 21,701 hectares in 2005, representing 0.10 percent of the total agricultural land area (21million hectares) (Ellis *et al.* 2006). Moreover, Thailand's National Agenda on Organic Agriculture was launched in October 2005. The total budget for the Agenda is 1.2 billion baht (US$ 39 million) over four years (USDA 2006).

This study tries to determine the important influencing factors for adoption of organic rice farming in Thailand and to formulate recommendations for improving ways to extend organic farming in Thailand.

Methodology

Data for the study was collected in northeastern Thailand during crop year 2007/08. Surin and Yasothon provinces are situated in the area which is the best place for planting Jasmine rice in Thailand. The Surin and Yasothon Provinces are the main areas of organic rice cultivation and were therefore selected as the study areas. Contact and non-contract organic rice farms in Surin and Yasothon versus their neighbouring conventional farms were selected. In addition, other stakeholders in whole country were selected. Sampling method of the study is multi-stage method. The first stage of sampling is stratified sampling for 4 categories of stakeholder (organic farmers, conventional farmers, NGOs, government officials, processors and handlers). Later simple random sampling by using snowball technique was applied for 180 farmers overall survey with comprises of 90 organic rice farms and 90 conventional farms. Finally, purposive sampling of samples that are suitable key informants, 6 organic farms and 20 other stakeholders for interview.

Descriptive statistic analysis was applied to summarise the important characteristics of the rice samples by using simple statistic analysis, i.e. frequency, percentage, mean, mode.

Since time plays an important role in explaining farming decisions, a dynamic econometric framework (duration analysis) is used to model adoption of organic rice farming (Läpple 2009). In this approach the variable of interest is the length of time until a certain event occurs or until the measurement is taken (Greene 2003). An important feature of the approach is that one can estimate the probability that a farmer with given attributes will adopt organic practices in a particular year, given that adoption had not occurred by that time.

Since this research includes only organic farmers who are certified with an organic certification body on all or a part of the farm, the start date (t=0) is either 1995 when the first organic certification body began operating in Thailand, or the date when the farmer started farming as the main farm holder, whichever is latest. The end of the spell is either the date when the farmer adopted organic farming (started the conversion period), while for the conventional farmers, spells are right censored at the time of data collection.

In duration analysis the hazard function and the survivor function are the key concepts. Let T be a nonnegative continuous[1] random variable representing the length of a spell with a probability density function $f(t)$ and a cumulative distribution function $F(t)$ (Jenkins 2004). The survivor function $S(t)$ gives the probability that the spell is at least of length t, which means the probability of surviving beyond time t. The survivor function is given by:

$$S(t) = 1 - F(t) = \Pr(T > t) \tag{1}$$

The survivor function equals one at $t = 0$ and strictly decreases towards zero as t goes to infinity. This implies an underlying assumption that all observations will eventually end in an event. However, at the time of measurement, it is usual that not all spells are completed. Since the spell end dates for these observations are unknown, right censoring at the time t of data collection is necessary. The only thing that is known about a censored observation is that the completed spell is of length $T > t$.

The density function $f(t)$, which is the slope of the failure function $F(t)$, can also be obtained from $S(t)$:

$$f(t) = \frac{dF(t)}{dt} = \frac{d}{dt}\{1 - S(t)\} = -S'(t) \tag{2}$$

The hazard function $h(t)$ is the instantaneous rate of failure. It provides the probability that the event will end in the next short interval Δt , conditional upon survival to that time,

$$h(t) = \lim_{\Delta t \to 0} \frac{\Pr(t \le T \le t + \Delta t | T \ge t)}{\Delta t}) = \frac{f(t)}{S(t)} \quad (3)$$

A Cox proportional hazards model is chosen and estimated for the adoption decision. The Cox model is robust because the results from using the Cox model will closely approximate the results for the correct parametric model, reasonably good estimate of regression coefficients, hazard ratios of interest and adjusted survival curves can be obtained for a wide variety of data situation, even though the baseline hazard is not specified (Kleinbaum and Klien 2005).

In the proportional hazards model of Cox, independent failure times $T_1, T_2, ..., T_n$ are studied, with the distribution being described by a hazard function $h(t, X)$ given by Kalbfleish and Prentice (2002):

$$h(t, X) = h_0(t) \exp(\beta' X) \quad (4)$$

where $h_0(t)$ is an arbitrary unspecified base-line hazard function which specifies a continuous distribution for a failure rate and a second term $\exp(\beta' X)$ incorporating the influences of covariates on the hazard rate (Blossfeld *et al*. 2007).

Based on literature, the factors that motivated the conversion could be distinguished as economic and non-economic factors. The important factors that could impact on the adoption of organic farming include financial competitiveness, management skills, agro-climatic conditions and social considerations.

Duration analysis is applied to determine the factors affecting the adoption and diffusion of organic farming on all or part of the farm. The explanatory variables that hypothesised decision on the adoption of organic farming are grouped into four categories: household and farmer characteristics, production, economic, and psychology. The household and farmer characteristics comprised year of education (EDU), and land ownership (LTENURE) were hypothesised to have a positive influence, while liability (DEBT), and off-farm work (OFFW) were hypothesised to have a negative effect on adoption of organic farming. The production factors consisted of availability to access water during dry period (ACWATER), farm size (FSIZE), and household labour (LABOUR). The economic factor is farm-gate price (FGPRICE). The psychological factors are attitude towards problem from conventional technology (CPROBLEM), and supporting organic input credit special credit for organic farming (CREDIT). These were hypothesised to have a positive effect on adoption of organic farming. The factors affecting adoption of organic farming were analysed using binary logistic regression, and survival analysis in the STATA program.

Results and discussions

1. Household and farm characteristics

The evidence from the field survey indicates that the average size of the farm households is of medium size, which means that it consisted of 4 members. The farm labour force referred to those members of the households with labour force status who actually work on the household farm full-time or part-time basis in all round year. The results reveal statistically significant difference (at 10% level) in average farm family labour (ME) between conventional and organic samples (Table 1). This can be imply that organic rice farms require greater labour input in term of full-time labour than conventional farms.

The average total land size per family is approximately 17.58 rai, which is lower than the average of the country (22.56 rai) and of the northeastern region (21.23 rai) (OAE 2008). Moreover, this farm land is divided into two to three paddy plots or more. The average rice farm size is about 15.62 rai. The results show no statistically significant differences in total agricultural land and average rice farm size between organic and conventional farms. However, land is significant difference between contract and non-contract organic farms.

Most of jasmine rice farms are located in rain fed area; nevertheless, some farms are engaged in small irrigation project. The results show that more than 87 percent of conventional farms and 67 percent of organic samples are rain fed farms. In specific, 70 percent of contract organic farms are partial and irrigated farms with engaged in small irrigation project, while most of non-contract organic farms located in rainfed area and no accessibility on water during dry season.

The average production of organic samples is 5,932.39 kg per farm, meanwhile conventional farms have higher average production about 6,725.78 kg per farm. The average yield per rai of organic farms is slightly lower than conventional farms about 389.26 kg per rai versus 420.36 kg per rai (3.61 percent of difference). Globally, organic plant yields are on average 10% below conventional systems. Global averages do vary between extensive and intensive systems because the conventional comparator is different (MacRae *et al*. 2004). Therefore, improving scientific knowledge on organic farming is necessary.

The paddy price of organic rice is highly statistically significant than conventional farms at 10.71 THB per kg and 9.08 THB per kg, while no difference between prices of contract and non-contract organic paddy dues to rice price is rose in the crop year. But between non-contract organic, ACFS farms have significantly higher price than ACT farms (Table 1). Because many of them sell their paddy at cooperative mill and they get market price with return profit, while some farms sell paddy as seed, as the result they get higher price.

Table 1. Household and farm characteristics.

	All samples (n=180)	Conv. Samples (n=90)	Organic samples (n=90)				
			Total organic	Non-contract			Contract
				ACFS	ACT	Total	
Household size (persons)							
Mean	3.96	3.53	4.38	4.40	4.33	4.37	4.40
SD	1.58	1.54	1.52	1.73	1.42	1.57	1.43
t-value			3.707***		-0.163^{NS}		0.098^{NS}
Farm family labour (ME)							
Mean	1.97	1.87	2.01	2.16	1.99	2.07	2.06
SD	0.69	0.68	0.68	0.78	0.76	0.77	0.47
t-value			1.915*		-0.851^{NS}		-0.119^{NS}
Rice farm size (rai)							
Mean	15.62	16.00	15.24	13.25	11.19	12.22	21.29
SD	10.08	10.92	9.26	6.48	8.92	7.79	9.08
t-value			-0.504^{NS}		-1.023^{NS}		4.921***
% land ownership	88.34	84.41	91.88	95.27	79.75	89.11	95.75
Farm type (%)							
Rain-fed	77.78	87.78	67.78	80.00	96.67	88.33	26.67
Partial irrigated	12.22	6.67	17.78	0	0	0	53.33
Irrigated	10.00	5.56	14.44	20.00	3.33	11.67	20.00
Productivity (kg/rai)							
Mean	405.19	420.36	389.26	420.75	453.75	435.86	335.59
SD	104.88	104.61	104.76	44.35	95.92	76.01	121.08
t-value			-1.296^{NS}		1.832*		-4.919***
Paddy price (THB/kg)							
Mean	9.88	9.08	10.71	11.72	9.60	10.80	10.56
SD	2.03	1.51	2.18	1.90	3.00	2.63	1.01
t-value			5.690***		-3.132***		-0.474^{NS}
On-farm (THB)	69,610	62,658	76,562	97,414	56,170	76,792	76,103
SD	48,381	45,746	50,173	66,280	38,884	57,749	30,665
t-value			1.943*		-2.940***		-0.061^{NS}
Off-farm (THB)	28,409	32,973	24,211	32,480	28,353	30,417	11,800
SD	24,186	25,637	21,992	21,357	17,952	19,670	21,402
t-value			-2.358**		-0.810^{NS}		-4.110***
Total (THB)	98,019	95,631	100,773	129,894	84,523	107,209	87,903
SD	52,297	51,599	53,130	67,376	38,329	58,964	36,506
t-value			0.706^{NS}		-3.206***		-1.640^{NS}

Note: NS = statistically non-significant,
*, **, *** = significant at 10%, 5% and 1% level, respectively

Sources of farm household income can be divided into on-farm income and off-farm income. The on-farm income comprises from rice production, and from other agricultural activities. Apart from rice income is income from vegetables, orchard and livestock. Moreover, they earn off-farm income mainly from working as labours or employees in non-agricultural activity. The results show that farm household income of organic samples is relatively higher than conventional farms. On-farm income of organic samples is highly significant than conventional farms, due to total farm land and paddy price, while conventional farms have significant difference in average off-farm income (Table 1).

2. Attitude towards organic farming

The opinion is measured by a five-point scale. This scale measures the opinion or reactions of farmers on a set of statements. For example, low cost of production under organic system (1 = strongly disagree, 2 = disagree, 3 = not at all, 4 = agree, 5 = strongly agree). These reactions are analysed and calculated as average score and mode of each statement. Table 2 shows that attitude about specialised markets and premium prices (special price) for organic foods, and special credit (especially on inputs) should be given for organic farming are strongly supported by rice farmers. In addition, farmers are agree on production technique about farmer can produce without chemicals, continuous use of conventional farming technologies induces problem on farm (conventional problem), and organic farming offers a suitable solution of conventional problem (solve problem). While, organic farming become low yield is disagreed.

Table 2. Farmers' attitude towards organic farming.

View on	Average score of attitude (mode)						
	All samples (n=180)	Conv. Samples (n=90)	Organic samples (n=90)				
			Total organic	Non-contract			Contract
				ACFS	ACT	Total	
1) Production technique	4.06 (4)	3.38 (4)	4.74 (5)	4.87 (5)	4.50 (4)	4.68 (5)	4.83 (5)
2) Conventional problem	4.03 (4)	3.68 (4)	4.39 (5)	4.00 (5)	4.27 (4)	4.13 (4)	4.90 (5)
3) Solve problem	4.27 (4)	3.81 (4)	4.73 (5)	4.83 (5)	4.50 (4)	4.67 (5)	4.87 (5)
4) Low yield	2.37 (2)	2.44 (2)	2.29 (2)	1.80 (1)	3.03 (2)	2.42 (2)	2.03 (2)
5) Special price	4.62 (5)	4.51 (5)	4.72 (5)	4.80 (5)	4.73 (5)	4.77 (5)	4.63 (5)
6) Special credit	4.40 (5)	4.39 (5)	4.41 (5)	4.53 (5)	4.33 (4)	4.43 (4)	4.37 (5)

Note: Scalar variable of attitudes, where 1 = strongly disagree and 5 = strongly agree

3. Information and extension method

Information about organic rice farming is very important for the farmers to change their practice, enhance knowledge on farming, production and market situations. Approximately 60 percent of organic rice farmers have got information from extension agents (government and NGOs agents), in form of group meeting. In addition, 18 percent of organic farms have got information from their neighbouring farmers (relatives and friends), while mass media (TV and radio) takes about 14 percent (Table 3).

Table 3. Source of organic information* (%).

	Organic sample (n=90)	Non-contract (n=60)			Contract (n=30)
		ACFS	ACT	Total	
Mass media	13.95	27.63	4.88	19.66	1.82
Extension agent	46.51	34.21	73.17	47.86	43.63
NGOs	16.28	0	0	0	50.91
Merchant	5.24	11.84	0	7.69	0
Farmers	18.02	26.32	21.95	24.79	3.64
Total	100.00	100.00	100.00	100.00	100.00

Note: *farmers can get information from more than one source

Most of organic rice farmers are members of agricultural production group, while only 23 percent of conventional farmers are members of the group. In addition, participation in extension service has a similar result with the groups' member; approximately 90 percent of organic rice farms are participated in extension service on organic farming, while only 3 percent of conventional rice farmers have been done (Table 4).

Table 4. Member of agricultural organisation and participation in extension service.

	All samples (n=180)	Conv. Samples (n=90)	Organic samples (n=90)				
			Total organic	Non-contract			Contract
				ACFS	ACT	Total	
Member of agricultural production group (%)							
Yes	60.00	23.33	97.78	93.33	100.00	96.67	100.00
No	40.00	76.67	2.22	6.67	0	3.33	0
Participation in extension service (%)							
Yes	47.22	3.33	91.11	96.67	96.67	96.67	80.00
No	52.78	96.67	8.89	3.33	3.33	3.33	20.00

Figure 1 shows the number of adopters and the timing of adoption in our sample. The longest observed time in farming until adoption of organic farming is 11 years. An average duration until adoption is 8 years while the shortest duration is 4 years. In year 2001 and 2006 are the year after government gives support for organic project. These may imply that the implementation of policy can increase the adoption tendency of organic farming. Organic farming re-emerged in Thailand in the 1980s, which clearly indicates a demand-driven re-emergence of organic farming.

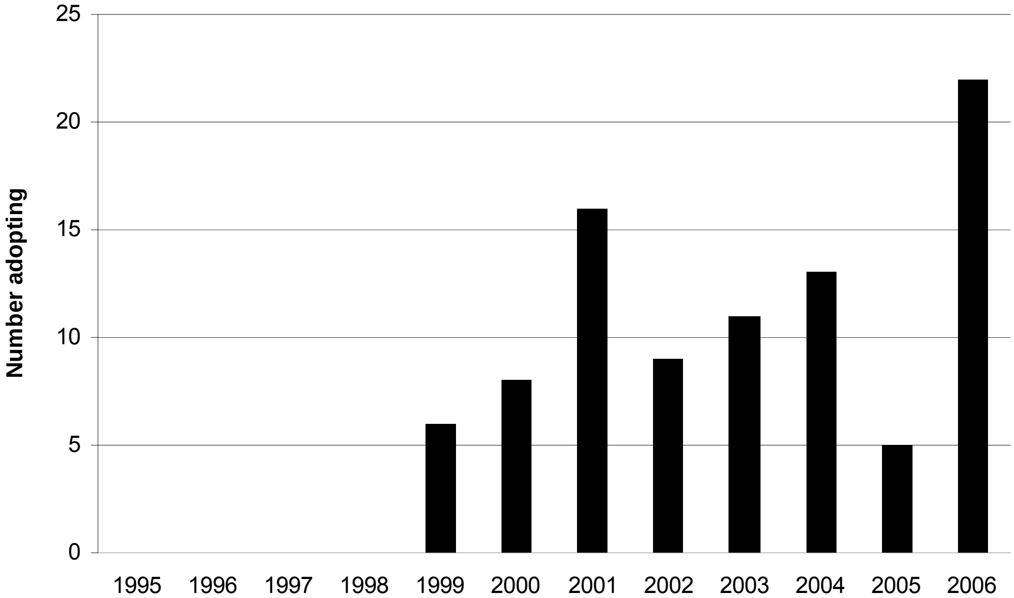

Figure 1. Year of adoption of organic farming in sample, 1999-2006

4. Important factors influencing adoption of organic farming

In certified organic farms, participation in extension service from organic program is very important. According to the derivation of high conventional rice price in crop year 2007/08 affects contract organic price that causes to negative effect of contract farming. Apart from participate in extension service and contract farming what factors are influencing adoption of organic farming is interested. The mean values of the variables are presented in Table 5.

Table 5. Definition and mean value of variables used in the adoption model (n=180)

Variables	Definition	Mean value
Household and farmer characteristics		
EDU	Year of schooling (years)	5.91
DEBT	Amount of loan (THB)	53,278
OFFW[1]	1 for off-farm work	128
	0 for otherwise	52
LTENURE	Land tenure ratio	0.86
Production		
ACWATER[1]	1 for access water during dry period	40
	0 for otherwise	140
FSIZE	Farm size (rai)	15.62
LABOUR	Number of farm family labours (persons)	2.17
Economic		
FGPRICE	Farm-gate price (THB per kg)	9.88
Psychology		
CPROBLEM	Conventional technology induces on-farm problem	4.03
CREDIT	Special credit should be given for organic farming	4.40

Note: [1]each binary variable shows how many farmers are in the category.

In the Cox model, covariates are reported as hazard ratios (Exp(B)). In terms of interpretation a value greater than one has a positive impact on the hazard of adoption, a value less than one has a negative impact and a value of one means no impact.

Table 6. Cox model result for the adoption of organic farming (N=180)

	Hazard Ratio[1]	S.E.	z	p-value
EDU	1.021	0.038	0.54	0.587
DEBT	1.000	0.000	0.89	0.372
OFFW[1]	0.669	0.172	-1.57	0.118
LTENURE	1.371	0.685	0.63	0.527
ACWATER[1]	2.249	0.607	3.00	0.003
FSIZE	0.994	0.013	-0.50	0.616
LABOUR	0.874	0.174	-0.68	0.449
FGPRICE	1.415	0.092	5.34	0.000
CPROBLEM	1.589	0.224	3.28	0.001
CREDIT	1.122	0.157	0.82	0.411
Log-likelihood	-251.04			
Chi^2	66.66		0.000	

Note: [1]Covariates are reported as hazard ratio.

The hazard ratios (Exp(B)) for farm type, farm-gate price, and conventional problem are 2.249, 1.415, and 1.589, respectively. This means that a unit increase in ability to access water, price, and attitude on conventional problem lead to approximately 2.2, 1.4 and 1.6 times increase in the hazards that the farmers will adopt organic farming, assuming that the other variables are constant. Access to water (ACWATER) is the only production variable that shows a significant impact. In rainfed area, the ability to access water conducts to full-year farming, while organic regulation concerns all round year activity. Household labour during rice cultivation (LABOUR) which was expected to positively shift the probability is not significant. Besides, farm size (FSIZE) which was expected to negatively shift the probability, has no significant for diffusion. In general, farm size is regarded as an important determinant of adoption decisions (Feder *et al*. 1985 cited in Läpple 2009), and also Burton *et al*. (1999) found farm size to be significant for organic farming. In term of economic variable, farm-gate price (FGPRICE) has significantly positive impact. As the same way, attitudinal variable (CPROBLEM) is also significantly positive influence, while attitude on credit program (CREDIT) is not significant. Burton et al. (2003) found attitude concern about environmental issues and the belief that organic farming is better for the environment have a strong positive impact on the hazard, whereas those farmers who believe that conventional agriculture can sustain productivity have a much lower hazard. In addition, the hazard ratio for off-farm work (0.669) means that the hazard of organic farms is about 33% lower for farm that a unit increases in working off-farm.

In addition, the organic farmers are asked the opinion on adoption of organic farming. Table 7 represents the opinions of organic rice farmers on influencing factors and their ranks according to the means and mode of each statement. The important factors in all organic groups are demand for healthy food, human and animal health hazards due to use of agro-chemicals is seen as one of the consequences of conventional farming. In contract organic farm, the influencing factors are gaining higher commodity price, and concern with degrading soil fertility and productivity on farm. While low cost of production and independence in farming occur in non-contract farms. In addition, gaining higher commodity price has strong influence for ACFS farms, while less influence in ACT farms. The results imply that health concern factors are very important reason.

Table 7. Influencing factors on decision of adoption of organic farming

Influencing factors	Average score of influencing factor (mode)				
	Total organic (n=90)	Non-contract (n = 60)			Contract (n=30)
		ACFS	ACT	Total	
1) Low cost of production under organic system	3.41 (4)	3.60 (4)	3.30 (3)	3.45 (4)	3.27 (3)
2) Gaining independence in farming	3.43 (4)	3.47 (4)	3.57 (4)	3.52 (4)	3.20 (3)
3) Demand for healthy food through organic farming	3.71 (4)	3.80 (4)	3.70 (4)	3.75 (4)	3.67 (4)
4) Motivational work of extension agent	2.93 (3)	3.07 (3)	2.40 (3)	2.73 (3)	3.37 (3)
5) Working with groups of likeminded farmers	3.17 (3)	3.37 (3)	2.93 (3)	3.15 (3)	3.23 (3)
6) Credit support program for organic farming	2.91 (3)	3.23 (3)	2.43 (2)	2.83 (3)	3.07 (3)
7) Gaining higher commodity price	3.20 (4)	3.53 (4)	2.53 (2)	3.03 (4)	3.57 (4)
8) Concern with degrading soil fertility and productivity	2.34 (2)	2.07 (1)	1.60 (2)	1.83 (1)	3.37 (4)
9) Concern with in-debt and profitability	2.80 (3)	2.57 (4)	2.80 (3)	2.68 (3)	3.07 (3)
10) Human and animal health problem (due to use of agro chemicals)	3.53 (4)	3.27 (4)	3.70 (4)	3.48 (4)	3.60 (4)

Note: Scalar variable of influence, where 1 = no influence and 4 = strong influence.

Conclusion and recommendations

The rice farmers' households have some different characteristics, with statistically significant differences between organic and conventional farms in on-farm family labour, and on-farm and off-farm income. It indicates that the organic farms depend more on agricultural activities income than the conventional farms.

Both organic and conventional rice farmers have similar attitudes on specialised markets and premium prices for organic foods and special credits. Also, farmers agree on production techniques without chemicals and the continuous use of conventional farming technologies induces problems on farm while organic farming is perceived to offer a suitable solution to conventional problems.

Many of the organic farms emerged from farmers who faced with the problems arisen by the conventional farming while premium prices with a market access from contract farming and changing agents are important incentives.

Cox model implies that the early adoption of organic farming relates to water accessibility, ability to seek higher farm-gate prices, and attitudes toward conventional problems. In summary, there is no factor controlling by farmers. However, some factors like off-farm work, price difference, water accessibility, credit support and attitudes on organic farming may be controllable by policies. In addition, opinions about the decision to adopt organic farming shows that influencing factors for all organic farmers are demand for healthy food, and human and animal health problems (due to use of agro-chemicals). However, there is a disparity in opinions between groups and extension goals towards gaining higher commodity prices, low costs of production under organic systems and obtaining independence on farming.

Therefore, promotion of internal input use by increased water accessibility (e.g. small ponds in fields) in order to increase farm activity and income all round year is recommended. Promotion of organic paddy markets at the local level, with fair trading and price guarantees, as well as organic rice markets in country are also necessary. The attitudes towards conventional problems are highly significance for adoption of organic agriculture; therefore, the conductibility on the improvement of problem-solving capacity should be considered in approaches and contents of extension service.

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