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The Effects of Economic Factors and Knowledge Management Practices on the Productivity of Small Farmers in the North of Thailand

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Abstract: To analyze the effect of the use of factors of production on productivity of small farmers who use <8 acres of land distributed by Agricultural Land Reform Office in the North of Thailand, this research has two main objectives: to search for factors that affect the productivity of the small farmers and to study the role of knowledge management practices on the productivity of small farmers. Research results are: most farmers have primary school background (85%). They sold most of their products to middle man with prices set by buyers (80.6%). Main source of knowledge was from family members (80%). Knowledge was shared informally while they are in the field. About half of farmers still need external helps such as sufficient irrigation system and capital from the government. As indicated by estimated productivity function, significant factors comprise of labor, water, fertilizer, pesticide and knowledge management practices and the usage of fertilizer is considered to be the most important factor. Moreover, success groups of farmers that attained balance between productivity improvement and quality of life tended to practice all processes of knowledge management activities (acquiring, storing, adjusting, sharing and creating knowledge). Qualitative evidences also confirm that farming techniques, water and marketing are crucial factors for the improvement of productivity and overall income.

Key words: North of Thailand, marketing, labour, water, fertilizer

INTRODUCTION

In the world driven by transaction of products and information, the competitive advantage of an economy depends on the smart use of factors of production including knowledge. Under this circumstances, there are many evidences indicate that Thai agricultural sectors are facing comparative disadvantage for many reasons. Among those reasons are the scarcity of water, shortage of skilled labor and inefficient utilization of pesticides. To reverse those trends, water system infrastructure, pesticide reduction and proper government policies such as cross purpose market intervention should be implemented (Siamwalla, 1996; Poapongsakorn *et al*., 1998). Farmers in the land distributed by Agricultural Land Reform Office in Thailand have faced relatively the same problems. In some areas, the problems are more severe since many places are in deforested area and near the mountain.

This research aims to understand the practices of farmers in that specific area in the North of Thailand by analyzing factors that influence land productivity including labor, fertilizer, water, pesticide and knowledge management practices. The emphasis on knowledge factor comes from the fact that now we are at least at the beginning of knowledge based economy where the most important factor is knowledge not resources. The productivity of producers of any product can be measured by their ability to use and to create knowledge effectively. The concentration of the research is on small farmers because they are the majority of the farmers in the area and the quest for the improvement of the quality of life of this group of farmers by Thai government.

Objectives: There are two objectives for this research:

- To search for factors that affect land productivity of the small farmers in the North of Thailand
- To study the role of knowledge management practices in the production processes of the small farmers in the North of Thailand

Conceptual framework: Two objectives above base on the concept that with effective use of knowledge management practices in production, the overall productivity of farmers should be improved sustainably as demonstrated by Fig. 1.

Figure 1 shows that the context of the production process of small farmers composes of the impact of globalization through international trade and agreements

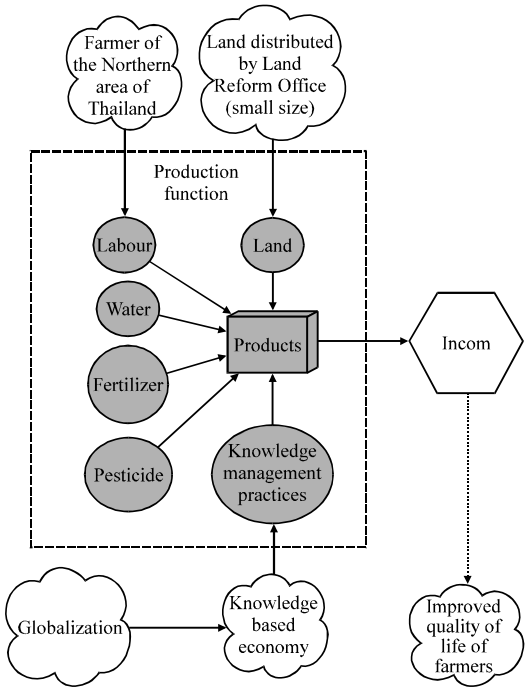

Fig. 1: Conceptual framework of the research

on one side and the effect of knowledge based economy and production technology on the other side. To improve and maintain their competitive advantage in the world agricultural markets, productivity improvement by the efficient use of factors of production including knowledge is really essential.

Many evidences show that knowledge management practices may not affect innovation directly (Karimi *et al*., 2014) but it affects productivity of an organisation directly (Constantinescu, 2009; Gyensare and Asare, 2012; Naik *et al*., 2014). However, knowledge sharing, a process in knowledge management processes is the source of both productivity and innovation because: it promotes interactions among workers through the use of information technology and other forms of communication, it is a tool for social cohesion, it could improve every processes of production, delivering the right information at the right time and it could bring cultural change to an organization. Larger firms may have higher chance of taking advantage by using modern technologies holistically with other tools. Generally, every processes of knowledge management help an organization produce new products and services by not re-inventing the wheel, avoiding past mistakes and generating new knowledge in the process.

In the community of farmers in Thailand, knowledge management practices are mostly in the form of knowledge sharing between farmer leaders and farmers in the community. Knowledge from both government authorities and from other sources will be disseminated first by leader. This is why leaders with strong knowledge management skills such as knowing how to collect customized knowledge by all means possible will help their community utilize those outside knowledge effectively. But when the knowledge is inside community, it will normally spread out informally among community members. At this point, sharing culture of that community will certainly play an important role. Therefore, it justifies us to include knowledge management practices directly into the production process, instead of embed it in human resources. However, supporting evidence on the effect of this type practices on the productivity of farmers in Thailand at the industrial and national level is still rare. This research intends to fill that gap.

MATERIALS AND METHODS

In the production process, farmers put together many factors including their labor, machines, water, fertilizer, pesticide, knowledge (such as knowledge of production management and marketing) and other unknown factors (regulations, local and international economic situation). All these factors will be organized by farmers and knowledge brought from outside to obtain the highest income possible (Kayser, 2015). Economist normally treats knowledge as technology embedded in labor or in an organization. In this research, knowledge will be treated as a factor managed by farmers of a community. Ability to manage knowledge effectively is believed to have direct significant effect on productivity (Constantinescu, 2009). As a result, production function can be written in the following form:

$$Q = f(L, Labor, Water, F, P, KM)$$

Where:

- Q = Income that farmers obtained from their land (unit: baht)
- L = Amount of land (15 acres or less) in the land reform area used by farmers (unit: acres)
- Labor = Number of workers worked in the farm since last year including workers hired by farmers (unit: person)
- Water = Cost of getting water for farming such as fuel expense (unit: baht)
- F = Cost of fertilizer spent for the crops last year (unit: baht)
- P = Cost of pesticide spent for the crops last year (unit: baht)
- KM = Knowledge Management practices last year (number of time attending seminar and meetings or "knowledge acquisition" in the knowledge management processes) (unit: number of time)

From this function, we assume static and linear relationship between land productivity of farmers and all factors of production defined above (Huang and Wu, 2010). To estimate linear regression using ordinary least squares technique, the productivity function can be written in the following form:

$$Q_L = f(Labor_L, Water_L, F_L, P_L, KM)$$

Where:

Q_L = Income per 2.53 acre of land (2.53 acre is equal to 1 "rai" in Thai)
$Labor_L$ = Labor per 2.53 acre of land
$Water_L$ = Cost of getting water per 2.53 acre of land
F_L = Cost of fertilizer per 2.53 acre of land
P_L = Cost of pesticide per 2.53 acre of land
KM = Number of time attending seminars and meetings (assumed to be constantover 1 year)

In order to reduce heteroscedasticity problems (variance of error terms are on constant), location variable were added. The function becomes:

$$Q_L = f(Labor_L, Water_L, F_L, P_L, KM, Place)$$

Place is the numerical variables that indicate location (province) where the farmers live. Data from the questionnaire were collected and used to calculate land and labor productivity of various groups of farmers and to estimate the productivity function. To confirm the results of this productivity function, we conducted 17 in-depth interviews with farmer leaders from each province. Questions in the interview include farmers' problems, the use of factors of production, knowledge management practices and help from government authorities.

RESULTS AND DISCUSSION

Quantitative analysis of this research were from the estimation of production function of the small farmers using the data of small farmers (with <15 acres of land) who live in the land of provided by Land Reform Office. Sample of 30 farmers were collected from 17 provinces in the North of Thailand. However, only 494 questionnaires were collected from the field. Time of data collection both from the questionnaire and in-depth interviews was between the end of 2013 and October 2014.

The productivity of farmers: The productivity of all provinces are shown in Table 1. With information on productivity above, we use qualitative information on the marketing management skills and knowledge management practices of farmers to separate them into 2 distinct groups, "advance group" and "external help group". Both groups are different in production and knowledge management techniques that as later supported by quantitative evidences lead to different income.

Advance group is the group that some farmers (such as farmers in Payao Province) could balance well between production efficiency and quality of life. They are using various knowledge management techniques in their production processes, starting with the relentless acquisition of knowledge and active knowledge sharing among group members. With their strong leadership, they managed to have high level of land and labor productivity on organic products and at the same time get extra income from other processed agricultural products. Some farmers (such as in Chiangmai, Tak, Pichit, Phitsanulok Nakornsawan and Uthaithani, province) in this group have strong leaders who are very active (but different styles and techniques) in knowledge management. They are still in the process of improving the quality of the products their community members seem to understand the important of knowledge and cooperate with their leaders well. The targets are within their sight. Several groups started to understand the important of knowledge and tried to obtain knowledge but their practices were still unsystematic. Problems concerning income were seen from several groups especially in the places with the problem of water resources.

External help group contains about half of province in the North (such as Maehongsorn, Prae, Phetchabun, Sukhothai Province). This group had some interest in the power of knowledge but still occupied with problems

Table 1: Productivity of small farmers in land of agricultural land reform office in the North of Thailand in 2013-2014

Orders	Provinces	Land productivity (income per 1 rai (1 rai = 2.53 acre) (Unit: Baht)	Labor productivity (income per one worker) (Unit: Baht)
1	Phetchabun	4.863	26.573
2	Sukhothai	6.167	21.875
3	Nan	6.408	11.671
4	Prae	6.761	24.853
5	MaeHongSorn	6.962	7.304
6	Lampang	7.209	30.627
7	Chiangrai	7.311	16.366
8	Kampangphet	7.400	13.425
9	Phitsanulok	7.497	44.650
10	Nakornsawan	7.532	38.286
11	Payao	8.722	25.508
12	Lampoon	9.083	24.304
13	Uttaradit	9.768	21.783
14	Uthaithanee	12.239	65.149
15	Chaiangmai	12.466	15.624
16	Tak	13.889	45.895
17	Pichit	16.852	46.736

from traditional way of production practices such as debt problems from higher fertilizer cost and single crop growing. Their knowledge management skills, especially for the leaders are low for example, they cannot identify sources of important knowledge and sharing knowledge within the community is limited.

The role of economic factors and knowledge management practices on income: Results on the estimated productivity linear regression are as: results of all 17 provinces in the North of Thailand:

$$Q_L = -9428.875 + 1126.410Labor_L^* + 6.958W_L^* + 1.953F_L^* + 0.784P_L^* + 267.912KM^* + 91.277Place^*$$

Number of observations = 434, F = 31.364 ($p<0.05$) and adjusted R^2 = 0.296. *Indicates that estimated coefficient is significant at 5% level. Results of advance group:

$$Q_L = -31818.143 + 2117.377Labor_L^* + 5.54W_L^* + 1.783F_L^* + 0.948P_L^* + 271.978KM^* + 235.351Place^*$$

Number of observations = 214, F = 16.590 ($p<0.05$) and adjusted R^2 = 0.304. *Indicates that estimated coefficient is significant at 5% level. Results of external help group:

$$Q_L = 4030.301 + 406.15Labor_L + 8.39W_L^* + 2.420F_L^* + 0.438P_L + 11.822KM + 3.229Place$$

Number of observations = 219, F = 10.748 ($p<0.05$) and adjusted R^2 = 0.211. *Indicates that estimated coefficient is significant at 5% level. Above equations show that in the case of the whole area and in the case of advance group, all factors including the use of land, water, fertilizer, pesticide and knowledge affect land productivity of farmers in the North. For external help group, only the use of water and fertilizer per land affect the productivity. This indicates inefficient use of labor, pesticide and knowledge of this group of farmers. Overall results confirm our belief that the most important factor for small farmers in the North of Thailand at present is fertilizer, water, labor and knowledge, respectively (considering its standardized coefficient) and knowledge management factor (knowledge acquisition in particular) could affect land productivity significantly.

CONCLUSION

From the estimated regressions and information we obtained from the interview, we come to the conclusion that:

- Current groups of farmers, who use land effectively, tend to have higher productivity of land and labor
- With the small amount of land, the use of fertilizer and water contribute to an increasing of productivity more than other factor of production. While farmers with higher management skills emphasizelabor, water and fertilizerrelatively the same to improve land productivity, farmers with lower management skill (external help group) tend to emphasize more on fertilizer and their productivity of land did not relate to the use labor, pesticide and knowledge management practice
- Since knowledge of agricultural practice is so complex, depending on context (place, time and body of knowledge), the government cannot service farmers the particular need of knowledge they really need. What government has done so far were helping selected leaders in the area with new knowledge. It is the sole responsibility of farmer leaders of the community to utilize that knowledge using all knowledge management skills they possess

IMPLICATIONS

Knowledge we gain from this research clearly indicate three important messages:

- Massive irrigation systems is desperately needed for all farmers, especially farmers that need external help
- Organic farming (start with safety agricultural products) should be systematically supported by providing the whole package of required knowledge along with practical knowledge management skills
- Farmers should treat knowledge as one of their strategic factor

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