Factors enhancing efficiency of microfinance performance in agricultural communities of upper Northern Thailand

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ABSTRACT

Efficient savings groups are envisioned to help in improving production capability and livelihoods of the local communities. The present study, thus, has the purposes to evaluate the operational efficiency of savings groups and identity determinants of performance efficiencies of 100 samples of savings groups operating in Chiang Mai and Chiang Rai provinces in the upper northern region of Thailand. Data Envelopment Analysis (DEA) method was employed for performance evaluation and the study found the mean efficiency score of all samples to be 0.464. The Tobit regression model application provided the results that the variables having positive relationships at statistically significant level with the operational efficiency of the savings groups were the number of group members, net profit as percentage of total assets, net profit as percentage of share capital, average loan size per member, share capital to total lending ratio, and the financial management capability of

the organizational committee; while the deposit-taking to total lending ratio had negative relationship with the performance at statistically significant level. These findings suggest that membership enlargement is imperative for enhancing the efficiency of savings groups due to the economy of scale. It is also recommended that government agencies or public sector entities, in their supports to foster the savings groups operation, place emphasis on providing training on management and administration for the group committee members rather than subsidy.

1. Introduction

Most developing countries in their economic development efforts have given priority to the agricultural sector before extending to other industrial sectors. However, the agricultural systems of these countries are fundamentally rural based and subsistence oriented with food security being the primary production goal and, hence, the farming households attain the low standard of living (John and Mellor, 1961). Consequently, many countries have attempted to promote the adoption of various production technologies for agricultural system development so as to maximize income from the production but they still encounter a major hurdle namely the inadequacy of funding sources to   provide support to poor farmers. To deal with this obstacle, a system of community financial institution or the commonly called microfinance group or organization has been introduced as a solution tool as it is the financial source for low income households to take loans for investment in their   economic   activities (Aubert, 2009), leading to the increase in agricultural outputs and income and the poverty reduction among farming households (Morduch, 2000; Khandker, 2005). Furthermore, the lending operation of the microfinance or savings group is instrumental for investment loan dispersal to the rural areas (Morduch, 1995), household employment generation (Zeller, 1999), allocation of the organization's profit for establishment of welfare fund for disaster reliefs of its members (Hiatt and Woodworth, 2006; Hisako, 2009), as well as for restoring the economy effectively from the depressed regime (Weiss and Montgomery, 2005).   For the above reasons, governments of many countries especially those in African region have used microfinance institutions as a means to solve poverty problems of the poor households particularly those in the agricultural sector(Kevane and Wydick, 2001) and many countries were successful in this endeavor such as Bangladesh, Ghana, some other countries in the African continent, including Malaysia and China in Asia. However, it was cautioned that the national government should avoid its intervention in the operation of savings groups in its attempt to use the latter as a mechanism to destroy the poverty circle (Morduch, 2000). In Thailand, microfinance organizations or savings groups can be classified into two main categories: savings group for production and credit union covering 23,652 and

1,337 organizations, respectively (Community Development Department, 2011; Credit Union of Thailand League Limited, 2011).

The rural sector in the upper northern region of Thailand remains quite weak in terms of economic structure with the majority of its population taking farming as the main occupation and living in poverty (NESDB, 2009). Hence, some government agencies as well as private entities have provided various supports to encourage people in the rural communities to form and establish their community financial organization or "microfinance group" which is commonly called as "savings group" (in the present study, these two terms will be used interchangeably). The savings group in each community may be established under different names such as savings group for production, credit union, village bank, and savings commitment group but all share the same primary objective of functioning as a financial source for farmers to get loans for investment. Nevertheless, it should be noted despite the growth in the number of savings group establishments throughout the upper northern region every year (Cooperative Promotion Department, 2008), the proportion of households living in poverty continued to grow (NESDB, 2009). Problems encountered by the savings groups are one or combinations of the followings: inadequacy of working capital to answer the demand of members particularly in the initial years of operation; management and administration difficulties, lack of sustainable organizational structure, lack of holistic management and administration system, and having no legal status among the large-sized organizations; cheating, embezzlement, inefficient group management, lack of accounting knowledge on the part of personnel, and the low priority in government's support(Patamawadee Suzuki, 2009).

Consequently, it becomes crucial to find out the performance efficiency of various savings groups operating in the upper northern region and the determinants of their operational efficiencies because from the theoretical point of view and certain countries' experience, the efficient microfinance organizations can lead to a better quality of life of the farming households, a reduction in poverty incidents, as well as help contribute to the national economic development on the basis of healthy and sustainable agriculture.

2. Objectives of the study

    2.1) To find out the operational efficiencies of savings groups operating in agricultural communities.

    2.2) To identify the variables affecting the pertinent performance efficiency.

3. Literature review

3.1 Efficiency concepts

Studies on the efficiency of financial institutions were undertaken extensively during 1990's (Berger and Humphrey, 1997) using either stochastic frontier analysis: SFA, a parametric technique, or data envelopment analysis: DEA, a non parametric approach. Most studies on the efficiency of financial institutions particularly in the context of developing countries, however, were based on DEA models (Das and Ghosh, 2006).

The non-parametric study of efficiency by DEA method involves no parametric assumptions about the functional form of the frontier line but generates the efficiency frontier from the "best" linear combination of input-output sets of all firms under investigation. Thus , DEA approach can avoid the problem of model misspecification (Miller and Noulas, 1997; Resti, 1997; Fried et al., 1999). It is a multi-factor productivity analysis model involving the relative efficiencies of a homogenous set of firms or decision making units : DMUs that use n input factors to produce m output products. The efficiency score of each DMU is measured by the weighted sum of outputs and the weighted sum of inputs ratio. Most input-output relationships from DEA models application exhibit the variable return to scale: VRS nature due to the facts that some DMUs are not operating on the optimal scale, or they are producing outputs under imperfect competition condition or being restricted by government regulations or financial capacity (Coelli et al., 2005). (Therefore, the case of constant return to scale is excluded from consideration).

Apart from its advantages as mentioned above, the DEA method appears more superior to the SFA technique as it can be applied to investigating DMUs that produce many products using a given set of inputs while the latter is applicable to the case of single output or industry only. Although the DEA method has many advantages and is simple for use in the studies that have limited number of samples, researchers still have to pay attention to the choice of appropriate models which fall into two categories according to the production objectives: output oriented study when input factors are limited and input oriented study when output products are already set (Coelli et al., 2005).

3.2 Determinants of performance efficiency of savings groups

Previous studies revealed the operational performance could be attributable to various factors and those have been supported by several empirical evidences can be summarized as presented below.

The first set of factors is of institutional or organizational ones. Findings from previous researches clearly indicate that skills and knowledge as well as capability of committee members are most crucial in determining the group's performance efficiency (Josefson, 2004; Nieto et al., 2007). Because loans are generally made without collateral security requirement but primarily done on the basis of mutual trust among members,

trustworthiness of group members becomes highly important particularly that of those borrowers (Casson,2006). Another important factor is the existence of a cross-check system regarding members' behaviors like their utilization of loans whether or not according to the borrowing purposes (Arun, 2005;Hermes et al., 2005). Also important are the members' participation and cooperation in various group's management affairs and activities like taking part in policy making or rules and regulation setting process, and attending meetings to express ideas or propose guidelines for the development of the organization (Hartarska, 2005;Westover et al., 2008). The organizational administration and management features can also affect operational performance, such as policies which are set to be appropriate for and compatible with the needs of members, and financial services provision to serve the needs of members suitably and adequately for examples by designing convenient and speedy financial services and maintaining good financial solvency (Harrision et al.,1998;Zeller, 2004; Casson, 2006).

The second set involves economic factors which can be distinguished into three categories: 1) the members' economic behaviors and conditions encompassing the investment patterns of the borrowers whether or not compatible with the existing socio-economic and environmental situations (Westover et al., 2008) as their investment decisions will have implications for their potential production outputs and income from the investment activities as well as their household consumption level because the returns from investment will be a determinant of consumption level, and the level of the cost of living which according to the results of previous studies is another important variable affecting household savings (Thapa et al., 2005); 2) the savings group's economic situations including primarily the capital fund of the group (Hartarska et al., 2005) and the subsidy and donation from external sources especially NGOs that commonly make as grant-in-aid (Herme et al., 2005). Furthermore, the low operating cost of the group can help increase the group's profit hence allowing greater extent of cost-free working capital and greater flexibility in setting the interest rates for members' saving and borrowing (Westover et al., 2008) as revealed in various studies in the past that the loan interest rates of microfinance groups were set lower than those of other financial institutions (Casson, 2006); and, 3) external factors comprising the socio-economic structure, public infrastructure, as well as economic climate which all have effects on the investment outcomes, and the government policies which might be the intervention to the extent impairing the independent operational decision making of the organization or the establishment of rules and regulation for running the organization - (Hartarska, 2005).

The final set involves social factors including the caring and sympathetic attitudes of one toward other social members which is a social capital highly desirable for local financial group formation and functioning (Vanroose, 2008), and the local community's culture and traditions which meanwhile are the element reinforcing the harmonious relationships among savings group members (Casson, 2005; Thapa and Rasul, 2005; Vanroose, 2008). All these are positive contributory factors for efficient operational performance of savings groups.

3.3 Savings groups in northern region of Thailand

The most prevalent and popularly formed savings groups in northern Thailand are in two categories: credit union promoted by non-government organizations and savings group for production supported by government agencies. Statistics in the recent three years revealed the increasing trend of microfinance groups, overall memberships, and aggregate share capital; however, number of organizations and members in credit union category tended to grow relatively faster compared to the case of savings groups for production while the growth of share capital in the savings group category took place at relatively higher rate (Table 1).   In the aspect of organizational administration, credit unions were found to execute the standard business practice in both the lending procedure and the book-keeping system as they have constantly been supervised and supported by the Federation of Savings and Credit Cooperatives of Thailand Ltd. while the savings groups for production (which from now on will be called production groups) appeared to have unsystematic management and administration process letting the community leaders handle most business affairs, without continuing supervision and support from the implementing government agencies. The microfinance groups in both categories, however, are seen to remain facing the problem of lacking a holistic nature of management and administration to deal with the contemporary social and economic situations (Patamawadee Suzuki, 2009).

TABLE 1. Number of organizations, memberships, and share capital of microfinance groups in northern region

Item	2007			2009		
	CU[1]	SG[2]	Total	CU[1]	SG[2]	Total
Number of organizations (groups)	118	8,986	9,104	126	8,994	9,120
Memberships (thousand)	99	976	1,075	139	1,134	1,273
Share capital (million baht)	2,660	2,259	4,919	3,546	4,649	8,195

Note: CU refers to credit union, PG refers to production group
Sources: [1] Cooperative Promotion Department, 2011
              [2] Community Development Department, 2011

4. Materials and method

4.1 Study areas and samples

In the upper northern region, Chiang Rai and Chiang Mai provinces are the areas having largest number of savings group establishments, 482 and 392 organizations, respectively (Department of Local Administration, 2010) and are the two largest agricultural provinces in terms of farming household coverage as well as farm land area covering 1,942,364 and 1,240,359 rai, respectively (Office of Agricultural Economics, 2010). These two provinces thus became the target areas for the present study. The samples were determined on the basis of proportional distribution of memberships to

form a total 100 samples size, and consequently 31 credit unions (19 in Chiang Mai and 12 in Chiang Rai) and 69 production groups (20 in Chiang Mai and 49 in Chiang Rai) were identified.

4.2 Data analysis

The present study applied the widely used two-step analytical approach to examine the technical efficiency and the factors affecting efficiency of the firm.

Step 1: Analysis of technical efficiency of savings groups (TE)

DEA technique was adopted, due to the multi-product nature of savings group operation and the small sample size of firms, as shown in the following model:

$$\max_{\phi} \theta = \sum_{k=1}^{m} \phi_k O_{kp} \tag{1}$$

$$\text{Constraint} \sum_{k=1}^{n} \phi_k O_{kp} - \sum_{l=1}^{m} \gamma_l F_{lp} \leq 0 \tag{2}$$

$$\sum_{k=1}^{n} \phi_k O_{kp} = 1 \tag{3}$$

$$\sum_{l=1}^{m} \gamma_l F_{lp} = 1 \tag{4}$$

$$\phi_k, \gamma_l \geq 0 \tag{5}$$

Where θ is efficient score of total saving group, O_{kp} is output k of saving group p, ϕ_k is weighted value of output k, where k 1,2…,n, and F_{ip} is input i of saving group p. γ_l is weighted value of input i, when $i = 1,2…,m$

The output-oriented model was employed for the reasons that the savings groups are producers having limited working capital mobilized mostly from member's saving deposits with some subsidy from external organizations and hence facing no interest payment expenditure (Matthew, 1998; Mohammad, 2003), and that they are operating by voluntary workers thus incurring no compensation expenses. The input factor variables (O_1-O_4) and output product variables (F_1-F_4) for the analysis are presented in Table 2.

Specifically, the output product variables are justified as follows:

Lending (O_1): the main objective of savings group operation is to provide loans to its members; therefore, lending is considered an important output.

Net profit (O_2): although savings group does not function with a focus on profit seeking, it needs to earn some profit to finance the business running costs and to use as welfare fund for its members.

Investment in other assets (O_3): although savings group operates with a main purpose of mobilizing financial capital for lending to its members, it can allocate some money for investment in other assets like putting savings in commercial bank to allow greater financial flexibility for the group and to get some returns from investment.

Welfare fund for members (O_4): this is an output from the successful operation of savings group as the organization can take care of its members.

Meanwhile, the input variables were determined on the following grounds:

Share capital (F_1): it is the most important source of working capital for all types of savings group and shares the greatest proportion compared to other financial sources in the total working capital.

Fixed assets value (F_2): fixed assets such as office building, office equipment are facilities for business operation and in the present study; this term is used as the proxy of service flow from the assets.

Borrowing (F_3): it is a source of working capital obtained from borrowing from other financial institutions like the Government Savings Bank as well as borrowing from deposits in saving and fixed accounts of its members.

Personnel (F_4): this is an important labor input for the functioning of microfinance organization and this variable encompasses two types of personnel, employed workers who are paid monthly salary to perform routine tasks and volunteer workers who come to work occasionally and receive compensation allowance.

TABLE 2: Variables in the efficiency study of savings group

Output (O)	Input factor (F)
O_1 = lending (baht)	F_1 = share capital (baht)
O_2 = net profit (baht)	F_2 =value of physical capital or fixed assets (baht)
O_3 = investment in other assets (baht)	F3= borrowing from institution or deposits of members in saving or fixed accounts(baht)
O_4 = welfare fund for members' benefits (baht)	F_4 = full time workers (person)

Step 2: analysis of factors affecting performance efficiency of savings group

The Tobit model for analysis of performance efficiency in the present study covered two main sets of variables, the economic variables (X1-X5) and the management ability variables (X6-X9) as well as a dummy variable (D) to distinguish the two categories of savings group. The model and the definition of variables are expressed as follows:

$$TE = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} D + \varepsilon \qquad (6)$$

Where TE is the technical efficiency estimated from the step 1 analysis.

Group size measured by membership number (X1) is to reflect the economy of scale and hence the efficiency of a particular group becomes the relative efficiency in the same production scale although it is also challenging for comparison across group sizes. From the present data sets, it was expected that size would vary positively with efficiency.

Percentage of net profit in the total assets value (X2) represents the organization's ability to create productivity from the assets from two grounds namely the assets quality suitable for the work load and the managerial quality of the executive staff. It was expected that X2 would vary positively with efficiency.

Net profit/share capital ratio in terms of percentage (X3) is indicator of financial management capability although share capital is a cost-free fund which can be utilized for loans allocation to members or for spending without time lag, similar to the utilization of in-deposits but which needs some time for accounting management. X3 was considered likely to contribute positively to the performance efficiency of the group.

Lending per borrower (X4) reflects the ability in financial management of the savings group to provide big loan to each borrower despite the limited financial capital and the normal loan ceiling. With fixed cost of processing loans, the larger the loan per borrower the lower the average cost per loan unit and therefore X4 should vary in the same direction as efficiency.

Money deposits of members to total lending ratio (X5) indicates the financial burden because this source of working capital has cost from paying interests while the other, share capital, is cost-free; and hence X5 should affect the efficiency negatively.

Organizational management and administration aspect involves qualitative variables to be assessed for quality in 6 scales from none (0) to very high (5) including the level of members' participation in the election of group committee (X6), the level of rules and

regulation enforcement in the management and administration (X7), financial management capability of the committee (X8), transparency in the management and administration by the committee (X9),   and the dummy variable (D) to represent different category of microfinance organization whereby D=1 in the case of credit unions which are supported by non-government organizations and D=0 in the case of production groups which are promoted by government agencies. It was presumed that the X7 - X9 and D variables would generate positive effect on the efficiency.

The estimated technical efficiency (TE) according to the model expressed by equation (6) will have the value in the 0-1 range and the appropriate model should be in the form of Two-limit Tobit and estimated by the Maximum-likelihood technique (Aree Wiboonpongse, 2006).

5. Results

5.1 General characteristics of the savings group under study

The general survey revealed that the credit unions outperformed the production groups on the average in all aspects despite the same capacity of full time workers (Table 3), for example, a credit union had as high as 1,203 members more than six times a production group did, received deposits in saving accounts and fixed accounts 25 times and 58 times respectively greater than the achievement of a production group, as well as had 24 times higher in total lending.

TABLE 3: Status of selected business performances on group average basis

Variables	PG	CU	Overall average
Membership (person)	158	1,023	426
Full time worker (person)	4	4	4
Lending to members (baht/year)	972,989	23,658,946	8,005,635
Value of land, buildings, and other fixed assets (baht)	75,767	2,265,164	754,479
In-deposits in saving accounts (baht)	321,874	8,068,410	2,723,300
In-deposits in fixed accounts (baht)	95,609	5,559,256	1,789,340
Shareholder (baht)	652,885	12,285,872	4,259,111
Accumulated profit (baht)	32,583	769,938	261,163
Welfare fund for members(baht/year)	8,364	229,104	76,793

Source: survey

5.2 Operational efficiency of savings group

The results of DEA model application revealed the highly heterogeneous efficiency levels among savings group under study which range from very high (0.81-1.0) to very low (lower than 0.21) and apparently quite poor on the average with the average weighted TE score of 0.464 and with the majority of samples (34%) congregating within 0.21-0.40 range of technical efficiency (Table 4). However, there were 21% of all savings group operating at very high efficiency level. It should be noted in general the credit unions performed better than the production groups as suggested by the evidence that 38.71% of credit unions in the present study were evaluated to have high-very high efficiency levels while only 26.09% of those production groups performed at par excellent extent. Furthermore, the majority of the production groups (62.32%) appeared to operate in the low and very low ranges of technical efficiency. Meanwhile, the average TE score of credit unions was also higher than that of production groups (0.531 and 0.434, respectively).

The rather low operational efficiency of savings group on the average   was due to the present of input surplus which implies that certain input factors could be saved for other uses without upsetting the prevailing overall output level. This study found that 47% of all savings group experienced input surplus. Specifically, 36% of total savings group had underemployed fixed assets amount to 1,254,985.60 baht per group on the average, totally 14% had unexploited borrowing and members' deposited money equal to 2,456,672.10 baht/group, totally 12% could have saved 46,640.60 baht/group if they could cut down labor employment, and totally 8% had underutilized share capital at the magnitude of 442,705.30 baht per group in contrast to the high-very high efficiency credit unions which could make use of the share capital to the full capacity (Table 5).

In the aspect of business or production scale, the majority of the samples (69%) were found to operate with decreasing return to scale: DRS. Specifically, almost every credit union and 59% of the production groups were working in the DRS stage. Meanwhile, 32 % of the production groups appeared to experience increasing return to scale: IRS as they deposited their working capital in commercial banks since they still provided lending to members to a rather small extent. It would be better for them to extend more lending to their members so as to earn more interest from loans that their members borrow for production investment purpose.

TABLE 4. Efficiency levels of savings group by category

Efficiency level		PG			CU		
Score	Interpretation	Amount	%	Average TE	Amount	%	Average TE
0.81-1.00	Very high	16	23.19	0.991	5	16.13	0.921
0.61-0.80	High	2	2.90	0.612	7	22.58	0.667
0.41-0.60	Moderate	8	11.59	0.489	9	29.03	0.495
0.21-0.40	Low	25	36.23	0.291	9	29.03	0.295
0.00-0.20	Very Low	18	26.09	0.095	1	3.23	0.088
Total		69	100	0.434	31	100	0.531

Source: from calculation

TABLE 4. (cont.)

Efficiency level		Total		
Score	Interpretation	Amount	%	Average TE
0.81-1.00	Very high	21	21.00	0.974
0.61-0.80	High	9	9.00	0.655
0.41-0.60	Moderate	17	17.00	0.492
0.21-0.40	Low	34	34.00	0.292
0.00-0.20	Very Low	19	19.00	0.094
Total		100	100	0.464

Source: from calculation

TABLE 5. Surplus inputs of savings group

Input		TE levels)CU)[1]				
		Very high	High	Moderate	Low	Very Low
Share capital (baht)	Amount	0	0	1	1	0
	%	0.00	0.00	3.23	3.23	0.00
	Average	0	0	402,088	402,088	0
Fixed assets (baht)	Amount	2	2	5	2	1
	%	6.45	6.45	16.13	6.45	3.23
	Average	3,900,201	2,030,927	5,300,624	652,886	2,449,185
Borrowing and members' deposits (baht)	Amount	0	1	1	0	1
	%	0.00	3.23	3.23	0.00	3.23
	Average	0	8,232,470	11,350,489	0	249,483
Salary expense (baht)	Amount	2	1	4	2	1
	%	6.45	3.23	12.90	6.45	3.23
	Average	93,873	132,997	82,061	11,942	145,002

Note: (1CU = credit union, PG = production group
        (2percentage of samples in each category of savings group
         (3input slack
Source: calculation.

TABLE 5. (cont.)

Input		TE levels)PG)[1]				
		Very high	High	Moderate	Low	Very Low
Share capital (baht)	Amount	1	2	2	1	0
	%	1.45	2.90	2.90	1.45	0.00
	Average	1,376,231	1,488,797	462,709	295,140	0
Fixed assets (baht)	Amount	2	3	3	11	5
	%	2.90	4.35	4.35	15.94	7.25
	Average	163,517	824,033	94,662	342,773	691,249

Input		TE levels)PG)[1]				
		Very high	High	Moderate	Low	Very Low
Borrowing and members' deposits (baht)	Amount	1	3	3	3	1
	%	1.45	4.35	4.35	4.35	1.45
	Average	2,531,910	890,442	382,648	713,822	215,457
Salary expense (baht)	Amount	0	1	1	0	0
	%	0.00	1.45	1.45	0.00	0.00
	Average	0	307	224	0	0

Note: (1CU = credit union, PG = production group

(2percentage of samples in each category of savings group

 (3   input slack

Source: calculation.

5.3 Factors affecting performance efficiency of savings groups

The application of Tobit model suggested the inclusion of eight explanatory variables instead of the 10 hypothesized ones, dropping X6 and X7 which are highly correlated with X9 to deal with multicollinearity problem (simple correlation greater than 6.0). From the model evaluation, the model with eight explanatory variables had AIC value lower than that of the one with 10 explanatory variables. The estimation of the optimal model revealed that seven out of the eight included variables have the effect on the efficiency level of the savings groups at 0.01 statistically significant level, excepting the dummy variable which has the influence only at 0.05 level (Table 6). The variable in the model that had no effect on operational efficiency was the transparency in the management and administration by the committee (X9). From the committee's perspective, some decisions or actions should not be disclosed to members for examples the interest payment reduction, the extension of loan repayment term, as well as the reduction in repayment per installment for borrowers having repayment difficulties; the information disclosure might cause some managerial complications.

Ability in assets management is another crucial source of efficiency improvement as suggested by the estimation that a one percent increase in net profit to total assets ratio (X2) will result in the elevation of the efficiency level of the savings group by 0.455; therefore, the proper management of assets particularly in terms of lending will be an important generator of the group's revenue.

The ability of the committee in financial management (X8), if just improved to the next level will contribute to efficiency improvement by 0.088. Hence, the managerial capability of the committee especially in motivating the group members to gain the awareness of their ownership standing in the organization so that they have vested

interest in the group and fully get involved in the group's business and contribute effectively to the group's efficiency performance.

The capability in the management of borrowed capital, getting more funds from external sources for on-lending, is critical for efficiency enhancement. The finding from this study indicated that the enlargement of loan size by 100,000 baht per borrower (X4) would lead to an increase in efficiency by 0.086 because lending is a main source of the group's revenues. The enlargement of lending capacity not only generates additional revenue to the organization but also enables the borrowing members to make greater farm investment. The operational efficiency is indeed attributable to the group's ability to fully answer the credit needs of its members without letting them depend on extra loans from other sources.

Between the two categories of savings group, however, the credit unions had efficiency score higher than the production groups on average by 0.069 because the former had a relatively well-defined management system due to the continuing supervision and support given by the Federation of Savings and Credit Cooperatives of Thailand, Ltd.

The net profit to share capital ratio (X3) reflects the ability in capital management with speedy manner and at no cost. A one percentage increase in this ratio will increase the group's efficiency score by 0.061 because share capital is the fundamental source of working capital which incurs no interest payment cost and the more the lending made from share capital source the greater the profit. The present study still found the low impact of this determinant on the efficiency extent due to the fact that 15% of the savings groups had rather large surplus of share capital.

Meanwhile, a one percent increase in deposits received from members (X5) will lower the efficiency score by 0.044 as the received deposits has cost in terms of interest payment and because the depositing schedules and the loan disbursement times are not in compatibility resulting in the existence of out-going interest payments without in-coming ones from lending activity in certain period of the year. Since promotion for members' savings with the group is one of the operational objectives, reduction in this ratio cannot be the solution and the savings group has to find other means to improve efficiency.

The economy of scale accounts quite little for efficiency gain. From the estimation, a 100 increase in memberships (X1) will improve the efficiency score by 0.007 only. Although the number of members is the indicator of the group's business size as members are both the source and the users of the fund the more the members the greater the extent of working capital and lending, the impact of business size on performance is relatively trivial compared to the assets management ability and the proper composition of various capital funds.

TABLE 6. Factors effecting efficiency of saving groups by Tobit Model

Variables	Coefficient	t-test	Marginal Effect	t-test
Contant	-0.014	-0.150	-0.014	-0.150
X_1	0.00008***	3.476	0.00007***	3.479
X_2	0.501***	2.502	0.455***	2.504
X_3	0.067***	4.787	0.061***	4.797
X_4	0.095***	4.586	0.086***	4.581
X_5	- 0.048***	-5.133	-0.044***	-5.130
X_8	0.097***	4.573	0.088***	4.586
X_9	- 0.021	-0.781	-0.019	-0.782
D	0.076**	1.960	0.069**	1.963

Note: ***Significant at 0.01, **Significant at 0.05
Source: from calculation.

The empirical findings on the relationships and the effects of various determinants in explaining the performance efficiency of microfinance groups in agricultural communities in upper northern Thailand have provided the basis for making policy recommendations for efficiency enhancement as follows:

(1) Savings group must manage to improve its net profit to total assets ratio. As the major component of the group's total assets is working capital, the group must utilize it for maximum income. Maximum income is not originated from charging the possible highest interest rate for loans but rather should come from the increase in the capacity of share capital-based working capital which involves no increase in interest payment cost and from the effort to extend rotational credits from this base to members continually. Some savings groups, for working capital, depend also on deposits received from members which must be retained partially for potential withdrawal and this narrows the opportunity both for lending to the needy borrowers and for making more income.

(2) Attention should be paid to strengthening financial management capability of the group committee as this will directly strengthen the efficiency of the organization. The necessary knowledge and expertise concerning financial management the committee members should possess include the ability to seek low cost working capital particularly by means of mobilizing share capital from members both those who have credit demand and those who have no credit demand. Some savings groups have utilized social capital –relation and value- encouraging the wealthy in the village, who have no need for borrowing, to save their wealth in terms of share capital with the groups which helps enlarge the working capital. This act of the rural wealthy enables the savings group to provide lending to the economically poor members who need large loans in the amount exceeding the share capital they hold. Furthermore, the committee members should have knowledge in loan application analysis and loan supervision after

giving loans to the borrowers to prevent misuse of the money which is a cause of bad debts.

(3) Net profit to share capital ratio should be increased because share capital is the most important source of working capital. The savings group must find the ways to manage its share capital to attain most benefits, for example, through the enlargement of loan limits or diversification of loan types to support the investment and life quality improvement of farmers. Although the afore-mentioned undertaking might be more risky than depositing the share capital with other financial institutions, it renders greater benefits in terms of higher interest earnings for the group and answering better to the needs of members. The only reservation is that the committee members should have sufficiently sound knowledge and expertise in financial management.

(4) The deposits received from member to lending ratio should be lowered. This is because between the two main sources of working capital, the share capital involves no cost permitting the setting of not too high loan interest rate to relieve the interest payment burden of the borrowing members while the deposits received from members has a cost from interest payment to the depositors. In the case of reliance on members' deposits for working capital, with the lack of skills or capability in financial management, the savings group will incur heavier operation cost and probably earn lower profit as well as loss its solvency soon after large withdrawals particularly if it has limited working capital. In a nutshell, it is a good policy to mobilize share capital more than members' deposits as far as possible for use as working capital.

(5) Attempt should be made to increase memberships as members are both the source and the user of working capital. The smaller the number of members, the smaller the business volume. On the contrary, the more memberships, the more working capital, hence the greater extent of lending. Therefore, group memberships carry a heavy weight in the performance efficiency of microfinance group.

6. Conclusions

Credit unions have larger business size and perform better than production groups on average despite the comparable number of full-time office workers, and thus the former become relatively more efficient. In financial management, the savings groups in general faced the input surplus situation predominantly in terms of fixed assets, borrowing and received deposits, wage payment, and share capital. The mean efficiency of all savings groups is extremely low (0.464). While 21% of them had the efficiency scores in 0.81-1.00 range, more than half of the overall samples had efficiency levels as low as or lower than o.40. Apparently, the microfinance groups, regarded as the credit source close at hand for rural farmers with their presumably imminent role in helping local community development and self-reliance, still face so many difficulties that they have to deal with. Nevertheless, many savings groups do have the opportunity to learn from the experiences of the successful organizations and can use the efficient units in DEA as benchmarks for improvement.

Finally, this study proposes the guidelines for the improvement in performance efficiency of the savings groups in upper northern Thailand as follows: (1) find means to improve the net profit to total assets ratio, (2) enlarge loan size per borrower, (3) attempt to increase the net profit to share capital ratio, (4) invite, or campaign for, more memberships, and critically (6) enhance the financial management capability of the committee members.

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