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Evaluation of the operational efficiency of village development fund in Champasak Province, Lao PDR

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Village Development Fund (VDF) is a microfinance institution that has been established across Lao PDR since 1997. This study assesses and compares operational efficiency of the VDF in urban and rural areas of Lao PDR. Data envelop analysis (DEA) approach was used to analyze operation efficiency of VDF in Pakse (urban) and Bachieng (rural) districts of Champasak province in 2010. The result showed that the VDF, on average, had technical efficiency scores under constant return to scale and variable return to scale of 0.87 and 0.90, respectively. The fund had the scale efficiency of 0.97. The VDF in rural areas, despite their small sizes and location in poor infrastructure and public facilities, were more efficient than those in urban areas. The main input factors contributing to inefficiency were number of staff and operating costs, while output factors contributing to inefficiency were the contribution money and financial revenue. Most of the VDFs in rural areas also had better repayment rate than those in urban areas. To improve operational efficiency of VDF in Lao PDR, it is important for the management to search for optimum scale of operation. There is a need to improve skill in operation and reduce operating costs. Balancing contribution to social welfare and ensure financial return is also a key to efficiency improvement. Finally, social norms and measures would also enhance responsibilities and transparency among members and hence improve the operational efficiency of the VDF.

Key words: Operational, efficiency, village development fund, Champasak province, Lao PDR.

INTRODUCTION

As we know, poverty is the main issue of most developing countries throughout the world. Topics on hunger, threat, lack of basic need (clothes, televisions, motorbikes), and lack of permanent housing are being discussed across the world. Nowadays, nearly 1.8 billion people in Asia's citizens live on less than \$2 a day (Asian Development Bank, 2011).

Lack of credit is one of the major obstacles faced by poor people to enhance their productive capacity. Without capital, people cannot invest in productive activities, expand existing businesses, satisfy consumption when needed, thus significantly limiting their chances of escaping from poverty (Pagura, 2004). Microfinance was set up in many countries around the world such as Latin America, Europe and Asia as a policy tool to enhance the access to credit among the poor (Darachanthra, 2003). Design, structure and organization of microfinance vary among countries depending on their socio-

economic and institutional characteristics. They are also called by different names, for instance, it is called Grameen bank in Bangladesh, Bank Rakyat in Indonesia, Self Help Group in India or Village Fund in Thailand.

Similar to other developing or least-developed countries, rural poverty and disparity among social groups and regions are the most urgent problems in Lao PDR. Urban areas of Lao PDR are relatively well developed than rural areas in both economic and social aspects. With better physical and economic infrastructure, the urban poor have greater potential to improve their income, compared to the rural one. The rural households, on the other hand, live in relatively poor

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Table 1. Number of members and amount of savings and loans of the VDFs in Pakse and Bachieng district, Champasak province, 2010.

S/N	Name of district	Village (number)	Member saving (persons)	Total saving (million kip)	Members borrowing (persons)	Total loan (million kip)
1	Pakse	42	8,400	9,890.55	4,665	9,853.97
2	Bachieng	39	4,291	918.76	1,954	903.96

Source: Office of Political and Rural Development (2010).

developed areas; rely on rainfed agriculture and lack of other economic opportunities or social support. Many areas are accessible only in dry season. Hence, a larger proportion of people in rural areas are under poverty line compared to those in urban areas. The Lao government has implemented the National Poverty Eradication Programme (NPEP) aimed at helping the poorest groups by improving the basic needs such as health services, primary education, infrastructure and agricultural products, with the target to graduate from its Least Developed Country status and meet the Millennium Development Goals (MDGs) by 2020.

Village Development Fund (VDF) is a specific type of microfinance developed by the government of Lao PDR to mobilize the local resources and management to foster rural development and poverty eradication. The government provides general principles and guidelines, training and technical supports to the local community to establish and operate the VDF. The VDF was established in 1997 and has been expanded across the country since then. As of 2009, there were more than 3,314 VDF establishments in Lao PDR.

Following the general principles, VDFs in Champasak province, Lao PDR have the roles to promote saving and provide credit facility to their members. Each VDF has a management committee and an advisory committee. The VDFs require their members to deposit as saving at a minimum of 5,000 kip (\$6.25) per month. The members can borrow loans at an interest rate of between 3-5% per month.

The loanable amounts are subject to their eligible deposits. The VDFs earn incomes from the interests of loans. Income of the VDF is distributed as dividend to the share holders, compensation to management and advisory committees, VDF reserve and contribution to village development and other social welfare of the communities.

Development of VDFs between urban and rural areas varies. The VDFs in urban areas are generally larger and better established than those in rural areas. Many factors could contribute to this. Among them are physical infrastructure, public utilities, economic and social opportunities and active participation from high income groups. For the Lao PDR, rapid progress from poverty level in urban areas is also observed.

Pakse district in Champasak province is referred to as an urban area because there is good infrastructure and

facilities, and there is a nearby hospital or healthcare service. The people working in Pakse district have different occupations, for example, government staff, business, civil service, private sector, etc. The average per capita income in Pakse district year 2011 was more than \$1,500 mostly from non-agriculture (Department of Planning and Investment, 2011). The total household living in Pakse is 12,798 and the poverty rate decreased from 0.7% in 2004 to 0% in 2008 because the people working in Pakse district are into different occupations, that is, business, civil service, private sector, etc. In 2010, the total members of village development fund in Pakse district was 8,400 members with a total loan size of nearly 10 billion kip (Table 1).

In contrast, Bachieng district is one of the poorest districts in Lao PDR in which most people are farmers with low income and limited investment capacities, and majority of them are from the ethnic groups. This district is a rural area because the people lived far from the market, there is poor infrastructure, lack of facilities, lack of healthcare service, and their road cannot be used in two seasons. Development of VDFs in rural areas is generally slow.

The sizes of funds in Bachieng are normally much smaller than those in Pakse district. The total fund of VDFs in Bachieng was about 918.76 million kip with 4,291 members and the loan size is about 904 million kip in year 2010 (Table 1).

In addition to public infrastructure, utilities and economic and social environment factors, the progress, scales and the roles of VDFs between rural and urban areas are also due to their operation and management capacities and capabilities. This study aims to compare operational efficiency of VDFs in urban and rural areas of Champasak province, Lao PDR.

LITERATURE REVIEW

Operational efficiency can be measured by both parametric approach (Stochastic Frontier Analysis) and non-parametric approach (Data Envelop Analysis). The Stochastic Frontier Analysis was characterized with a composite error term of the estimated production function, and this composite error term consists of a random error component and a non-negative inefficiency component. For this study, the non-parametric approach (DEA) was used to measure the operational efficiency.

According to the literature, it was found that DEA is commonly used in financial sector and microfinance (Hong and Khanam, 2003). DEA involves the calculation of efficiency by comparing the inputs/outputs ratio of each firm with a piecewise surface, representing fully efficient operation, constructed from the data set by linear programming (Coelli et al., 1998).

Data Envelop Analysis (DEA) is a non parametric method and commonly used and applied in many fields. For instance, Ramesh et al. (2001) compared the efficiency of grand-in-aid hospital and public hospital and the relative efficiency of government and not-for-profit sectors. Gimenez (2000) measured operating efficiency of 16 restaurants in Spain, and Afonso and Aubyn (2005) used non-parametric approach to analyze education and health efficiency in OECD (Organization for Economic Co-operative and Development) countries.

In the financial sector, DEA is a common tool used to measure the financial efficiency. Farrell (1957) proposed that the efficiency of a firm consists of two components: technical efficiency, which reflects the ability of a firm to obtain maximal output from a given set of inputs, and allocative efficiency, which reflects the ability of a firm to use the inputs in optimal proportion, given their respective prices and the production technology. These two measures are then combined to provide a measure of total economic efficiency. These are usually termed input-output oriented measures.

Charnes et al. (1978) proposed a model which had an input orientation and assumed constant return to scale (CRS). The CRS specification is used when not all firms are operating at the optimal scale. Other papers have considered alternative sets of assumptions, such as Banker et al. (1984) who suggested an extension of the CRS DEA model to account for variable return to scale (VRS) situation. The use of the VRS specification permits the calculation of technical efficiency devoid of these scale efficiency effects.

The paper measuring efficiency that used both methods (parametric and non parametric) to compare efficiency of microfinance is that of Nghiem et al. (2006). The study compared stochastic frontier analysis, parametric linear programming, and data envelop analysis technique in measuring microfinance efficiency in Vietnam. Consistency comparison between stochastic frontier analysis and parametric linear programming techniques in financial and operational microfinance in Vietnam is also conducted. Inputs are divided between labor and non-labor in value terms. Three outputs identified in their study are number of depositors, borrowers and groups. Based on technical efficiency scores, the study concluded that DEA and parametric linear programming techniques are better than the stochastic frontier analysis technique.

Since then, a large number of papers have extended and applied the DEA methodology, using different inputs and outputs to analyze efficiency in microfinance.

For instance, Qayyum and Munir (2006) assumed constant returns to scale and variable returns to scale technologies with labor, capital and payable interest on deposit as inputs and loans and financial investments as outputs to measure efficiency of microfinance in Southeast Asia. On the other hand, Nieto et al. (2009) used assets, costs and employees as inputs, and loans and revenues as two financial outputs to measure efficiency. In their study, women and index of poverty were also used as two social outputs in the analysis. Likewise, Ben (2008) used both CRS and VRS to measure efficiency. In his model, the number of staff and assets are considered as inputs, and the deposits and loans as outputs.

From the aforementioned papers, DEA is an appropriate and simple approach with good measurements in efficiency analysis of microfinance. This study adopts the DEA approach in the analysis of efficiency of VDFs in urban and rural areas of Champasak province of Lao PDR. The approach is appropriate to Lao PDR circumstance, particularly on availability of data and period of development of the fund.

METHODOLOGY

This study concentrates on two aspects of efficiency: financial and social efficiency. Financial efficiency is crucial for VDF operation because the fund is a self-support operation. Without financial viability, the fund will collapse. As a member, financial return is an important incentive to participate in the fund. An important objective of VDFs in Lao PDR is the contribution to communities' welfare, such as repairing schools, roads and medical centers, in addition to helping the poor to have access to financial resources. Achieving financial and social efficiencies simultaneously is a great challenge to the operation and management of VDFs in Lao PDR.

Three inputs and three outputs (two financial outputs and one social output) were selected to analyze the efficiency of the village development fund in Lao PDR. The three inputs are total amount of fund (kip), number of staff (person) and operating cost (kip), while the three outputs are financial revenue (kip), repayment money (kip) and contribution money (kip). They are summarized in Table 2.

The model used in the study is as follows:

$$Max\theta = \frac{\sum_j^{81} \lambda_j Y_{rj}}{\sum_j^{81} \lambda_j X_{ij}}$$

Subject to:

$$Input \quad \sum_{j=1}^{81} \lambda_j X_{ij} \leq X_{ij}; i = 1, 2, 3$$

$$Output = \sum_j^{81} \lambda_j Y_{rj} \geq Y_{rj}; r = 1, 2, 3$$

Table 2. Indicators used to measure V DF efficiency.

Variable (symbol)	Variable name	Definition	Unit
Input (TF)	Total amount of fund	Total amount of money in VDF	Kip
Input (S)	Number of staff	The total number of staff working in VDF	Persons
Input (OC)	Operating cost	Expenses related to operation, such as personnel, transportation, office supplies	Kip
Output (FR)	Financial revenue	Total revenue generated from gross loan portfolio plus other operating revenue	Kip
Output (RM)	Repayment money	Total repayment amount	Kip
Output (CM)	Contribution money	Amount of money from VDF donated to the community	Kip

Where θ : efficiency value, X: input, Y: output, i: number of input ($i=1,2,3$), r: number of output ($r=1,2,3$), j: number of village ($j=1,2,\dots,81$), and is weighted input and output in each village.

Data used

Pakse and Bachieng districts are used to represent urban and rural areas in Champasak province. This study covers all VDFs (81 establishments) established in Pakse and Bachieng districts of Champasak province, Lao PDR. Data are obtained from interviewing representatives of the management committees as well as from the business management records of the 81 establishments. The information collected is used to assess the operation and management especially on the structure, management rules, and operation and performance aspects.

General characteristics of the village development funds in Pakse and Bachieng districts

Champasak Province is located in the southern part of Lao PDR. It consists of 10 districts with a total population of 667,305 people. Of the total 639 villages, 423 villages have established and operated the VDFs of about 26.52 billion kip in 2010. Pakse district, representing urban area, is the most developed district of Champasak

Province, while Bachieng district, representing rural area, is one of the poorest districts of the province.

In 2010, Pakse district had 42 VDFs and Bachieng district had 39 VDFs. Basic characteristics of VDFs in the two districts are shown in Table 1. In 2010, the average sizes of the VDFs in the two districts were different substantially. With double of the number of members, total saving of VDFs in Pakse was ten times that of Bachieng district. The same is true for sizes of business, as indicated by the members who borrowed and the total

loans in 2010 (Table 1).

RESULTS AND DISCUSSION

Using DEA approach, the efficiency values were obtained for different indicators under variable return to scale (VRS) assumption. The following results show that the average efficiency value of the total 81 VDFs (42 urban and 39 rural) is very close to 1. Under CRS assumption, the average efficiency for 2010 was 0.875 and it increased slightly to 0.904 under the VRS. The average efficiencies between urban and rural areas were different with VDFs in rural area which was surprisingly more efficient (Table 3). It can be said that VDFs in Champasak province is generally efficient with most of the fund higher than 0.61 or 0.81. Under CRS, only 7 VDFs in Pakse district were inefficient with efficiency index of less than 0.41- 0.60. Despite its disadvantages in social and physical infrastructure and economic opportunities, VDFs in rural areas is more efficient than that in urban areas.

As shown in Table 3, as compared to the mean of efficiency for 2010, slightly less than one-half of the VDFs in Pakse district were fully efficient, about one-third was less efficient and the remaining was considered inefficient. The same conclusion was obtained for both CRS and VRS assumptions. On the other hand, most VDFs in Bachieng district were fully efficient. Only three VDFs were inefficient. If variable return to scale is used, it could be said that all VDFs in Bachieng district operated very well.

Factors affecting inefficiency of VDFs in Champasak province could be seen from the input and output perspectives. Table 4 shows input and output factors affecting the operation and management efficiency. For this particular analysis, VRS and output oriented are used.

Based on inputs contributing to the efficiency of VDFs

Table 3. The efficiency values of VDFs in Pakse and Bachieng districts, 2010.

District	Efficiency value	CRS (constant return to scale)	VRS (variable return to scale)	SE (scale efficiency)
Pakse (42 villages)	1	17	17	32
	0.81-0.99	11	11	10
	0.61-0.80	7	8	0
	0.41-0.60	5	4	0
	0.21-0.40	2	2	0
	0.00-0.20	0	0	0
	Mean	0.750	0.824	0.988
Bachieng (39 villages)	1	33	35	36
	0.81-0.99	2	3	0
	0.61-0.80	1	1	0
	0.41-0.60	0	0	0
	0.21-0.40	2	0	2
	0.00-0.20	1	0	1
	Mean	0.936	0.965	0.983
Mean	0.875	0.904	0.969	

Table 4. Input and output factors affecting the operation and management efficiency of Pakse and Bachieng districts, 2010.

Input type	Inefficiency due to amount of fund too high	Inefficiency due to number of staff too high	Inefficiency due to operating cost too high
Pakse	3 villages	17 villages	9 villages
Bachieng	1 village	2 villages	1 village
Output type	Inefficiency due to revenue too low	Inefficiency due to repayment too low	Inefficiency due to contribution money too low
Pakse	16 villages	5 villages	17 villages
Bachieng	2 villages		1 village

Note: Unless indicated, numbers in the cells refer to number of VDF establishment.

as shown in Table 4, number of staff is the main factor causing inefficiency to VDFs in urban areas of Champasak province. About 40% of the funds experienced inefficiency due to number of staff. Some VDFs also encountered operating costs as a burden to efficiency. It is notable that very few cases experienced total amount of fund causing inefficiency. In contrast, all three input factors in VDFs in rural areas performed well to support efficiency of the fund in 2010, with very few exceptions (Table 4).

The major outputs contributing to the efficiency of VDFs in Pakse district in 2010 were money contributed to social welfare and financial revenue. The contribution money represents the importance of the VDFs to social economic development at village level and hence it is an important indicator to measure VDF efficiency. However, because the share of VDFs in some villages are too small or not balance with the size of fund

or financial revenue, some villages spent less than average, as compared to total profit of the fund. This is the case of inefficiency for 20 villages in Pakse district. VDFs should not only contribute to the community but also need to operate profit financially. The numbers of inefficient village by financial revenue are 16 villages, or about 38% of the total 42 villages. For the repayment money indicator, it shows less problematic with about 12% of the total village fund that had the problem. Failure to repay the loans is mostly due to agriculture or business failure, although some are due to misuse of loans.

In contrast, Bachieng district is less problematic than Pakse in all aspects, as suggested by the overall efficiency indicators in Table 3. Only in three villages was inefficiency caused by contribution money and financial revenue. It is surprising to see that repayment for the

Table 5. Magnitude of output factors needed to increase and enhance operational efficiency of VDFs in Champasak province, 2010.

Output	Number of village	Money needed to increase* (kip/fund)	Target value to be efficient (kip/fund)	Proportion of money needed to target value (%)
Financial revenue	18	15,530,260	34,682,984	44.77
Repayment money	5	64,169,631	156,329,087	41.04
Contribution money	18	2,106,544	3,959,260	53.2

* Calculated from the inefficiency villages.

loans is not the problem in Bachieng district, despite the fact that the areas are rural, rainfed and vulnerable to climate variability. This could be due to the social factors in such small villages in rural areas that positively assist to repayment effort and negatively deter to default.

The DEA analysis could also identify the factors that need to improve to enhance operating efficiency of the fund. As shown in Table 5, to improve operational efficiency of the VDFs, especially in urban area of Champasak province, about 45 to 53% of revenue or contribution to social welfare money has to be increased. Similarly, the repayment money would also need to increase by more than 41%.

In summary, the operational efficiencies in Champasak province are good especially in variable return to scale with the value of 0.904. The scale efficiency of 0.969 means there is no problem with scale efficiency of VDFs in Champasak province. VDFs in rural areas of the province were more efficient than those in urban areas with full efficiency (84%, as compared to 40%).

The results of DEA analysis in Champasak province are consistent with others although the operation efficiency levels in Champasak province are somewhat higher than other cases. For instance, if the efficiency value is compared with that of other papers, such as the efficient frontier under variable returns to scale for Pakistan, Bangladesh and India are 0.395, 0.087, and 0.28, while average pure technical efficiencies for these countries respectively range between 0.713-0.823, 0.175-0.547 and 0.413-0.452 (Qayyum and Munir, 2006). The average efficiency in the Mediterranean zone during the period of 2004-2005 is 0.644 (2004) and 0.637 (2005) using CCR (Charnes, Cooper and Rhodes) model (Ben, 2008).

In the latter study, it was also found that the size of the microfinance institutions has a negative effect on their efficiency; microfinance institutions of medium size are more efficient than large size. The study of operational efficiency in urban and rural areas in Champasak province confirms that large microfinance does not necessarily operate better than small ones. The results here also suggest that social cohesion and other social factors can be important drivers of operational efficiency of microfinance institution, as shown by relative efficiency between those in rural and urban Lao PDR.

Conclusion

Village development fund is an important financial source for Lao people, especially in rural areas. Using DEA analysis to assess operational efficiency of village development fund in urban and rural areas for year 2010 in Champasak province, Lao PDR, the results show that despite their small sizes and located in rural areas, the village development funds in rural areas was more efficient than those in urban areas. Only 7.69% of the funds in rural areas (Bachieng district) were inefficient as compared to 59.52% in urban areas (Pakse district). The main input factors contributing to inefficiency were number of staff and operating costs while output factors contributing to inefficiency were the contribution money and financial revenue.

To improve operational efficiency of village development fund in Lao PDR, it is important for the management to search for optimum scale of operation. There is a need to improve skill in operation and reduce operating costs. Balancing between contribution to social welfare and ensure financial return is also a key to efficiency. Finally, making use of social measures would also enhance responsibilities and transparency among members and hence improvement of operational efficiency of the village development fund.

REFERENCES

- Afonso A, Aubyn M (2005). Non-parametric approaches to education and health efficiency in OECD country. *J. Appl. Econ.*, 8(2): 227-246.
- Asian Development Bank (2011). The ADB annual report 2011 comprises two separate volumes: volume 1 is the main report and volume 2 contains the financial statements and statistical annexes.
- Banker D, Charnes A, Cooper WW (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *J. Manage. Sci.*, 30: 1078-92.
- Ben SB (2008). Efficiency of microfinance institutions in the Mediterranean. An Application of DEA. Springer-Verlag 2008.
- Charnes A, Cooper WW, Rhodes E (1978). Measuring the efficiency of decision making units. *Eur. Respiratory J.*, 2: 429-444.

- Darachanthra S (2003). Microfinance Capacity Building and Research Project. Microfinance newsletter. Issue 1, June-December 2003.
- Department of Planning and Investment (2011). Annual report 2011. Department of Planning and Investment, Champasak province, Lao PDR.
- Farrell MJ (1957). The measurement of productive efficiency, *Journal of the royal statistical society, series A, CXX, Part 3*, pp. 253-290.
- Gimenez VM (2000). Measuring operating efficiency. An application for the restaurant industry. *Departament d'Economia de l'Empresa Escola Universitaria de Turisme i Direccio Hotelera Universitat Autonoma de Barcelona* 08193.
- Hong N, Khanam D (2003). Efficiency of Banks in Bangladesh: A non-parametric Approach. *JEL-Classification: G21, G24, G3*.
- Nghiem H, Coelli T, Rao D (2006). The efficiency of microfinance in Vietnam: Evidence from NGO schemes in the north and the central regions. *Int. J. Environ. Cult. Econ. Soc. Sustain.*, 25: 71-78.
- Nieto B, CSerrano C, Molinero C (2009). Social efficiency in microfinance institutions. *J. Operational Res. Soc.*, 60: 104-119.
- Office of Political and Rural Development (2010). The operation and implement of microfinance in Champasak province. Office of Political and Rural Development Champasak province, Lao PDR.
- Pagura ME (2004). Client exit in microfinance: A conceptual framework empirical results from Mali", paper presented at The CSAE conference: Growth, human capital, and poverty reduction in Africa. St. Catherine's College, Oxford March 21-22, 2004.
- Qayyum A, Munir A (2006). Efficiency and sustainability of microfinance institutions in south Asia. Pakistan institute of development economics (PIDE). Online www.saneinetwork.net. 10 Jan 2010.
- Ramesh B, Bharat B, Elan R (2001). Hospital efficiency: An empirical analysis of district hospitals and general - aid hospitals in Gujarat. Publish online <http://jhm.sagepub.com/content/3/2/167>.