



## The Analyses of Efficiency and Factors Affecting Efficiency of Agricultural Cooperatives in Lower Northern Region of Thailand

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**Abstract** Agricultural cooperative has been a crucial community business for Thais in the rural area of Thailand over 100 years. It is important to analyses of efficiency and factors affecting efficiency. The research objectives were to (1) analyze the efficiency of agricultural cooperatives in the lower-northern area of Thailand utilized by the Data Environment Analysis Model (DEA Model) and (2) study the factors affecting the efficiency and operational development of agricultural cooperatives in the lower-northern area of Thailand. The research population comprised of agricultural cooperatives which identified as the general agricultural cooperatives. The study area covered nine provinces comprise of 196 cooperatives. The secondary data were collected from Financial Information Data Base of the Department of Cooperative Auditing, Ministry of Agriculture and Cooperatives. The data were analyzed by using Data Environment Analysis Model and Ordered Probit Model. The major findings were (1) the entire efficiency index of agricultural cooperatives in the lower-northern area of Thailand expressed at the medium score index of efficiency. The return to scale of agricultural cooperative operations in the lower-northern area of Thailand lighted on the Constant Return to Scale (CRS), Diminishing Return to Scale (DRS), as well as Increasing Return to Scale (IRS) of 15.31, 49.49, and 35.20, respectively. (2) Factors affecting the efficiency and operational development of agricultural cooperatives in the lower-northern area of Thailand expressed by value of total assets and value of credit business. According to the research results, it was suggested that the cooperative operations should be reached the maximum point of efficiency and it is necessary for cooperatives to make the operation cost management, the resources of co-operative operations which comprised of the entire co-operative assets. Moreover; the cooperatives should pay the crucial role on credit business management.

**Keywords** efficiency analysis, factors affecting efficiency, agricultural cooperatives Ltd.

### INTRODUCTION

A cooperative is an autonomous association of people who voluntarily cooperate for their mutual social, economic, and cultural benefit. Cooperatives include non-profit community organizations and businesses that are owned and managed by the people who use their services, a consumer cooperative, or by the people who work there or by the people who live there, hybrids such as worker cooperatives that are also consumer cooperatives or credit unions, multi-stakeholder cooperatives such as those that bring together civil society and local actors to deliver community needs, and second and third tier cooperatives whose members are other cooperatives (The World Cooperative Monitor, 2015).

Cooperative in Thailand was defined by 2 major groups; 1) Agricultural Co-operative sector and 2) Non-Agricultural Co-operative. The agricultural cooperatives sector was comprised of agricultural cooperative, land settlement cooperative, and fisheries cooperatives while the non-agricultural sector was comprised of consumer cooperative, saving cooperative, service cooperatives and credit union cooperative (The Federal of Savings and Credit Cooperative of Thailand Ltd, 2015).

In Thailand, Agricultural cooperatives were generally organized among the people engaging in agricultural earning with varying kinds and degrees of need, thus resulting with various agricultural cooperative types. Basically, the royal Thai government utilized agricultural cooperative as the tool for rural development especially in the agricultural and rural area since Thailand has been agricultural economy base so the agricultural sector still be the important part in Thai economy. In addition, agricultural cooperatives have been the biggest proportion among 7 types of Thai cooperatives which was accounted for 53 percent (The Cooperative Promotion Department, Ministry of Agriculture and Cooperative, the Royal Thai Government, 2015).

It is importance to analyses the efficiency of agricultural cooperatives in Thailand especially in the Lower Northern region of Thailand which has been and still be the main agricultural area of the country. The research also examined factors affecting on their efficiency, and finally find out the guidance to help Agricultural Co-operatives to improve their operational efficiency.

## OBJECTIVE

The objectives of this study are as follows.

1. To analyze the agricultural cooperatives Ltd. efficiency in the lower northern region of Thailand.
2. To find out the factors affecting on agricultural cooperatives efficiency and develop agricultural cooperatives' operation in the lower northern region of Thailand.

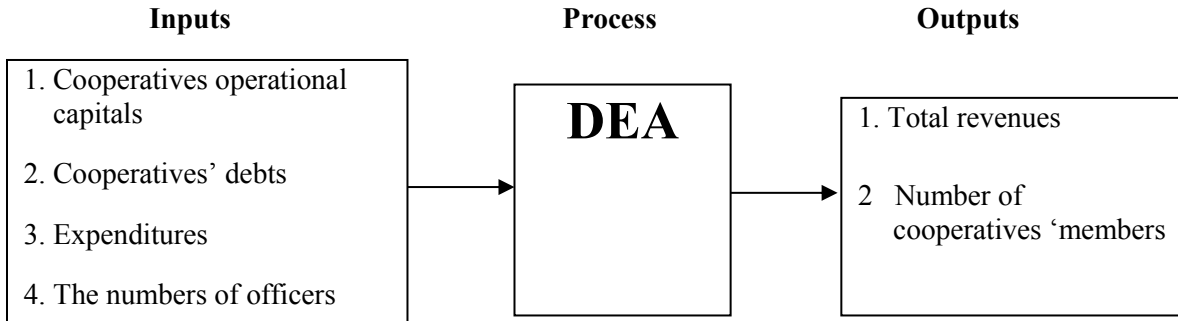
## METHODOLOGY

The Study Population was comprised of agricultural cooperatives Ltd. which operated in 9 provinces in the lower northern region of Thailand which include Kampanget, Tak, Nakhonsawan, Pichit, Pitsanulook, Petchabul, Sukhothai, Utaradit Provinces, and Uthathani Province which accounted for 196 cooperatives.



Fig. 1 Map of lower northern region of Thailand

The data was collected by secondary data from the information data base of Department of Co-operatives Audit, Ministry of Agriculture and Cooperatives, The Royal Thai Government which comprised of the inputs data; cooperatives operational capitals, cooperatives’ debt, expenditures, the numbers of officers, output data which comprised of total revenues, and number of cooperatives ‘members. The data analysis was utilized Data Envelopment Analysis Model (DEA) to find out the index of efficiency. The DEA is a relatively new data oriented approach for evaluating the performance of a set of peer entities called Decision Making Units (DMUs) which convert multiple inputs into multiple outputs (W. Cooper, 1984). This concept could be expressed as the following diagram.



**Fig. 2 Concept of inputs to outputs through Data Envelopment Analysis Model**

The Analysis of factors affecting on Agricultural Co-operatives Ltd efficiency, was exploited by Ordered Probit which was expressed by the following equation:

$$Efficiency = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7) \tag{1}$$

- Where:  $X_1$ , = The Value of Agricultural Cooperatives Assets
- $X_2$ , = The Numbers of Agricultural Cooperatives Officers
- $X_3$ , = The Value of Agricultural Cooperatives Deposit
- $X_4$  = The Value of Agricultural Cooperatives Credits
- $X_5$  = The Value of Agricultural Cooperatives Selling Business
- $X_6$  = The Value of Agricultural Cooperatives Collecting Business
- $X_7$  = The Value of Agricultural Cooperatives Processing Business

**RESULTS AND DISCUSSION**

In order to answer the first research objective, the research results could be expressed as the efficiency of agricultural cooperatives Ltd. in the Lower Northern region of Thailand as shown in Table 1.

**Table 1 Agricultural Co-operatives Ltd. efficiency in the Lower Northern region of Thailand**

The Level of Efficiency		Agricultural Co-operatives Ltd.		
Score	Meaning	Numbers	Percentage	The Average TE
0.81 – 1.00	The Highest Efficiency	133	68.88	0.926
0.61 – 0.80	The High Efficiency	33	16.84	0.725
0.41 – 0.60	The Medium Efficiency	17	8.67	0.523
0.21 – 0.40	The Small Efficiency	9	4.59	0.311
0.00 – 0.20	The Minimum Efficiency	2	1.02	0.150
Total		196	100	0.527

According to Table 1, the 133 out of 196 Agricultural Cooperatives Ltd. received the highest efficiency which accounted for 68.88 percent, with the 0.926 or 92.60 percent of Technical Efficiency (TE). This mean that majority of Agricultural Cooperatives Ltd in the Lower Northern region of Thailand performed their operation in the good shape. There were only 2 Agricultural Cooperatives accounted for 1.02 percent faced with the minimum efficiency which would be improved.

In order to answer the second research objective for factors affecting on efficiency, the results could be expressed as Tables 2 and 3.

**Table 2 Factors affecting on agricultural cooperatives Ltd. efficiency**

Variables	Coefficients	Standard Error	Marginal Effects					
			t Stat	P (Y=0)	P (Y=1)	P (Y=2)	P (Y=3)	P (Y=4)
Intercept	29152.10607	343926.6336	0.08476257	0.93254034	-649299.13	707603.345	-649299.13	707603.345
X 1	0.029905614	0.0040159	7.44680323	3.3542E-12	0.0219836	0.03782763	0.0219836	0.03782763
X 2	-152661.379	52791.37576	-2.8917863	0.00428213	-256800.96	-48521.802	-256800.96	-48521.802
X 3	-0.00717676	0.005729983	-1.2524932	0.21194601	-0.0184801	0.00412656	-0.0184801	0.00412656
X 4	0.029655875	0.007794125	3.80490123	0.00019177	0.0142807	0.04503105	0.0142807	0.04503105
X 5	-0.01626762	0.006648256	-2.4469003	0.01532823	-0.0293824	-0.0031529	-0.0293824	-0.0031529
X 6	-0.01106485	0.013729747	-0.8059036	0.42131665	-0.038149	0.01601931	-0.038149	0.01601931
X 7	-0.86824247	0.235262534	-3.6905259	0.00029302	-1.3323361	-0.4041488	-1.3323361	-0.4041488

**Table 3 Results of Ordered Probit Model for analyzing factors affecting on agricultural cooperatives Ltd. efficiency**

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
	1 (Constant)	29152.106	343926.634			
x1	0.03	0.004	0.841		7.447	0
x2	-152661.379	52791.376	-0.278		-2.892	0.004
x3	-0.007	0.006	-0.127		-1.252	0.212
x4	0.03	0.008	0.398		3.805	0
x5	-0.016	0.007	-0.147		-2.447	0.015
x6	-0.011	0.014	-0.034		-0.806	0.421
x7	-0.868	0.235	-0.156		-3.691	0

According to factors affecting on agricultural cooperatives efficiency, there were 5 factors that had affected on efficiency which were 1) the numbers of agricultural cooperatives officers, 2) the value of agricultural cooperatives deposit, 3) the value of agricultural cooperatives credit, 4) the value of agricultural cooperatives selling business, and 5) the value of agricultural cooperatives processing business.

The research could be concluded that the majority of agricultural cooperatives Ltd. in the lower northern region of Thailand performed in the highest efficiency. This indicated that agricultural cooperatives Ltd. in the lower northern region of Thailand have been the main and crucial way to get into economic development since cooperatives would be the only one community business for people who live in the rural area that get along with the study of Chuamaengphan, (2003) and Kaewthip S.

(2014). The Royal Thai Government could have the program to promote the agricultural cooperatives business.

## **CONCLUSION**

Majority of agricultural cooperatives Ltd. in the lower northern region of Thailand performed in the highest efficiency. This means that in lower northern region of Thailand, agricultural cooperatives has been the crucial community business to help people for their better standard of living in Thailand. Moreover, the Royal Thai Government would take this research result to utilize the agricultural cooperatives Ltd. as the tool for community development.

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