

MEASURING ECONOMIC AND SOCIAL EFFICIENCIES OF AREA FARMERS ORGANIZATION IN MALAYSIA

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ABSTRACT

To fulfill highly expectations of the government and to retain continuous supports from the members, Area Farmers Organization (AFOs) is anticipated to be an efficient organization. Hence, one way to measure the ability of an organization is through efficiency measurement. Therefore, this paper examines the technical efficiency (TE) of AFOs and determinant factors of efficiency; from 2006 to 2010. The efficiency is measured through three different dimensions namely as economic, social and socio-economic. For the purpose of the study, a two stage Data Envelopment Analysis (DEA) is used. In the first stage, DEA applied to measure the efficiency score of 56 AFOs. In the second stage, the efficiency score obtained and regressed by using Tobit model. Based on previous study, determinant factors such as assets, location, year of operation, types of business, manager's education, size of business and size of membership serve as independent variables. The efficiency analysis in the study reveals most of the AFOs are plagued with inefficiency. The average technical efficiency scores recorded at 0.708, 0.672 and 0.790 under economic, social and socio-economic dimensions respectively. As for determinant factors, the variables liked location, age of operation, size of business and membership are found to have a positive relationship with efficiency level.

Key words: *Technical Efficiency, Area Farmers Organization (AFOs)*

INTRODUCTION

Malaysia has come a long way, since the agriculture-based economy in the 1960s to the industrial-based economy in the 1980s and recently the government has embarked on ambitious plan to develop the country towards the service-based economy. The roles of the public and private sector are still important to transform the economy to the highest level. Besides these two dominant sectors, co-operative institutions are expected to be the third engine of economic development in Malaysia and the government has targeted a contribution of 4 % towards Gross Domestic Product (GDP) in 2013. The numbers of co-operative are projected to increase from 6,084 in year 2008 to 10,000 by the year 2013 with an average turnover for each co-operative anticipated between RM 80,000 to RM 1.5 million. In contrast, agricultural co-operatives performance is not quite promising when compared to the other sectors. Although the importance of the agricultural sector has been slowly decreasing over the years, the contribution of this sector should not be ignored as proven when the prices of food commodity increases during the oil price hike, OECD (2008).

One of the most promising schemes which had been silently active and successful in the agriculture sector abroad is through the co-operatives organizations, as demonstrated in Japan (Nonaka, 2006). Therefore, the performance of agricultural co-operatives such as Farmers Organizations (FOs) is relevant to be put under study.

Background of the Farmers Organization

The history of co-operative movement in Malaysia started about 90 years ago. Similar to some other countries, the formation of co-operatives served as the tool to overcome the poverty of the society. The British government formed the co-operative in 1922 with the purpose of tackling widespread poverty of rural farmers and government servants. Since then, the movement has expanded and grown.

An important aspect of Farmers Organization (FOs) is that it could also be categorized as agriculture co-operatives, under the jurisdiction of Farmers Organization Authority (FOA). Thus, FOs was established along the principles, values and aspiration of co-operatives. As its name implies, FOs is owned by farmers as members and managed by a selected board of directors as policy makers to carry out a wide range of economic and social activities. The Farmers Organization Act 1973 was enacted to properly place the farmers associations and agro-based co-operatives. Through the Act, the government acknowledges the role of FOs to assist the government in developing the economic and social status of the farmer's community in Malaysia.

However, the co-operative as well as FOs need to innovate to cope more successfully with the pressure of globalization. The evaluation of co-operative performance is vital to ensure the ability of co-operative to survive, compete, grow and meet the member's aspirations. As for the FOs, the success or the failure was determined by the ability of FOs to maximize and utilize the resources to fulfill the needs of the member's. Under section 6 of 109 Act, FOs has been empowered to run activities in order to uplift the economic and social status of the members.

Previous literature shows a large number of agricultural co-operatives are facing multi-dimensional problems that limit their performance level. The majority of co-operatives as reported in the National Co-operative Policy (NCP) from 2002 to 2010 were small in size, insufficient capital and poor networking system together with difficulties in maintaining good governance, inefficient administration and poor financial performance.

In the study of FOs, Ahmad (2006), found that the lack of competitiveness in FOs and agricultural co-operatives in Malaysia was plagued by inefficiency. Two major sources of funding for FOs to run the activities come from government and member's shares. AFOs are actively supported by the government through FOA in the form of managerial personnel support and development funding for financing, processing, marketing and other business activities that benefit its members. Thus, like other co-operatives, the AFOs must be efficient to fulfill the functions of their establishment.

In other words, FOs must plan to minimize the input used and at the mean time maximize the output. However the economic achievement of AFOs has been inconsistent even though FOs received consistent support from the government and the members. One of the consequences of inconsistent performance is that the member's confidences may erode and feel the existence of co-operatives is not important (Din, 2006).

From Table 1 showed the actual profit and loss of all AFOs throughout Malaysia and the data is obtained by deducting the government aids to AFOs. The figures proved that with the absence of government support, AFOs will be operated at loss. But it worth to highlight that, AFOs managed to reduce the gap from total lost in 2006 to (RM 777,157) in 2010.

Table 1: Actual Profit and Loss of AFOs by State

State	2006	2007	2008	2009	2010
Perlis	(117,087)	(1,052,364)	(904,985)	(633,857)	(688,786)
Kedah	(2,876,001)	(4,310,080)	(3,372,174)	(4,004,394)	(1,072,270)
P. Pinang	505,172	1,079,218	(69,481)	5,963,520	411,777
Perak	36,650	6,438,652	6,920,794	7,516,132	8,934,148
Selangor	117,006	149,931	(1,371,883)	(334,788)	2,107,463
N. Sembilan	(1,142,935)	(530,941)	(887,981)	(1,813,077)	(1,308,708)
Melaka	(415,733)	(579,205)	(986,929)	(732,581)	(649,628)
Johor	(1,638,440)	4,850,091	5,340,181	4,978,077	6,029,225
Pahang	(3,103,215)	(1,240,450)	(2,355,726)	(2,227,312)	(2,342,685)
Terengganu	(2,432,972)	(255,088)	(1,258,859)	(1,541,451)	(1,396,177)
Kelantan	(3,146,798)	(4,863,059)	(5,439,300)	(5,819,198)	(6,351,045)
Sabah	(4,235,312)	(5,404,138)	(7,550,038)	(5,559,846)	(3,965,064)
Labuan	(359,389)	(424,637)	(117,715)	(490,267)	(485,407)
Total	(18,809,054)	(1,083,303)	(12,054,096)	(4,699,043)	(777,157)

Source: Farmers Organization Authority (2011)

The empirical data indicated inconsistent performances of FOs and the symptoms reflect some of the underlying problems identified in the operation of FOs. The indicator such as inability to recover accumulated loss shows the symptoms of inefficiency in the operation of FOs. Moreover, based on previous studies Mahadavan (2004), Monk et al. (2007) Jeong and Heshmati (2009) linked the positive relationship between profitability and efficiency. Increase in profitability would lead to increase in technical efficiency whereas lower profitability indicated of less efficiency. Maintaining low cost of operations signifies operational efficiency and this efficiency translated into lower prices to members Rajaratnam et al. (2010)

The basic motives for the establishment of AFOs are to serve the members economically as well as socially with or without government assistant. Economic performance and social performance are inseparable while evaluating the entire performance of co-operative as well as AFOs. Hamid (1977) anticipated that FOs can no longer be mere beneficiaries of services from the government. Thus, after 39 years of establishment, in-depth evaluation is needed to assess AFOs in order to ensure that they are efficient enough to fulfill their roles to the members as well as meeting government aspirations. Therefore, the purpose of the study is to evaluate AFOs performance through measuring economic and social efficiencies.

OBJECTIVES OF THE STUDY

This study aims to assess the performance of the AFOs in Malaysia. Thus the specific objectives of this study are:

1. To measure the efficiency of AFOs.
2. To identify the critical factors that affect AFOs efficiency

SIGNIFICANCE OF THE STUDY

For co-operatives as well as AFOs, efficiency is rarely adopted as performance measurement even though the technical efficiency concept has been introduced since 1951. Certainly, the term 'efficiency' has wide varying meaning in different disciplines such as in economics, business and sciences. Generally, efficiency is a measurable concept, quantitatively determined by the ratio of output to input and also defined as a measure of a unit's ability to produce output for a given set of input. Prior studies proved that the efficiency is often used by other types of organization to evaluate the performance. For instance, when the efficiency measure indicates inefficiency, the scores demonstrate that the organization is running at below feasible level of output and still have the room to improve the output from the resources used. As for FOs concern, this study is considered as the first attempt to evaluate the economic and social efficiencies of selected AFOs.

Three Different Dimensions

The efficiency evaluation on AFO'S should be based on the nature of AFO's themselves. Likewise in other types of firms, economic dimension relates to measure the efficiency of business performance for selected AFOs, including agri-business and non-agribusiness. In different perspectives, social dimension refers to evaluate the social efficiency performance from social benefits output to members such as dividends, honorarium and member's fund. As for socio-economic dimension, it indicates the overall efficiency of AFOs since both social and economic efficiency is combined under one perspective. Therefore, it was expected to get the whole pictures of AFOs efficiency performance by measuring through three different dimensions.

LITERATURE REVIEW

Norman and Stoker (1991), defined efficiency as a measure of unit's ability to produce output from a given set of inputs. Farrell (1957), begins with modern efficiency measurement proposed that the efficiency of a firm consists of two components; technical efficiency and allocative efficiency. Technical efficiency reflects the ability of a firm to obtain maximum output for a given set of input while allocative efficiency refers to the ability of a firm to use the inputs in optimal proportions, given the respective prices.

Moreover, the efficiency measurement has received considerable attention from both theoretical and applied economists. From a theoretical point of view, there has been a spirited exchange about their relative importance of the various components of firm efficiency (Leibenstein 1996 and 1978, Comanor and Leibenstein 1969). Meanwhile from an applied perspective, according to (Bravo-Ureta and Rieger, 1991) measuring efficiency is the first step in a process that might lead to substantial resource savings which have important implications for both policy formulations and firm management.

In contrast, Harte (1995), argued, the efficiency of co-operatives is not proven by their survival and development as co-operatives in most countries have been favored by government policies. According to Sengupta (2000), technical efficiency measures the firm success in producing the maximum possible output from a given set of input. Meanwhile, Bhagavath (2006), notified in order to improve the performance of organization; it depends heavily on efficiency and effectiveness.

While Kaur (2006), urged that any measurement of co-operative performance must consider the objective and strategic intent of the co-operative organization which can be summarized as; to ensure the co-operative success in business and maximize benefits and fulfill member's needs and wants.

Efficiency in Economic Dimension

Agriculture co-operatives could provide the means of economic efficiency by which farmers can multiply or increase their capabilities through group action. With the efficiency and effectiveness in uplifting the socio-economic status of the small farmers, agricultural co-operation has indeed deservedly earned its rightful place as a reliable and potent development tool (Eugenio, 1980). Wells (1981), argues that the appraisal of agro-based co-operatives in Peninsular Malaysia achieved less measurable goals, and they will be unable to achieve their social purpose without improving their performance in relation to economic goals.

Nourse (1942), emphasis on efficiency rather than size can put the co-operative in the role of economic and concluded that high degree of economic efficiency is vital for the survival of many co-operatives. Since economic efficiency rarely appears as a co-operative principle therefore, Munkner (1986), has suggested economic efficiency as one of his eleven ideas to be called co-operative principles. Din (2006), found out that a high degree of economic efficiency in a highly competitive economy is vital for the survival of many co-operatives.

Efficiency in Social Dimension

The study on social performance became crucially important since the government compensated co-operatives in terms of subsidized interest rates and lower taxes and caused by efficiency loss. In returned the co-operative should perform some socially valuable tasks (Marini and Zevi, 1996)

The study on business efficiency alone is still insufficient to demonstrate the whole performances of co-operatives. Even though he never stress on social performance specifically, Emelianoff (1948) criticized the American descriptive literature which concerned mainly with the aspect of the business efficiency of co-operative organization and yet none of such test sufficiently comprehensive to cover the whole range of existing co-operative forms. The experts distinguish organizational efficiency, for instance the efficiency as an organization in achieving economic viability and in rendering services to its members (Din, 2006).

Amersdorffer et al. (2011), found numerous case studies of microfinance institutions which assess their social impact. Rating agencies, which formerly concentrated on financial performance, also started assessing social performance, often with their own system or collection of indicators.

Efficiency in Socio-economic Dimension

Hind (1998), highlighted the minimum requirement to measure corporation performance in order for it to survive and be in a position to deliver its members the economic and social benefits. Sargent (1982), agreed that agricultural co-operatives require continuous assessment and underlined six approaches to assess the performance and two of them are economic approach and social approach. Meanwhile, Cronan (2007), urged the co-operators to develop a consistent and rigorous

framework to better measure the way co-operatives operate and demonstrate the combined of economic and social benefits.

Amersdorffer et al. (2011), based on the study on economic efficiency performance by using DEA and with application of Social Performance Indicator (SPI) to examines social efficiency performance for microfinance institution in Bulgaria then summarized the efficiency level tends to be higher with the combinations of economic and social efficiency performance. Din (2006), shared the similar experience while evaluating the efficiency of Fisherman Association in Malaysia, socio-economic efficiency dimension proved to be more efficient as compared to economic dimension and social dimension alone.

Determinants Efficiency of Firm

The relationship between efficiency and a few explanatory variables has been under investigation in the literature for a long time. Amongst the determinants of the efficiency of firms is asset size, location, operational age, types of business or specialization, managerial attitude, firm size and membership size.

Krasachat and Chimkul (2009), in the study of agricultural co-operatives in Thailand employed a Tobit Model and confirmed that the independent variables such as locations, the types of business, the co-operatives' age, lending policies, management's attitudes and size of asset influenced the dependent variables.

Meanwhile, another study from Jeong and Heshmati (2009), summarized that, the level of technical efficiency of firms is positively related to defense ratio, rate of operation, age of firm, specialization, competitive environment change, and R&D investment in defense part. In contrast, the size of firm has a negative affects to technical efficiency. Yao et al. (2007), used panel data sets of 22 insurance firms in China then they found that, firm size, ownership structure, type of business and human capital are important factors affecting firm efficiency performance. In the case of co-operative study in Malaysia, Kaur (2006), categorized co-operative into large and small based on accumulative share capital.

Different location effect the efficiency level. According to Athanassopoulos and Gounavis (2001), seek to assess the efficiency of public hospital in Greece and the study proved that urban hospital are efficient as compared to the rural hospital. Membership in a farmers' association significantly influence technical efficiency Omonona et al. (2010), and Nyagaka et al. (2010). Jaime and Salazar (2010), viewed the participation in co-operative as a relevant factor to obtain higher efficiency levels, especially in territories that do not have favorable conditions for these activities. Ortmann and King (2007), found out that education and training of managers are the critical requirements for the establishment of successful co-operatives. The statement in line with Arshad et al. (2009), when noted that highly educated and competent management team leads the co-operatives to success

RESEARCH METHODOLOGY

Data Envelopment Analysis (DEA)

DEA was introduced by Charnes, Cooper and Rhodes (1978), as a method for measuring the efficiency of decision making units (DMUs). Basically DEA is used to determine relative performance amidst multiple input and output. DEA used as a tool to evaluate and improve the performance of manufacturing and service operations. According to Charnes et al. (1994) it has been extensively applied in performance evaluation and benchmarking of schools, hospitals, bank branches and production plants.

Wagner and Shimsak (2007), elaborated DEA produced a single comprehensive measure of performance for each DMU for a given set of input and output variable meanwhile a few studies proved that DEA out performed ratio analysis, regression analysis and translog regression method in estimating and identifying efficiencies. Ho (2001) has made a comparison between DEA with Analytical Hierarchy Process (AHP), Grey Relation Analysis (GRA), Balance Scorecard (BSC) and Financial Statement Analysis (FSA). The main features for DEA compared to others are; simple in solving multiple input and output problems, specific purpose to measure efficiency and provide information on efficiency.

It is common to analyze efficiency in two stages; first stage DEA and second stage DEA. The first stage is to use non-parametric DEA to calculate the efficiency with which output is produced from physical inputs used. The second stage (Tobit or OLS) involves regression process in order to relate efficiency scores to factors seen to affect efficiency. Some procedures have been developed that incorporate the influence of efficiency factors in the DEA analysis (see Cooper et al., 2000; Coelli et al., 1999; Fried et al., 1999).

For the co-operative sector, Krasachat and Chimkul (2009), applied combination of DEA technique and Tobit regression to study the technical efficiency and its determinants of agricultural co-operative in Thailand.

In DEA, relative estimation of non-parametric deterministic frontier and the disposability of outputs and inputs are expressed in term of minimizing input requirements. The coefficient or weight developed through this method is unique to the individual DMU's or AFO's under evaluation. Based on the special characteristics, hence this study will employ DEA to measure AFO's efficiency.

DEA gives the general model as follows:

$$\begin{aligned}
 \text{Max } E_o \text{ or } S_o \text{ or } SE_o &= \frac{\sum_{r=1}^s U_r Y_{rj} r_o}{\sum_{i=1}^m V_i X_{ij} i_o} \\
 \text{s.t. } \frac{\sum_{r=1}^s U_r Y_{rj} r_j}{\sum_{i=1}^m V_i X_{ij} i_j} &\leq 1 \\
 U_r &> 0 \\
 V_i &> 0
 \end{aligned}$$

Where Y_{rj} denotes the quantity of r_{th} of the j_{th} DMU, X_{ij} is the vector of quantity inputs employed by AFO_{stj}, o id DMU under evaluation in set $j=1, \dots, n$ DMU, s is the number of produced by DMU, m is the number of input used by DMU. U_r denotes the weight given to r_{th} outputs and V_i is the weight given to j_{th} input.

When the coefficient takes this structure, the value taken by E (Economic) or S (Social) or SE (Socio-economic) always lies between zero and one. When the coefficient or index is 1, it denotes complete efficiency. The efficiency here denotes an input or output relationship and is thus a measure of productivity.

Tobit Model Regression

The Tobit model, also called a censored regression model was proposed by James Tobin in 1958. Basically, the model is a statistical model and designed to estimate linear relationships between variables when there is either left or right-censoring in the dependent variable. According to McDonald and Moffit (1980), the Tobit model is assumed that the dependent variable has a number of its value clustered at a limiting value, usually zero.

Amemiya (1984), noted that this model also known as truncated regression because the observations outside a specific range are totally lost. The model was preferred by many researcher over other alternatives techniques due to Tobit technique uses all observation, both those at the limit and those above it, to estimate a regression line.

Simar and Wilson (2007), considered a second-stage regression is meaningful and determined by the structure in the first stage where the initial DEA estimates are obtained. So they introduced a truncated regression in the second stage which can be estimated consistently using the maximum likelihood method.

According to Hwang and Oh (2008), it is customary to do a regression of DEA efficiency scores on the relevant control variables. Liu et al. (2012), employed super-efficiency DEA to access technical efficiency in colleges and Tobit regression specially uses to analyze an uncensored score.

Krasachat and Chimkul (2009), preferred Tobit in the study due to inefficiency scores from DEA were limited to values between 0 and 1. That is, co-operatives which achieved Pareto efficiency always have an inefficiency score of 0. Thus, the dependent variable in the regression equation cannot be expected to have a normal distribution. This suggests that the ordinary least squares (OLS) regression is not appropriate.

The Tobit model is a special case of a censored regression model, because the latent variable y^* cannot always be observed while the independent variable x_i is observable. The Tobit model may be defined as:

$$\begin{aligned}
 & y^* ; 0 \leq y^* \leq 1 \\
 & y = 0 ; y^* < 0 ; \\
 & \quad 1 ; 1 < y^* \\
 & y^* = \beta x_i + \varepsilon_t
 \end{aligned}$$

where y is the DEA CRS TE score. $\varepsilon_t \sim i e N(0, \sigma^2)$

y^* is a latent (unobservable) variable.

β is the vector of unknown parameters which determines the relationship between the independent variables and the latent variable.

x_i is the vector of explanatory variables

In addition, the Tobit beta coefficient is defined as the combination of the change in y^* of those above the limit, weighted by the probability of being above the limit; and also the change in the probability of being above the limit, weighted by the expected value of y^* if above.

Data Source

This study will use panel data of 56 AFOs throughout Malaysia specifically involved in agriculture as their core activity from the year 2006 to 2010. The annual financial statement of selected AFOs will be used to analyze their technical efficiency.

Variables for DEA Analysis

For the purpose of this study, two input variables and four output variables had been selected. Labor input was measured in labor expenses whereas capital input was measured in capital expenses. In selection of output variables, gross revenue from AFOs business and non- business activities were chosen as economic outputs and socials output was measured by dividends, member's fund and honorarium.

Variables for Tobit Analysis

Hence, this study will evaluate the significant relationship between independent variables to the AFOs efficiency levels. The descriptions are illustrated in the table below:

Table 2: Description of Variables for Tobit Estimation

Variables		Description	Hypotheses
1.	Asset	A = Amount of asset	Higher assets leads to higher efficiency
2.	Location (Dummy)	Ldum = 1 for granary area 0 otherwise	AFOs in granary area more efficient than non –granary area
3.	Age Of AFOs	AA = is the age of AFOs	The older firm have the higher efficiency
4.	Type of Business (Dummy)	TBdum = 1 for agribusiness 0 otherwise	Agribusiness AFOs more efficient to non-agribusiness AFOS
5.	Manager Education (Dummy)	EMdum = 1 for graduate manager 0 otherwise	Highly educated manager increase AFOs efficiency
6.	AFOs size (Dummy)	AS = Amount of accumulated shares	Large Size AFOs more efficient than small size
7.	Membership	M = Number of members	Larger membership size tends to increase efficiency of AFOs

Therefore, the Tobit model used in this study may be specified as:

$$y^* = \alpha + \beta_1 A + \beta_2 Ldum + \beta_3 AA + \beta_4 TBdum + \beta_5 EMdum + \beta_6 AS + \beta_7 M + \epsilon t$$

FINDINGS

First Stage DEA

This section presents the summary of efficiency performances growth of AFOs as accordance to three different dimensions. This implies that majority of AFOs under this study are operating at lower efficiency

Table 3: Summary of Efficiency Performances of AFOs

Dimensions	2006	2007	2008	2009	2010	Mean
	Average Efficiency					
Economic	0.770	0.717	0.706	0.704	0.642	0.708
Social	0.648	0.646	0.681	0.636	0.750	0.672
Socio-economic	0.800	0.785	0.802	0.721	0.840	0.790

A multiple lines chart was used to plot the average efficiency of the three dimensions. From the figure 1, the chart shows that socio-economic efficiency recorded the highest efficiency score with an average of 0.790 as compared to 0.708 for economic and 0.672 for social dimension. In other words, AFOs must maximize the output and minimized or at least maintained the input used in order to reach the point of being fully efficient. Statistically, the AFOs need to improve the efficiency level up to 0.292 or 29.2% for economic dimension and 0.328 or 32.8% and 0.210 or 21 % for social and socio-economic dimension respectively. Important to note that, difference in efficiency scores between economic, social and socio-economics indicated the evaluation performance may vary if one highlighted the result of a certain dimension only.

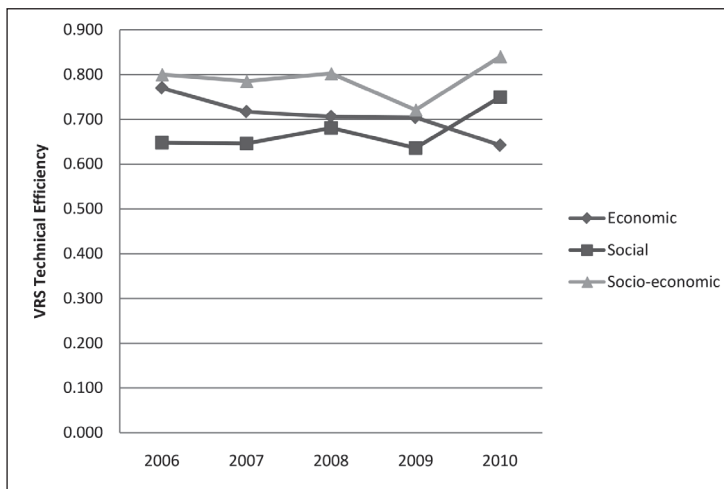


Figure 1: Average efficiencies of AFOs according to dimension from 2006-2010

The above table and line chart showed that for the unique organization like AFOs, the TE must reflect to the whole operations namely as economics and social performance. Even though most of the AFOs still inefficient but socio-economic efficiency dimension outperforms the findings as compared to economic performance and social performance alone.

Second Stage DEA Result

Basically, the Tobit model is a statistical model proposed to describe the relationship between a non-negative dependent variable independent variable.

Table 4: Results of Tobit Estimations

Variables	Economic	Social	Socio-economic
	Coefficients P -Value	Coefficients P -Value	Coefficients P -Value
Membership (M)	0.000109401 0.0000389***	2.96539e-05 0.2483	6.23660e-05 0.0106 **
Asset (A)	1.78043e-09 0.7588	2.93689e-09 0.6310	2.92220e-09 0.6935
Age Of AFOs (AA)	0.0118241 0.2043	0.0559575 1.57e-09***	0.0218809 0.0306 **
Type of Business (TBdum)	0.0490724 0.2599	0.0419049 0.4023	0.0299024 0.5421
AFOs size (AS)	-0.000444096 0.00000165***	-0.000557099 2.42e-06***	-0.000323048 0.0092 ***
Location (Ldum)	0.143218 0.0090***	0.262747 1.48e-06***	0.157130 0.0105 **
Manager Education (MEdum)	0.0103395 0.8113	-0.000102604 0.9983	0.0153180 0.7525
Constant	0.199309 0.4986	-1.03907 0.0004***	0.0613265 0.8450
No. of observations	280	280	280
Significant level	** Significant at 5 % level *** Significant at 1 % level		

As for economic dimension, it is observed that the significant or positive coefficients for the pooled data were the variables of membership and location. Membership and location positively influences efficiency. The larger number of membership tends to increase the efficiency level of AFOs. Different location determined different efficiency level. AFOs located under granary area and out of granary area also cause different in their efficiency scores. Contrary to expectation, the size of AFOs is significant even though the coefficient of the variables showed a negative sign.

Tobit estimation results which are presented under social perspective signified two positive coefficients of variables. Age and location of AFOs found to have an influence in the efficiency level. The number of years operating AFOs distinguished the efficiency score where the longer the time it takes to operate is likely to make the AFOs to be more efficient. Likewise in economic dimension, location of the AFOs was one of the efficiency determinants as well as size of AFOs. Even though the coefficient showed a negative value but the p value recorded below significant level. This implies that the larger size of AFOs, the efficiency will be decreased.

The results obtained under socio-economic dimension, observed that the positive coefficients were the variables of membership, age of AFOs and location. The three significant variables were proved to influence the efficiency level of AFOs under study.

CONCLUSIONS

In general, the summary of the results showed unhealthy performance for the majority of AFOs under evaluation. The mean efficiency score took the value of below one which indicated the AFOs were less efficient or in other words most of the AFOs are plagued by inefficiency. The Tobit result showed that the maximum of four factors were significant in determined the efficiency level. The factors like location, membership and age of AFOs as well AFOs size were found significant.

There is practical significance of employing right methods to measure AFOs efficiency accurately and to determine the factors affecting the efficiency. The findings from this study signified the unhealthy performances of AFOs in terms of technical efficiency but it is beneficial in guiding the government and FOA to formulate new strategies to improve AFOs. FOA threw the lights by reporting in 2010, AFOs managed to increase their volume of business, reduced the accumulated lost, retained members support as indicated by increased in share capitals and size of memberships. More importantly, the roles and contributions of AFOs had been recognized by government as a significant farmer's institution to transform the farmer's community.

REFERENCES

- Ahmad, A. R.(2006). *Agricultural cooperatives in Malaysia: Innovations and opportunities in the process of transition towards the 21st century model*, 2006 FFTCNACF International seminar on agricultural cooperatives in Asia: Innovations and Opportunities in the 21st century, Seoul, Korea, 11-15 September 2006, 1-33. Retrieved from www.agnet.org/activities/sw/2006/.../paper-290571303.pdf.
- Amemiya,T.(1984). Tobit Models: A Survey. *Journal of Econometrics*,24(1-2),3-61.
- Amersdorffer, F., Buchenrieder, G., Bokusheva, R. &Wolz, A.(2011). *Financial and social performance of rural credit cooperatives in Bulgaria*. Contributed paper, 2nd EURICSE (European Research Institute on Cooperative and Social Enterprises). Conference on Cooperative Finance and Sustainable development, June 9-10, Trento. Retrieved from https://edit.ethz.ch/afee/people/Staff/braushan/CV_Raushan.p.
- Arshad,F.M.,Radam,A.,Abdullah,A.M.,Noh,K.M.,Ismail,M.M.,Yacob,M.R.,&Ishan,Z.M.(2009). *Penilaianprestasikoperasipertanianterpilih*.Serdang:Universiti Putra Malaysia.
- Athanassopoulos,A.,&Gounavis,C.(2001).Assessing the technical and allocative efficiency of hospital operation in Greece and its resource allocation implication. *Journal of Operational Research* 133,416-431.
- Bhagavath,V.(2006).Technical efficiency measurement by data envelopment analysis: An application in Transportation. *Alliance Journal Business Research*,60-72.
- Bravo-Ureta, B.E & Laszlo Rieger.(1991). Dairy farm efficiency measurement using stochastic frontiers and neoclassical duality, *American Agricultural Economics Association*.5,421-427.
- Charnes, A., Cooper, W. W.,&Rhodes,E.(1978). Measuring the efficiency of decision making units. *European of Operation Research*, 2,429-444.
- Charnes, A., Cooper, W. W., Lewin, A. Y., &Seiford, L. M.(1994). *Data envelopment analysis: Theory, methodology, and applications*.Boston: Kluwer.
- Coelli, T., Prasada Rao, D.S., &Battese, G.E.,(1999). *An introduction to efficiency and productivity analysis*. Kluwer Academic Publishers.
- Comanor, W.S. &Leibenstein H.(1969). Allocative efficiency, X-efficiency and the measurement of welfare losses, *Economica*. 36,304-309.
- Cooper, W.W., Seiford, L.M., & Tone, K.(2000). *Data envelopment analysis*. Kluwer Academic Publishers.

- Cronan, G.(2007). The global 300 project –measuring co-operative performance and difference. *ICA Review of International Co-operation*,100(1).
- Din, J.(2006). *Applying data envelopment analysis to evaluate the efficiency of fisherman association in Malaysia*.(Unpublish Doctoral dissertation). Faculty of Economic and Management, Serdang,Universiti Putra Malaysia.
- Din, J.(2006). Data envelopment analysis as a method to measure efficiency of performance in cooperatives. *Malaysian Journal of Cooperative Management*,2, 19-25.
- Eugenio, V. M.(1980). *Agricultural cooperation in developing countries-A management approach*. Quezon City: Bustamante Press Inc.
- Emelianoff, I. V.(1948). *Economic theory of cooperation. Economic structure of cooperative organizations*. Washington.
- Farrell, M. J.(1957). The measurement of productivity efficiency. *Journal of the Royal Statistical Society*,1120,251-281.
- Fried, H.O., Schmidt, S.S., &Yaisawarng, S.(1999). Incorporating the operational environment into a nonparametric measure of technical efficiency. *Journal of Productivity Analysis*,12,249–267.
- Hamid, A. S.(1977). *Farmers cooperatives:Institution for small farmers in Malaysia*.Farmers Organization Authority.
- Harte, L. N.(1995). *Creeping privatization of Irish cooperatives: A transactional cost explanation*. Paper presented at EIAM Conference: Institutional changes in the globalized food sector. Brussels.
- Hind, A. M.(1998). *Assessment on cooperative performance*. The world of cooperative Enterprises. Plunkett Foundation.
- Ho, C. T.(2001). *Astudy on the application of decision analysis on performance measurement for small and medium business*. Proceedings of the 46th International Council for Small Business World Conference, to be held by National Association of Small and Medium Enterprises and ICSB-ROC Affiliate in Taiwan, June 17-20, 2001, A-3, 1-21.
- Hwang, D.S.,& Oh, D.(2008). Do software intellectual property rights affect the performance of firms? case study of South Korea. In the Third International Conference on Software Engineering Advances, Sliema, Malta, October 26-31, 2008.

- Jaime, M., & Salazar, A. (2011). Participation in organizations technical efficiency and territorial differences: A study of small wheat farmers in Chile. *Chilean Journal of Agricultural Research*, 71(1), 104-113.
- Jeong, K. I., & Heshmati, A. (2009). Efficiency of the Korea defence industry: A stochastic frontier approach. In J. D. Lee., & A. Heshmati. (Eds.). *Productivity, efficiency and economic growth in the Asia Pasific Region* (pp. 217-254). German: Physica.verlag Heidelberg. Springer.
- Kaur, I. (2006). Performance measurement. An evaluation of cooperatives performance in Malaysia. *Malaysian Journal of Cooperatives Management*, 2, 1-17.
- Krasachat, W., & Chimkul, K. (2009). Performance measurement of agricultural cooperatives in Thailand. An accounting based data envelopment analysis. In J. D. Lee., & A. Heshmati. (Eds.). *Productivity, efficiency and economic growth in the Asia Pasific Region* (pp. 255-266). German: Physica.verlag Heidelberg. Springer.
- Laporantahunan (2011). Lembaga Pertubuhan Peladang. Kuala Lumpur: LPP
- Leibenstein, H. (1978). X-Inefficiency Xist-Reply to a Xorcist, *American Economic Review*: 68, 203-211.
- Leibenstein, H. (1996). Allocative efficiency vs. x-efficiency, *American Economy Review*, 56, 392-415.
- Liu, W. B., Wongchai, A., & Peng, K. C. (2012). Adopting super efficiency and tobit model on analyzing the efficiency of teachers in Thailand. *International Journal on New Trends in Education and Their Implications*, 3(3).
- Mariani, M., & Zevi, A. (1996). Cooperative principles and the Italian cooperative movement. In J. L. Monzon Compos. (Eds.). *Cooperatives, markets, co-operatives principles* (pp. 108-131). Liege: CIRIEC.
- McDonald, J., & Moffitt, R. (1980). The uses of tobit analysis. *Review of Economics and Statistics*, 62, 318-321.
- Monk, V., Yeung, G., Han, Z., & Li, Z. (2007). Leverage, technical efficiency and profitability: An application of DEA to foreign invested toy manufacturing firms in China. *Journal of Contemporary China*, 16(51), 259-274.
- Munkner, H. H. (1986). *Cooperative principles and cooperative law*: Friedrich-Ebert-Stiftung.
- Mahadavan, R. (2004). *The economic of productivity in Asia and Australia*. UK: Edward Elgar Publishing Limited.

- Nonaka, A.(2006). *The agricultural structure and agricultural co-ops in Japan presented at the 2006. FFTC-NACF International Seminar on Agricultural Cooperatives in Asia: Innovations and Opportunities in the 21st Century*,11-15 September 2006, Seoul, Korea.
- Nourse, E. G.(1942). *The place of the cooperative in our national economy*. America cooperation 1942-1945.
- Norman,M.,&Stoker,B.(1991).*Data envelopment analysis: An assessment of performance*,Wiley.
- Nyagaka,D.O., et al.(2010). Technical efficiency in resource use.Evidence smallholder Irish potato farmers in Nyandawa North District Kenya. *African Journal Of Agricultural Research*, 5(11),1179-1186.
- OECD.(2008). Rising Food Prices. Retrieved from <http://www.oecd.org/dataoecd/40847088.pdf>.
- Omonona, B. T., Egbetokun, O. A., &Akanbi ,A. T.(2010). Farmers Resource – Use and Technical Efficiency in Cowpea Production in Nigeria. *Economic Analysis & Policy*,40(1).
- Ortmann, G. F., & King, R. P.(2007) Agricultural cooperatives : History, theory and problems. *Agrekon*, 46(1). Retrieved from <https://entwicklungspolitik.uni-hohenheim.de/uploads/media/A>.
- Rajaratnam, S. D., Noordin,N.,Said, M. S. A., Juhan, R., &Hanif, F. M.(2010). Success factors of cooperatives in Malaysia: An exploratory Investigation. *Malaysian Journal of Cooperative Studies*, 6,1-18.
- Sargent, M. J. (1982). *Agricultural Co-operation*. Hampshire England: Gower Publishing Company Limited.
- Sengupta,K.(2000).*Dynamic and stochastic efficiency analysis*.Economics of data envelopment analysis. WorldScientific.Singapore,NewJersey,London,Hong Kong.
- Simar, L., & Wilson, P. W.(2007). Estimation and inference in two-stage, semi-parametric models of productive efficiency. *Journal of Econometrics*, 136,31-64.
- Wagner, J. M., &Shimsak, D. G.(2007). Stepwise selection of variables in data envelopment analysis: Procedures and managerial perspectives. *European Journal of Operational Research*, 180,57-67.
- Wells, R. J. G.(1981). An Appraisal of Agro-Based Cooperatives in Peninsular Malaysia. *Public Administration and Development*,1(2),165-176.
- Yao,S.Han,Z., & Feng,G.(2007).Technical efficiency of China insurances industry after WTO accession. *China Economic Review*,18,(1),66-86.