EFFICIENCY OF COOPERATIVES: EMPIRICAL EVIDENCE IN MALAYSIA

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ABSTRACT

Cooperatives are organizations that are created jointly by participants to meet their economic needs and interests. The role of cooperatives in Malaysia cannot be denied since it consists of the Malaysian financial system. However, the contribution of cooperatives to gross national product is still low compared to the other financial institutions. This may be due to inefficiency in managing resources. Hence, the study aims to evaluate the efficiency of cooperatives in Malaysia. The study used the annual report provided by the Malaysian Cooperatives Commission. The period of the study is from 2010 to 2017. A non-parametric Data Envelopment Analysis (DEA) is used to evaluate the efficiency of the cooperatives. Overall, the study found that Malaysian cooperatives had been performing better because of the scale of their operation instead of good managerial performance. The management of cooperatives in Malaysia should enhance their managerial performance because pure technical efficiency was found to contribute less to overall technical efficiency.

Key Words*:* cooperatives, efficiency, technical efficiency, data envelopment analysis

1.0 INTRODUCTION

The Malaysian economic system comprises many different sectors that contribute significantly to Gross Domestic Product (GDP), yearly. Within these different sectors, cooperative is one of the business sectors that play the roles and hence become one of the contributors to local economic performance. According to Malaysian Law, a cooperative is an organization that consists of individual persons with the target to promote the economic interest of its member's accordance with cooperative principles (Malaysia Law, 2008). In 2002, the government has launched National Co-operatives Policy to plan for further development and enhance the cooperatives legislation to ensure better governance and management. The achievement of this policy is proven by the statement from Deputy Minister of Entrepreneur Development, Datuk Dr. Mohd Hatta Md Ramli, who said, the Malaysian Cooperative Commission is the third contributor to the national economy after the government and private sectors because it has assets of more than RM140 billion (Astroawani, 2018). However, co-op is not exempted from

the Covid-19 impact that struck the global in the quarter of 2020. According to Malaysia's Prime Minister, this pandemic has caused cooperatives to suffer losses of RM 10 billion in 2020 (Carvalho & Tang, 2021). This huge amount of loss directly affects economic performance.

It is important to evaluate the efficiency of cooperatives to ensure the sustainability of operations although systematic factors are unavoidable. This significant contribution to economic performance and the achievement of a comprehensive plan can be seen through the efficiency of co-op operations. According to Farrel (1957), Kumbhakar & Lovell (2000), Kipesha (2013) efficiency is the ability to avoid wastage by effectively utilizing the minimum resources (input) for maximum production of goods and services (output). Despite the fact of the importance in cooperatives' efficiency and fast-growing trend, the inefficiency that occurs in co-operative operation is a challenging issue to be resolved. The studies of cooperatives' efficiency show that lack of managerial capacity (Ismail & Sarif, 2010) and financial liquidity issues (Md. Salleh et al, 2008) lead to cooperatives' inefficiency.

This paper is the first attempt to discover the efficiency of co-operatives in Malaysia. The following section provides the background of Malaysian co-operatives and the literature on co-operatives and efficiency. While Section 3 explains the methodology and selection of input-output and Section 4 reports the results. Finally, the last section offers some recommendations.

2.0 LITERATURE REVIEW

Efficiency refers to how well a company uses its inputs to generate its outputs (Farrell, 1957). Technical efficiency, scale efficiency and price or allocative efficiency are the three forms of efficiency measures. When a company generates more output from the same set of inputs, it is termed technically efficient, and when the company maximizes profit, it is considered price-efficient (Hassan, 2006).

Efficiency studies in the past have looked at a variety of areas. Banking (Alrafadi, Kamaruddin, & Yusuf, 2014; Sassi, 2013; Said, 2013; Yudistira, 2004), microfinance institutions (Kim, Long, & Sang, 2018; Lensink, Meesters & Hermes, 2011), pawnbroking (Maamor & Ismail, 2010), and zakat institutions (Kim, Long, & Sang, 2018; Lensink (Noor, Rasool, Ali & Rahman, 2015; Wahab & Rahman, 2013). Few studies on cooperatives have been conducted (e.g., Fukuyama, Guerra, & Weber, 1999; Xiong, Tian, & Ruan, 2011; Asawaruangpipop & Suwunnamek, 2014; Magali & Lang'at, 2014; Marwa & Aziakpono, 2014; Galarza, Campoverde, & Borenstein, 2019). As a result, research into cooperatives is deemed necessary.

Asawaruangpipop & Suwunnamek (2014) assessed the efficiency of savings and credit cooperatives in Thailand. The study found that private cooperatives had maximum efficiency in terms of cooperative quantity and efficiency score. Sousa de Abreu, Kimura, Araújo Neto, & Peng (2018) also investigate the efficiency in the Brazilian Credit Unions and they found that the link between cooperative members is not a determinant of efficiency, nevertheless, free admission cooperatives tend to be less efficient than those that have admission restrictions.

According to Park and De (2004), Data Envelopment Analysis (DEA) is a significant way of measuring efficiency. The co-operatives are regarded as financial institutions and their nature of business is comparable to the bank, which both provide financial services, thus the DEA can be used to examine efficiency (Safiyuddin, Wahab, & Maamor (2019). Xaba, Marwa and Mathur-Helm (2019) agreed that the DEA is a measure that is commonly used and has produced consistent findings.

To date and to the best of our knowledge, efficiency studies on co-operatives outside Malaysia had used the DEA method. Although other methods to examine efficiency are available, such as Frontier Approaches, which consist of the Stochastic Frontier Approach (SFA), Distribution Free Approach (DFA), and Thick Frontier Approach (TFA), DEA is a popular method to evaluate the financial institutions including banks, microfinance institutions and cooperatives because it easily handles multiple outputs, is non-parametric, and does not require input prices. Hence, we employed DEA to examine the efficiency of co-operatives in Malaysia.

3.0 RESEARCH METHODOLOGY

The aim of this study to evaluate the efficiency of cooperatives in Malaysia. The population for this study is 100 best cooperatives in Malaysia. From 100 best cooperatives, 15 cooperatives that are listed consecutively in 100 best cooperatives from 2010 to 2017 are evaluated (see Appendix 1). This study used unpublished data of 100 best co-operatives from the Malaysian Co-operative Commission database.

3.1 Data Envelopment Analysis (DEA)

To construct an efficiency model of the co-operatives, this study utilized the Data Envelopment Analysis (DEA). The DEA is a linear programming-based efficiency evaluation method that was introduced by Farrell (1957), which was later extended by Charnes, Cooper, and Rhodes (1978) and then extended by Banker, Charnes, and Cooper (1984).

There are two methods that can be used to assess efficiency which is Charnes-Cooper-Rhodes Model (CCR model) and the Banker-Charnes-Cooper Model (BCC model). Charnes et al. (1978) expanded Farrell's efficiency measurement concept of multiple inputs and single output to the concept of multiple inputs and multiple outputs, utilized linear combination to convert it to single virtual input and output, and estimated efficiency frontier from the ratio of two linear combinations, and measured the relative efficiency of each DMU in CRS, which is between 0 and 1. The efficiency value of 1 indicates it is efficient, otherwise it is inefficient.

Banker et al. (1984) widened the CCR model ratio concept and application scope in both Farrell and CCR models. According to Coelli, Rao, & Battese (1998a), both methods allow technical efficiency (TE) to be split into two mutually comprehensive components: pure technical efficiency (PTE) and scale efficiency (SE).

The treatment of return-to-scale differs between the two models. CCR assumes that each cooperative (C) operates with constant return-to-scale, whereas BCC allows for variable return-to-scale (VRS). A measure of efficiency for every single decision-making unit (DMU) was

initiated by Charnes, Cooper, and Rhodes to attain a maximum ratio of weighted output to weighted input.

The BCC model is consequential from the DEA model. The BCC efficiency scores are obtained by solving the model for each DMU and interpreting the values in the same way as the CCR model. These scores are sometimes known as "pure technical efficiency scores" since they are derived from a model that allows for varying returns-to-scale, removing the "scale part" from the analysis.

The scale efficiency score is defined by the ratio of CCR/BCC or (TE/PTE). At that point, a DMU_o, is found to be efficient with a CCR model which is also found to be efficient for the corresponding BCC model, and a constant return-to-scale means that DMU_o is the most productive scale size. When a DMU_O shows decreasing returns-to-scale, $\left(\sum_{j=1}^{n} \lambda_j > 1\right)$ it is likely that the DMU_o can develop its performance by decreasing its size. On the other hand, when a DMU_O shows increasing return-to-scale,

$$\left(\sum_{j=1}^{n} \lambda_j < 1\right)$$

it is likely that a DMU_o can improve its performance by increasing its size.

3.2 Selection of Input and Output

The selection of inputs and outputs in this study was basically determined by data availability. Two inputs and two outputs were considered to examine the efficiency of 15 cooperatives in Malaysia. The input was total assets and total share capital while the outputs were net income and dividends. This study employed output-oriented DEA where a linear program was formed to determine a cooperative's potential output given its inputs if it functioned efficiently as a cooperative along the best practice frontier. The output-oriented was utilized by contemplating the case where the cooperative may have a fixed amount of resources and enquired to produce as much output as possible (Coelli, Rao & Battese, 1998).

This study employed the production approach. The production approach assumes that co-operatives act as producers in collecting savings, offering other financial services, and providing returns in the form of dividends if the co-operatives gain profits.

4.0 RESULT AND DISCUSSION

This section presents the efficiency score of cooperatives from the year 2010 until 2017. All data were measured by Data Envelopment Analysis (DEA) to identify the level of efficiency of each cooperative. The result is output-oriented by considering the case where production involved two outputs and two inputs. In this study, total assets and total share capital were the

inputs whereas net income and dividends were the outputs. Table 4.1 explained the value of the overall technical efficiency (OTE) of 15 cooperatives in Malaysia from 2010 to 2017.

Table 4.1: Overall technical efficiency of cooperatives

Cooperatives	2010	2011	2012	2013	2014	2015	2016	2017
CC1	0.899	0.637	0.74	0.887	0.418	0.668	0.899	1
CC2	0.768	0.683	0.538	0.584	0.419	0.67	0.731	0.494
CC3	1	0.641	0.451	0.424	0.354	0.676	0.7	0.816
CC4	0.752	0.639	0.568	0.635	0.487	0.706	0.92	0.99
CC5	1	0.872	0.696	0.748	0.552	0.712	0.115	0.202
CC6	0.722	0.603	0.473	0.523	0.408	0.63	0.886	0.909
CC7	0.38	0.364	0.267	0.318	0.318	0.265	0.164	0.317
CC8	0.819	0.34	0.292	0.395	0.326	0.463	0.826	1
CC9	0.826	0.694	0.571	0.658	0.496	0.715	0.691	0.682
BC10	0.323	0.757	0.755	1	0.852	1	0.773	0.668
BC11	0.553	0.365	0.281	0.267	0.176	0.228	0.214	0.225
SC12	1	1	1	1	1	0.68	1	1
SC13	0.315	0.684	0.305	0.297	0.195	0.404	0.169	0.265
TC14	0.842	1	0.63	1	0.621	0.645	0.176	0.075
AC15	0.924	1	1	1	1	1	1	1

Based on Table 4.1, there are 4 cooperatives that are efficient in 2013. Remarkably, SC12 are efficient during the period of the study except in 2015. AC15 also efficient from 2011 to 2017. Table 4.2 indicates that there are 4 cooperatives that are efficient consecutively during the period of the study. Table 4.3 shows SC12 is efficient during the period of the study except 2015 and AC15 is efficient from 2011 to 2017.

Table 4.2: Pure technical efficiency of cooperatives

Cooperatives	2010	2011	2012	2013	2014	2015	2016	2017
CC1	1	0.967	0.96	1	0.837	1	1	1
CC2	0.772	0.688	0.543	0.586	0.422	0.671	0.741	0.501
CC3	1	0.664	0.48	0.434	0.378	0.7	0.767	0.913
CC4	0.754	0.647	0.577	0.639	0.494	0.71	0.933	1
CC5	1	0.876	0.7	0.75	0.554	0.713	0.117	0.211
CC6	0.727	0.608	0.48	0.526	0.414	0.634	0.907	0.932
CC7	0.396	0.375	0.279	0.325	0.336	0.273	0.18	0.355
CC8	0.929	0.368	0.293	0.436	0.327	0.464	0.828	1
CC9	0.83	0.707	0.586	0.667	0.512	0.727	0.724	0.729
BC10	1	1	1	1	1	1	1	1
BC11	0.578	0.398	0.333	0.33	0.278	0.347	0.402	0.41
SC12	1	1	1	1	1	1	1	1
SC13	0.319	0.697	0.31	0.311	0.199	0.407	0.17	0.267
TC14	1	1	1	1	1	1	1	1
AC15	1	1	1	1	1	1	1	1

Table 4.3 Scale efficiency of cooperatives

Cooperatives	2010	2011	2012	2013	2014	2015	2016	2017
CC1	0.899	0.658	0.77	0.887	0.5	0.668	0.899	1
CC2	0.995	0.993	0.99	0.996	0.993	0.998	0.986	0.985
CC3	1	0.966	0.939	0.976	0.938	0.966	0.912	0.893
CC4	0.997	0.988	0.984	0.993	0.986	0.995	0.987	0.99
CC5	1	0.996	0.994	0.997	0.995	0.998	0.985	0.958
CC6	0.994	0.991	0.985	0.994	0.987	0.994	0.977	0.976
CC7	0.962	0.97	0.956	0.979	0.948	0.971	0.911	0.893
CC8	0.881	0.924	0.994	0.907	0.998	0.999	0.997	1
CC9	0.995	0.982	0.975	0.987	0.968	0.983	0.955	0.935
BC10	0.323	0.757	0.755	1	0.852	1	0.773	0.668
BC11	0.956	0.919	0.843	0.811	0.632	0.658	0.532	0.548
SC12	1	1	1	1	1	0.68	1	1
SC13	0.988	0.982	0.983	0.956	0.983	0.993	0.995	0.991
TC14	0.842	1	0.63	1	0.621	0.645	0.176	0.075
AC15	0.924	1	1	1	1	1	1	1

The mean values of OTE, PTE, and SE of cooperatives in Malaysia from 2010 to 2017 are depicted in Table 4.4. The result shows that co-operatives in Malaysia exhibited 74.1%, 82% and 91.7% of OTE, PTE, and SE, respectively, during the study period. In 2014, the level of efficiency was lower than that in other years, which could be due to the low income of the co-operatives. For example, in the annual report of CC1, CC2 and BC11 indicate a decline in their net income in 2014 compared to that in 2013 and 2015. Overall, from 2010 to 2017, the results indicate that scale efficiency dominated the overall technical efficiency, implying that Malaysian co-operatives had been performing better because of the scale of their operation instead of good managerial performance. Thus, it is suggested that co-operatives need to maintain a good scale in terms of membership fees and shared capital to enhance scale efficiency.

Table 4.4: Average of OTE, PTE and SE from 2010 to 2017 of 16 selected co-operatives

	OTE	**PTE**	**SE**
2010	0.741	0.820	0.917
2011	0.685	0.733	0.942
2012	0.571	0.636	0.920
2013	0.649	0.667	0.965
2014	0.508	0.583	0.893
2015	0.631	0.710	0.903
2016	0.618	0.718	0.872
2017	0.643	0.755	0.861
MEAN	0.741	0.820	0.917

We now discuss how the returns to scale of co-operatives in Malaysia. A constant return to scale (CRS) situation is one in which an increase in inputs leads to an equal increase in outputs. The term "declining return to scale" refers to an increase in inputs that results in a lower increase in output. The term "increasing return to scale" (IRS) describes how an increase in inputs leads to an increase in output.

From the results of the developments in returns to scale of co-operatives in Malaysia. We can see the constant return to scale (CRS), increasing return to scale (IRS), and decreasing return to scale (DRS) of Malaysian co-operatives. The result reveals that the majority of the Malaysian co-operatives were operating at IRS. This study recommends that the output increase by a larger proportion than the increase in inputs during the production process. Therefore, Malaysian co-operatives need to increase their inputs in order to produce more outputs.

6.0 CONCLUSION AND RECOMMENDATIONS

This paper investigates the efficiency of cooperatives in Malaysia from the year 2010 to 2017. The selection of non-parametric Data Envelopment Analysis (DEA) methodology has allowed us to distinguish between the three different types of efficiency, such as technical, pure technical, and scale efficiency. During this period, co-operatives in Malaysia showed a good performance in scale efficiency rather than pure technical efficiency.

Based on our analysis, the overall result from the year 2010 to 2017 indicates that scale efficiency dominated the overall technical efficiency. From the mean efficiency scores, the cooperatives were 91.7 percent efficient on SE, meaning only 8.3 percent inefficiency levels by the scale efficiency score. This result is implying that Malaysian co-operatives had been performing better because of the scale of their operation instead of good managerial performance. The results presented are consistent with the findings of Ismail & Sarif (2010) where the studies of cooperatives efficiency show that lack of managerial capacity.

Thus, it is suggested that co-operatives need to maintain a good scale in terms of membership fees and shared capital to enhance scale efficiency. This finding would provide guidance for the co-operatives sector to improve its performance, especially in the less efficient part such as OTE and PTE. The sample selected only 15 cooperatives: a larger sample would provide a better understanding of the efficiency levels of cooperatives in Malaysia. In a conclusion, Cooperative plays a vital role in global economic development. Highlighting the efficiency of the cooperatives in three main dimensions would help the cooperatives to take proper action towards enhancement of technical efficiency of cooperatives.

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