

Relative Efficiency of Kenyan Commercial Banks

Isaiah Onsarigo Miencha, M. Selvam, R. Rajesh Ramkumar and V. Karpagam
Department of Commerce and Financial Studies, Bharathidasan University,
620024 Tiruchirappalli, Tamil Nadu, India

Abstract: Banking has been considered before and after independence, as the main sector that contributes significantly to the development of national economy and hence, the efficiency of commercial banks gains significance. This study aims to find the relative efficiency of a few selected Kenyan Commercial Banks. The analysis of the study, using operation approach research and intermediation approach, reveals the efficiency of Kenyan Commercial Banks. However, the efficiency of sample banks showed inefficiency in some areas during the study period. But, small banks showed better efficiency scores during the study period.

Key words: Kenyan Commercial Banks, data envelopment analysis, banking industry, development, India

INTRODUCTION

The banking sector contributes substantially and greatly for the growing economy to any country and hence, the efficiency of commercial banks gains significance. After the financial crisis in 1997 and 2008, the efficiency of Kenya's Commercial Banks to the Total Factor Productivity (TFP) growth was sharply declining due to enormous Non-Performing Loans (NPLs), stemming from inappropriate lending to real estate sector (borrowing short but lending long) and the heavier repayment burden with foreign currency liabilities (Central Bank of Kenya-Bank Supervision Annual Report 2009 and 2010).

However after the crisis, Kenya's Commercial Banks made profits and regained peoples' trust. Due to the importance of commercial banks to the government, households and investors, the profitability of banks is one of the most important issues for research. Moreover, people particularly the investors, expect better performance and efficiency of commercial banks under any circumstances.

Background of Kenyan Banking Industry: As the economy grows and becomes more complicated, banking sector is there to support and stimulate the economic growth of the nation. One of the central issues faced by developing economies is how to strengthen the financial system. A sound financial system stimulates economic growth by mobilizing financial saving for production purposes and managing the risks.

The Kenyan Financial System, particularly the banking sector may have to be strengthened to compete and integrate with the global financial system. The recent

economic reforms, initiated by the government of Kenya, have changed the landscape of the economy. The financial reforms have improved the banking industry to be more transparent, efficient, disciplined and competitive by changing the pattern of cost of funds, opportunities to earn income, range of financial services and the magnitude of lending priority sector. Further, these reforms created new and powerful customers and a new mix of players (public, private and foreign banks). The emerging competition caused new expectations from the existing as well as new players. With the acceleration of economic growth and the revival of investment cycle, the banking sector has witnessed a transformation in the intermediation between the demand and supply of funds. The banking business has become more competitive with the entry of multiplayer's. The banking sector has witnessed mergers and acquisitions in the previous years and they have driven the banks to improve the delivery system and offer quality banking services to customers, matching the needs of customers at reasonable cost and by increasing network. The retention of customers is the base and a complex event. Apart from streamlining the processes through technology initiatives such as ATMs, Telephone Banking, Online Banking and Web Based Products, banks have resorted to cross selling of financial products, such as credit cards, mutual fund and insurance policies to augment fee based income. The banks have adopted micro-marketing approach to promote their services. Besides, banks share technology and infrastructure to cut down technology cost. The ongoing developments in the Kenyan Banking Industry and integration of financial markets at the global level have offered countless opportunities to the banking sector.

Review of literature: An attempt has been made in this study to review the selected research work already undertaken in the area of this study, in order to understand the methodology employed and the gaps in the research.

Efficiency means the maximum output that can be produced from any given total inputs. In the banking sector efficiency is one of the most interesting economic issues for economists all over the world. This is evident from several attempts to investigate the efficiency of commercial banks by a number of economists both in Kenya and abroad. Charnes *et al.* (1978) applied a nonlinear programming model to measure the relative efficiency of Decision Making Units (DMUs). Saha and Ravisankar (2000) found that Public Sector Banks (PSB) accounted for about 85% of the Indian Commercial Banking business and supported the DEA methodology to be useful and suitable for rating the efficiency of Indian Banks. Casu and Molyneux (1998) employed DEA to investigate the efficiency in European Banking Systems. The study examined whether the productive efficiency of European Banking Systems has been improved and converged towards a common European frontier. The study by Shanmugam and Das (2004) studied banking efficiency using stochastic frontier production function model. The study considered four inputs variables (viz deposits, other borrowings, labour and fixed assets) and four outputs (viz net interest income, non-interest income, credits and investments). Kumar and Gulati (2008) studied the technical efficiency of public sector banks in India using two data envelopment analysis models, viz. the CCR model and Anderson and Petersen's super-efficiency models. The results show that the score of technical efficiency range from 0.632-1 with an average of 0.885. Thus, the overall level of technical inefficiency in Indian public sector banks was found to be 11.5%. Saha (2008) pointed out that the commercial banks like NCBs, PCBs, SCBs and FCBs have been playing a commendable role in achieving the economic growth of Bangladesh. The study focused on the performance indicators of banking activities of Bangladesh. According to Prasad V. Joshi and J.V. Bhalariao (2011), there was efficiency of major commercial banks in India and most of the banks were satisfactorily efficient. The average performance of the banking sector ranges above 80% which indicates the appropriate conversion of inputs into outputs. The public and private sector are equally efficient but the private sector has an edge over the public sector. Chansarn (2008) examined the relative efficiency of Thai Commercial Banks during 2003-06 by utilizing Data Envelopment Analysis (DEA), the study reveals that the efficiency of Thai Commercial Banks via operation

approach is very high and stable while the efficiency via intermediation approach was moderately high and somewhat volatile.

The literature review reveals that with the exception of a few, no comprehensive effort has been made recently towards a critical analysis of the efficiency level of the Kenyan Commercial Banks. In this context, the present study would be a significant venture at analyzing the efficiency of Kenyan Commercial Banks.

Statement of the problem: The study of banking efficiency is very important in policy making, industry administration and many others who rely on the banking sector. Kenyan banking industry was once dominated by public sector banks. But, now the situation has changed due to technology and professional management of private sector banks that gained remarkable position in the banking industry. The private sector banks play an important role in the development of the Kenyan economy. Therefore, the present study investigates the efficiency of Kenyan public sector banks and private sector banks. Many firms in the service industry face the problem of not producing better results in terms of efficiency. In particular, the last decade witnessed continuous changes in regulation, technology up gradation and competition in the global financial services industry and Kenyan commercial banks are no exception to this. The efficiency in the operation of banks has become an important issue in Kenya. It is therefore, crucial to benchmark the performance of banks operating in Kenya and hence this study.

Objectives of the study: The present study examines the financial performance of banks in Kenya using Data Envelopment Analysis (DEA-Input, Output Oriented).

Hypotheses of the study: The following two null hypotheses were framed and tested for this study:

- NH_1 : There is no significant difference in profitability among the selected banks during the study period
- NH_2 : There is no significant difference of influencing factors of profitability among the selected banks during the study period

MATERIALS AND METHODS

Sample selection: As on March 31st, 2009, there were totally 45; 5 public sector banks, 28 private sector banks and 12 foreign sector banks in Kenya. The present study covered only 10 Kenyan commercial banks, based on their top performance i.e., three large banks (Cooperative Bank

of Kenya, Barclays Bank of Kenya and Equity Bank of Kenya), 4 medium size banks (Diamond Trust Bank of Kenya, National Bank of Kenya, Family Bank of Kenya and Commercial Bank of Africa-Kenya) and 3 small banks (Equatorial Bank of Kenya, Jamii Bora Bank of Kenya and Development Bank of Kenya).

Period of study: The study period covered a period of 4 years from January, 2007 to December, 2010.

Sources of data: This study was mainly based on secondary data. The required data were collected from annual report published by Central Bank of Kenya, various reputed journals and respective bank websites.

Tools used

Data envelopment analysis: The Data Envelopment Analysis (DEA) is a performance measurement technique used for analyzing the relative efficiency of productive units, having multiple inputs and multiple outputs. It is a non-parametric analytic technique which compares the relative efficiency of units using a benchmark and by measuring the inefficiencies in input combinations in units relative to the benchmark. Farrell measured the technical efficiency of production input in a single output case. DEA was originally developed by Charnes *et al.* (1978) with the assumption of constant return to scale. This study uses CCR-Model using the following formula:

$$\text{Efficiency} = \frac{\text{Weightedsum of outputs}}{\text{Weightedsum of intputs}}$$

The weights for the ratio are determined by the restriction that similar ratios for every DMU have to be less than or equal to unity, thus reducing multiple inputs and outputs to a single virtual output without requiring pre-assigned weights. Therefore, the efficiency score is a function of the weights of the virtual input-output combination. The relative efficiency score of a given DMU_o is obtained by solving the following linear programming model:

$$\max h_0(u, v) = \frac{\sum_{r=1}^s v_r Y_{r0}}{\sum_{i=1}^m u_i X_{i0}}$$

Where:

- X_{ij} = The amount of input i utilized by the jth DMU
- Y_{rj} = The amount of output r utilized by the jth DMU
- U_i = Weight given to input i

The linear programming model shown above is run n times for identifying the relative efficiency score of all the DMUs. Each DMU selects input weights that maximize its

efficiency score. Generally, a DMU is considered to be efficient if it obtains a score of 1.00, implying 100% efficiency whereas a score of <1.00 implies that it is inefficient.

For the purpose of calculating data for this study, Data Envelopment Analysis Online Software (DEAOS) was used.

Limitations of the study: The present study suffers from the following major limitations:

- The study was based on only secondary data
- The study focused only on the productivity efficiency of sample banks
- The study examined the relative efficiency of Kenyan commercial banks and not their absolute efficiency
- The period of the study was limited to 4 years only
- It was limited to aspecific number of banks

RESULTS

Analysis of the relative efficiency of commercial banks: For the purpose of this study, the analysis of relative efficiency of sample commercial banks is made as follows:

Relative efficiency of commercial banks through operation approach from 2007-2010: The result of relative efficiency of sample commercial banks through operation approach is presented in Table 1. According to Table 1, the average efficiency of Kenyan sample commercial banks during the study period from 2007-2010, ranged from 0.6131-0.7508 which is considered to be moderately efficient. In the year 2007, the average efficiency score was at 0.6131. It is to be noted that three sample commercial banks, namely; Barclays Bank of Kenya, Equity Bank of Kenya and Commercial Bank of Kenya were considered to be efficient with the efficiency

Table 1: Relative efficiency of commercial banks through operation approach from 2007-2010

Name of the banks	2007	2008	2009	2010	Average score
Large sector banks					
Cooperative Bank of Kenya	0.1084	0.8620	0.7743	1.0000	0.6862
Barclays Bank of Kenya	1.0000	0.8944	0.7926	1.0000	0.9218
Equity Bank of Kenya	1.0000	1.0000	1.0000	0.6933	0.9233
Medium sector banks					
Diamond Trust Bank of Kenya	0.6665	0.7574	0.5559	0.7010	0.6702
National Bank of Kenya	0.8100	0.8341	0.8860	0.5076	0.7594
Commercial Bank of Africa	1.0000	1.0000	1.0000	1.0000	1.0000
Family Bank of Kenya	0.4117	0.4458	0.3820	0.8641	0.5259
Small sector banks					
Equatorial Bank of Kenya	0.3120	0.8168	0.5525	0.3102	0.4979
Jamii Bora Bank of Kenya	0.4067	0.4148	0.2487	0.1340	0.3011
Development Bank of Kenya	0.4165	0.4825	0.3803	0.1586	0.3595
Average score	0.6132	0.7508	0.6572	0.6369	-

Central Bank of Kenya publication between 2007-2010 and respective bank websites

scores of 1.00, implying that these banks had produced their output on the efficiency frontier in the year.

The Diamond Trust Bank and the National Bank of Kenya, however recorded efficiency scores of 0.6665 and 0.8100, respectively implying that if the National Bank of Kenya could increase its output by 1.9% and Diamond Trust Bank of Kenya by 3.34% with the same amount of input, they could be considered efficient. It is surprising to note that the other sample banks, namely; Development Bank of Kenya, Equatorial Bank, Family Bank of Kenya and Jamii Bora Bank of Kenya were also less efficient in 2007. If these banks could increase their outputs by 68.35, 68.80, 58.83 and 59.33%, respectively with the same amount of input, they could operate on the efficiency frontier. It is to be noted that only 1 bank, namely Cooperative Bank of Kenya was the least efficient bank in 2007 with the efficiency score of 0.1084, indicating that if it could increase its output by 89.16% with the same amount of input it could be considered efficient.

Table 1 also shows that in 2008, the average efficiency score earned by all sample banks increased from 0.6131 in 2007 to 0.7508 in 2008. It is to be noted that out of 10 sample banks taken for this study, only 2 banks, namely, Equity Bank of Kenya (1.00) and Commercial Bank of Africa (1.00) were considered efficient because these banks had produced their outputs at the efficient frontier. However, Cooperative Bank of Kenya, Barclays Bank of Kenya, Diamond Trust Bank of Kenya, Equatorial Bank of Kenya and National Bank of Kenya had produced their outputs with the efficiency scores of 0.8620, 0.8944, 0.7574, 0.8168 and 0.8341, respectively indicating that Cooperative Bank of Kenya had to increase its output by 13.80%, Barclays Bank of Kenya by 11.10%, Diamond Trust Bank of Kenya by 24.30%, Equatorial Bank of Kenya by 18.30% and National Bank of Kenya by 16.60%, respectively. The Development Bank of Kenya, Family Bank of Kenya and Jamii Bora Bank of Kenya earned least efficiency scores of 0.4825, 0.4458 and 0.4148, respectively which indicates that they should increase their output by 51.75, 55.42 and 58.52%, respectively with the same amount of input, in order to operate in the efficiency frontier.

According to the analysis of Table 1 in 2009, the average efficiency scores earned by all sample banks decreased from 0.7508 in 2008 to 0.6572 in 2009. Out of 10 banks, Equity Bank of Kenya and Commercial Bank of Africa-Kenya were considered to be efficient with efficiency score of 1.0000 at which they maintained their input and the output efficiently. The sample banks like Cooperative Bank, Barclays Bank and National Bank of Kenya achieved the efficiency scores of 0.7743, 0.7926

and 0.8860, respectively and this indicates that these banks should increase their output by 22.57, 20.74 and 11.40%, respectively to be considered efficient. It is also understood that banks like Diamond Trust Bank, Development Bank of Kenya, Equatorial Bank of Kenya, Family Bank of Kenya and Jamii Bora Bank of Kenya earned least efficient scores of 0.5559, 0.3804, 0.5525, 0.3820 and 0.2487, respectively which indicates that they had to increase their outputs by 44.41, 61.96, 44.75, 61.80 and 75.13%, respectively.

The analysis of data for the year 2010 clearly reveals that the average efficiency score further decreased from 0.6572 in 2009 to 0.6369 in 2010. It is to be noted that out of total 10 sample banks, Cooperative Bank of Kenya, Barclays Bank of Kenya and Commercial Bank of Africa were considered efficient bank with the efficiency scores of 1.00. It is clear that except Commercial Bank of Africa which maintained its efficiency as 1.00 other 2 banks, namely, Cooperative Bank and Barclays Bank of Kenya had to increase their efficiency to the level of 1.00 by increasing their output by 22.57 and 20.74%, respectively from the previous year (2009).

The overall analysis of result through operation approach clearly indicates that the Commercial Bank of Africa was, also efficient in all years of study period. The Equity Bank of Kenya was efficient in 2007-2009 except in 2010. The Cooperative Bank of Kenya was found to be efficient bank only in 2010. The efficiency score value kept fluctuating all through indicating the lowest efficiency in 2007 (0.1084). The National Bank of Kenya maintained an average efficiency of 0.7594 indicating that it should increase its output by 24.06% with the same input to be considered efficient. Eventually, the Development Bank of Kenya earned the least average efficiency score of 0.3595 which indicates that the Development Bank of Kenya need to increase its output by 64.05% with the same input to achieve efficiency.

Relative efficiency of commercial banks through intermediation approach from 2007-2010:

Table 2 shows the analysis of relative efficiency of commercial banks through intermediation approach. According to Table 2, the average efficiency score of sample commercial banks during 2007-2010 ranged from 0.6308-0.7994 which is fairly high but somewhat volatile and lower than the average efficiency (0.6131-0.7508) by operation approach. It is to be noted that in 2007, the average efficiency for all sample banks was at 0.6308. Only 2 commercial banks, namely; Development Bank of Kenya and Equatorial Bank of Kenya were considered efficient as these banks' efficiency score was 1.0 whereas the other 8 commercial banks (Cooperative Bank of Kenya, Barclays

Table 2: Relative efficiency of commercial banks through intermediation approach from 2007-2010

Name of the banks	2007	2008	2009	2010	Average score
Large banks					
Cooperative Bank of Kenya	0.8119	0.2180	0.2189	0.1951	0.3610
Barclays Bank of Kenya	0.8723	1.0000	0.7045	0.5799	0.7892
Equity Bank of Kenya	0.7096	0.7099	0.7090	1.0000	0.7821
Medium sector banks					
Diamond Trust Bank of Kenya	0.2577	0.2191	0.2766	0.3098	0.2658
National Bank of Kenya	0.5733	0.3283	1.0000	1.0000	0.7254
Commercial Bank of Africa	0.7733	1.0000	1.0000	1.0000	0.9433
Family Bank of Kenya	0.6517	0.8975	1.0000	0.9622	0.8779
Small sector banks					
Equatorial Bank of Kenya	1.0000	1.0000	0.8918	1.0000	0.9730
Jamii Bora Bank of Kenya	0.6569	0.9693	0.9452	0.9466	0.8795
Development Bank of Kenya	1.0000	1.0000	1.0000	1.0000	1.0000
Average score	0.6308	0.7341	0.7746	0.7994	-

Central bank of Kenya publication in the year 2007-2010 and respective bank websites

Bank of Kenya, Equity Bank of Kenya, Diamond Trust Bank of Kenya, National Bank of Kenya, Commercial Bank of Africa-Kenya, Family Bank and Jamii Bora Bank of Kenya) were less efficient under the efficiency frontier. It is to be noted from the analysis of Table 2 that the Cooperative Bank had to raise its output by 18.81%, Barclays Bank of Kenya by 12.77%, National Bank of Kenya by 42.67%, Equity Bank by 29.04%, Commercial Bank by 22.67%, Family Bank of Kenya by 34.83% and Jamii Bora Bank by 34.31% for reaching efficiency with the same amount of input. The Diamond Trust Bank was the least efficient bank in 2007 with the efficiency score of 0.2577, indicating that it had to increase its output by 74.23% with the same amount of input.

According to the analysis of data for the year 2008, the average efficiency for all sample commercial banks increased to 0.7341 in 2008 from 0.6308 in 2007. The 4 commercial banks, namely; Barclays Bank of Kenya, Development Bank of Kenya, Equatorial Bank of Kenya and Commercial Bank of Africa-Kenya were considered efficient as their efficiency score was 1.0. The Equity Bank, Family Bank and Jamii Bora Bank of Kenya with an efficiency score of 0.7096, 0.8975 and 0.9693, respectively had to increase their output by 29.04, 1.25 and 3.07%, respectively with the same amount of input. The Cooperative Bank and National Bank of Kenya were the least efficient banks in 2008 with the efficiency score of 0.2180 and 0.3283, respectively indicating that they had to raise their outputs by 78.20 and 67.17%, respectively to be regarded efficient banks.

It is understood from Table 2 that the average efficiency for all sample Kenyan Commercial Banks, through intermediation approach, increased from 0.7341 in 2008 to 0.7746 in 2009. However, there were 4 commercial banks which were considered to be efficient. Those were

Development Bank of Kenya, National Bank of Kenya, Commercial Bank of Africa and Family Bank of Kenya whose efficiency scores were exactly 1.0000. It is to be noted that Cooperative Bank and Diamond Trust Bank of Kenya were the least efficient in 2009. They had to raise their output by 78.11 and 72.34%, respectively to be considered efficient bank. The Barclays Bank, Equatorial Bank, Equity Bank and Jamii Bora Bank of Kenya had, also produced their outputs under the efficiency frontier with the efficiency scores of <1.0 that is 0.7045, 0.8918, 0.7090 and 0.9452, respectively indicating that these banks had to increase their output by 29.56, 10.82, 29.10 and 5.48%, respectively with the same amount of input.

It is observed from Table 2 that in 2010, the average efficiency score via intermediation approach for all sample Kenyan commercial banks increased from 0.7746 in 2009 to 0.7994 in 2010. It is to be noted that out of 10 sample commercial banks of Kenya; 5 of the commercial banks, namely, Development Bank of Kenya, Equatorial Bank of Kenya, National Bank of Kenya, Equity Bank of Kenya and Commercial Bank of Africa-Kenya were at efficient zone with an efficiency score of exactly 1.0. But two banks, Family Bank of Kenya and Jamii Bora Bank of Kenya, earned an efficiency score of 0.9622 and 0.9466, respectively indicating that they should increase their output by 3.78 and 5.34%, respectively. It is shocking to note that the Cooperative Bank of Kenya, Barclays Bank of Kenya and Diamond Trust Bank of Kenya, as observed from Table 2 were considered the least efficient as their efficiency scores were at 0.1951, 0.5799 and 0.3098, respectively indicating that they should increase their output by 80.49, 42.01 and 79.02% without increasing the amount of the input in 2010.

The performance analysis of individual banks through intermediation approach during the period from 2007-2010 clearly indicates that no commercial bank considered efficient in all the years of the study period. However, few sample banks, namely, Barclays Bank of Kenya, Development bank of Kenya, Equatorial Bank of Kenya, Commercial Bank of Africa, Family Bank of Kenya and Jamii Bora Bank of Kenya were efficient in some years with the average efficiency score of 0.7892, 1.0000, 0.9730, 0.9433, 0.8779 and 0.8795, respectively. It is important to note here that 2 banks, namely; Cooperative Bank and Diamond Trust Bank of Kenya were considered the least performing banks with an average efficiency score of 0.3610 and 0.2658, respectively from 2007-2010.

According to the results in Table 1 and 2, it is clearly understood that Kenyan Commercial Banks taken for the study were less efficient with a fair efficiency ranging from 0.6308-0.7994 under the intermediation approach and 0.6132-0.7508 under operation approach.

The reason for the lower efficiency score earned by Kenya Commercial Banks taken for this study was probably the impact of financial crisis in 1997 and 2008. Besides, it is to be noted that prior to the crisis, every commercial bank in Kenya had lent inappropriately to real estate business (borrowing for short term but lending for long term) which created enormous amount of Non-Performing Loans (NPLs).

Comparison between operation approach and intermediation approach for the sample banks in 2007:

Figure 1 shows the comparison of efficiency of sample banks between Operation Approach (OA) and Intermediation Approach (IA) for the sample banks in 2007. It is to be noted that the efficient banks have earned values of 1.00, the range of values earned by moderate efficient have between 0.500-0.99 while the range of value of inefficient banks was <0.500. It is found that 5 sample Kenyan Commercial Banks, Cooperative Bank of Kenya (CoBK), Family Bank of Kenya (FBK), Equatorial Bank of Kenya (EQBK), Jamii Bora Bank of Kenya (JBBK) and Development Bank of Kenya (DBK) were inefficient under operation approach and 1 sample bank Diamond Trust Bank of Kenya (DTBK) under intermediation approach indicating a good performance, 2 banks Diamond Trust Bank of Kenya (DTBK) and National Bank of Kenya (NBK) were moderately efficient in operation approach and 7 sample banks (Cooperative Banks, Barclays Bank of Kenya, Equity Bank of Kenya, National Bank of Kenya, Commercial Bank of Africa, Family Bank of Kenya and Jamii Bora Bank of Kenya) under intermediation approach, lastly, there were three efficient sample

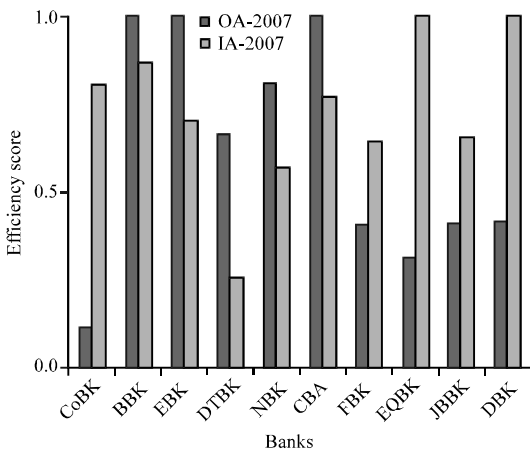


Fig. 1: Comparison between operation and intermediation approach for the sample banks in 2007; 0-0.5 indicates inefficiency; 0.5-1 Indicates efficient

banks Barclays Bank of Kenya (BBK), Equity Bank of Kenya (EBK) and Commercial Bank of Africa (CBA) in operation approach and 2 efficient sample banks (Equatorial Bank of Kenya and Development Bank of Kenya) in intermediation approach which indicates that they still require some little inputs and outputs to be efficient.

Comparison between operation approach and intermediation approach for the sample banks in 2008:

Figure 2 shows the comparison between Operation Approach (OA) and Intermediation Approach (IA) for the sample banks in 2008 from Fig. 2, it is clear that only Equity Bank of Kenya and Commercial Bank of Africa (CBA) were efficient under operation approach and 4 sample banks; Barclays Bank of Kenya, Commercial Bank of Africa, Equatorial Bank of Kenya (EQBK) and Development Bank of Kenya were efficient under intermediation approach. Commercial Bank of Kenya, Barclays Bank of Kenya (BBK), Diamond Trust Bank of Kenya (DTBK), National Bank of Kenya (NBK), Equatorial Bank of Kenya and Development Bank of Kenya (DBK) were moderately efficient under operation approach and Equity Bank of Kenya (EBK), Family Bank of Kenya (FBK) and Jamii Bora Bank of Kenya were moderately efficient in intermediation approach. Family Bank of Kenya and Jamii Bora Bank of Kenya (JBBK) under operation approach and Cooperative Bank of Kenya (CoBK), Diamond Trust Bank of Kenya and National Bank of Kenya in intermediation approach showed negligible inefficiency though still they require some percentages to improve their efficiency.

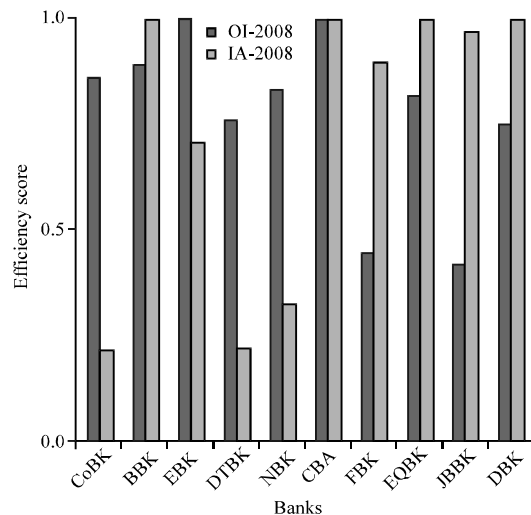


Fig. 2: Comparison between operation and intermediation approach for the sample banks in 2008; 0-0.5 indicates inefficiency; 0.5-1 indicates efficient

Comparison between operation approach and intermediation approach for the sample banks in 2009:

The comparison of efficiency of sample banks between Operation Approach (OA) and Intermediation Approach (IA) in 2009 is shown in Fig. 3. It is found that 3 banks under operation approach (Family Bank of Kenya, Jamii Bora Bank of Kenya and Development Bank of Kenya) and 2 sample banks under intermediation approach Cooperative Bank of Kenya (CoBK) and Diamond Trust Bank of Kenya (DTBK) were inefficient with ranges of 0.2189 and 0.2766. Equity Bank of Kenya and Commercial Bank of Africa were efficient under operation approach and 4 banks; National Bank of Kenya, Commercial Bank of Africa (CBA), Family Bank of Kenya (FBK) and Development Bank of Kenya (DTBK) were efficient under intermediation approach. Cooperative Bank of Kenya, Barclays Bank of Kenya (BBK), Diamond Trust bank of Kenya, National Bank of Kenya (NBK) and Equatorial Bank of Kenya (EQBK) were moderately efficient under operation approach while Barclays Bank of Kenya, Equity Bank of Kenya (EBK) and Jamii Bora Bank of Kenya (JBBK) under intermediation approach.

Comparison between operation approach and intermediation approach for the sample banks in 2010:

Figure 4 shows the comparison of efficiency of sample banks between Operation Approach (OA) and Intermediation Approach (IA) for the sample banks which clearly shows the efficiency of 3 Kenyan Commercial Banks under operation approach Cooperative Bank of Kenya (CoBK), Barclays Bank of Kenya and

Commercial Bank of Africa and Equity Bank of Kenya (EBK), National Bank of Kenya (NBK), Commercial Bank of Africa, Equatorial Bank of Kenya (EQBK) and Development Bank of Kenya (DBK) were absolutely (100%) efficient under intermediation approach. Equity Bank of Kenya, Diamond Trust Bank of Kenya (DTBK), National Bank of Kenya (NBK) and Family Bank of Kenya were moderately under operation approach. Barclays Bank of Kenya (BBK), Family Bank of Kenya (FBK) and Jamii Bora Bank of Kenya were, also considered to be efficient under intermediation approach. The analysis of the output inefficiency shows the fact that Equatorial Bank of Kenya, Jamii Bora Bank of Kenya and Development Bank of Kenya received high output inefficiency score under operation approach and Cooperative Bank of Kenya and Diamond Trust Bank of Kenya under intermediation approach accounted for less output inefficiency score which were more less than the same.

Relative efficiency of commercial banks (size) through operation approach from 2007-2010:

The sample commercial banks taken for this study were divided into three categories according to their market shares of total assets. Large banks include all commercial banks with market share to total assets not <10%, medium banks cover all commercial banks with market share to total assets not <3% and not >10% and small banks include all commercial banks with market share of total assets <3%.

The relative efficiency of sample commercial banks (size) in Kenya is shown in Table 3. The analysis of Table 3 reveals that large banks and medium banks earned value of 0.8452 and 0.7377, respectively which is

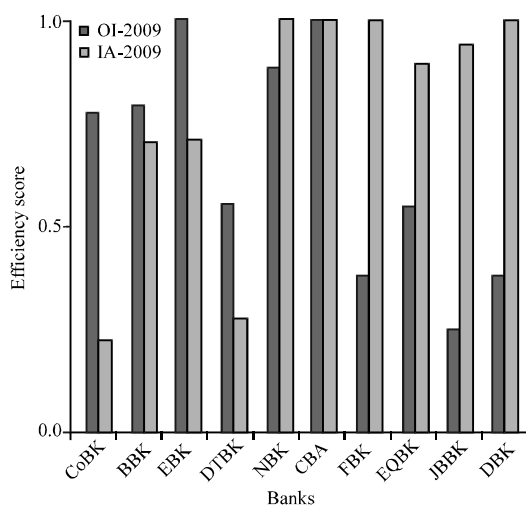


Fig. 3: Comparison between operation and intermediation approach for the sample banks in 2009; 0-0.5 indicates inefficiency; 0.5-1 indicates efficient

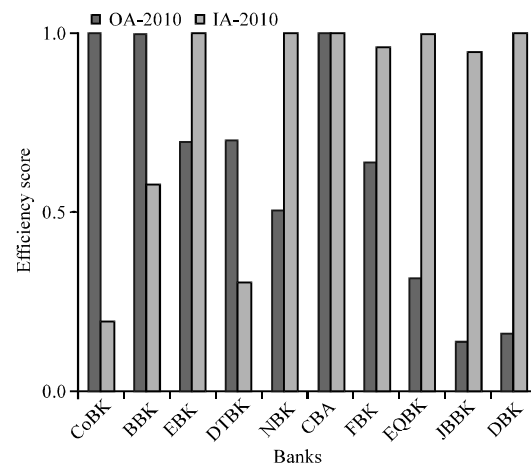


Fig. 4: Comparison between operation and intermediation approach for the sample banks in 2010; 0-0.5 indicates inefficiency; 0.5-1 indicates efficient

Table 3: Relative efficiency of commercial banks (size) through operation approach from 2007-2010

Banks	2007	2008	2009	2010	Average
Large bank (3)	0.7084	0.9188	0.8556	0.8978	0.8452
Medium banks (4)	0.7221	0.7593	0.7010	0.7682	0.7377
Small banks (3)	0.3811	0.5714	0.3939	0.2009	0.3868
Average	0.6039	0.7498	0.6502	0.6223	-

Central bank of Kenya publication 2008-2010 and respective banks websites. Researchers' own calculation; large banks include; Cooperative Bank of Kenya; Barclays Bank of Kenya and Equity Bank of Kenya; medium banks include Diamond Trust Bank of Kenya, National Bank of Kenya, Commercial Bank of Africa and Family Bank of Kenya; small banks include Equatorial Bank of Kenya, Jamii Bora Bank of Kenya and Development Bank of Kenya

Table 4: Relative efficiency of commercial banks via intermediation approach from 2007-2010

Banks	2007	2008	2009	2010	Average
Large banks	0.7979	0.6463	0.5441	0.5916	0.6450
Medium banks	0.5640	0.6112	0.8179	0.8180	0.7028
Small banks	0.8856	0.9898	0.9457	0.9822	0.9508
Average	0.7492	0.7491	0.7692	0.7973	-

Central Bank of Kenya publication 2008-2010 and respective bank websites; Researchers' own calculation

considered to be fairly efficient. In other words, they produced their outputs perfectly at the efficient frontier during the study period. The small banks earned average efficiency score of 0.3868 which is considered to be inefficient. Therefore, small banks should increase their output by 61.32%, using the same amount of input to become efficient.

Relative efficiency of commercial banks via intermediation approach from 2007-2010: Table 4 presents the analysis of relative efficiency of Kenyan Commercial Banks (size) through intermediation approach. Table 4 clearly shows that on an average, small banks were fairly efficient with efficiency scores of 0.9508, against medium banks with their average efficiency at 0.7028. Large banks were considered to be relatively inefficient with an average of 0.6450. The efficiency scores of banks clearly indicate that large banks, medium banks and small banks should raise their output by 35.50, 29.72 and 4.92%, respectively using the same amount of input, to be considered efficient.

The analysis of results given in Table 3 and 4 clearly confirm that sample commercial banks in Kenya were not efficient under operation approach, as well as under intermediation approach. Large and medium banks, on an average did not show much difference in the efficiency score via operation approach while small banks showed less efficient score of 0.3868. This clearly shows the fact that size of commercial banks exercised an influence on the performance of commercial banks in Kenya in costs/revenues management. On the other hand, small banks performed fairly well, though not efficient as per the intermediation approach and they could perform the role

of financial intermediaries, using labor and capital to transfer deposits into loans and investments. The revenues of commercial banks in Kenya generally come from two sources, namely; interest and non-interest incomes.

DISCUSSION

The present study investigated the relative efficiency of sample commercial banks in Kenya using the data envelopment analysis. The relative average efficiency score for all sample banks over the years was at 65.66% which is fair. The Equity Bank of Kenya was efficient in the years 2007-2009 with an efficiency score of 1.0000. The efficiency score of Family Bank of Kenya was 52.59%, National Bank of Kenya recorded 75.94 % and Equatorial Bank of Kenya recorded 49.79%. From this study, it is clear that the performance of Kenyan Commercial Banks should be improved. A few policy initiatives in the banking system are proposed for improving the performance of Kenyan Commercial Banks, based on detailed and intensive research.

A similar study was conducted by Supachet Chansarn-Bangkok University, Bangkok in the year 2008 in Thailand. In the study, the average efficiency of Thai Commercial Banks during 2003-2006 ranged from 0.9106-0.9720 which is considered to be high and stable. Four Commercial Banks, namely; Kasikorn Bank, Siam Commercial Bank, Thanachart Bank and Standard Chartered Bank (Thai) were considered to be highly efficient with the efficiency scores of 1.00. The other banks, Bangkok Bank, Krung Thai Bank and Siam City Bank were also found to be efficient with a score of 0.9486, 0.9558 and 0.9707. A bank namely, Bankthai was found to be the least efficient with the efficiency score of 0.6478.

Another study conducted by Prasad and Bhalerao, Nashik, India 2011 found that the efficiency of the Indian Banking sector was above 80%. They also, found that the public and private sector banks were equally efficient, though the private sector registered a margin over the Public Sector Banks. It was also found in their study that Canara Bank, Punjab National Bank, J and K Bank and Bank of Baroda were very efficient and they were consistent in their performance. But, banks like SBI, ICICI had an efficiency score which was below the satisfactory level. But, ICICI Bank had recorded a remarkable improvement.

It is important that the present study, also recorded results similar to that of the study conducted in Thailand and India. Therefore, the present study confirms the findings of earlier studies referred to above.

SUGGESTIONS

It is to be noted that the performance of Kenyan Banks should be improved. Few suggestions for improving the performance of the Kenyan Banks are furnished below:

- First, they need to implement the policy of 'Know Your Customer' which would help the banks to improve the business and the probability of recovering the loans and decreasing the risks in operations
- Secondly, instead of setting up permanent branches in remote areas, it is always better to provide banking services through self help groups in such areas by identifying suitable and committed persons and thus, enabling banks to save enormous human and monetary expenses

CONCLUSION

Finally, interacting with people for the purpose of explaining bank products to them and convincing them that banks are committed towards development of people rather than mere profits for banks would lead the people to access banking services to the maximum, particularly in rural areas where people still feel that the banks are just organized moneylenders. All round efforts are to be made by Kenyan banks to create confidence among people about banking services.

ACKNOWLEDGEMENTS

The researchers expressed their sincere wishes and gratitude to Bharathidasan University, Tiruchirappalli for providing an opportunity for this research work. Researchers are also grateful to all research workshop professors in the department for their useful comments together with fellow research scholars. Finally, special thanks to my parents for their moral support.

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