AN ANALYSIS ON EFFICIENCY OF SELECTED PUBLIC SECTOR BANKS WITH REFERENCE TO DEA APPROACH.

Mr. Mehul D. Chhaniyala
Assistant Professor, Atmiya University, Rajkot.

Abstract
Banking sector plays very important role in any economy. It mobilizes deposits and transfers the savings to those who are in need of it. It collects the savings from general public for safeguard of their amount and as source of investment. Bank grants loan to borrowers and charges interest on it. Efficiency of any unit is considered with comparison of its input and output. In this study, three variables are considered in average namely Fixed assets, Interest expended and number of employees and output is considered as deposits. The DEA approach follows liner programming and researcher conducted analysis via online software. Under DEA approach, CCR(charnes, cooper and Rhodes) model selected for analysis purpose. For the purpose of sample, five public sector banks namely State Bank of India, Industrial Development Bank of India, Punjab National Bank, Bank of Baroda and Indian overseas bank are selected on the basis of listing in BSE and selection criteria is considered as market capitalization as on Nov 3, 2020 for five years ending 2020.
Key Words: Efficiency, DEA Approach, CCR Model

Introduction
Banking in India has a long history and it has evolved over the years passing through various phases. During the last 17 years, an extensive programme of banking reforms has been followed to strengthen market institutions and allow greater autonomy to the banks. Data envelopment analysis (DEA) is a nonparametric method in operations research and economics for the estimation of production frontiers. It is used to empirically measure productive efficiency of decision making units (DMUs). Although DEA has a strong link to production theory in economics, the tool is also used for benchmarking in operations management, where a set of measures is selected to benchmark the performance of manufacturing and service operations. In benchmarking, the efficient DMUs, as defined by DEA, may not necessarily form a "production frontier", but rather lead to a "best-practice frontier".

Literature Review:
•   **Ehsan Pourjavad, Hadishirouyehzad, (2014)**, "A data envelopment Analysis approach for measuring the efficiency in continuous manufacturing lines: A case study." In this research paper researcher has been covered efficiency in production. In addition to this researcher focused on performance on continuous manufacturing lines. Researcher has applied DEA Approach and the method applied is proposed to compare and analyze similar units of industry criteria are considered as inputs and outputs to resolve this problem with DEA.

•   **Manas Kr Baidya**, "Multiple aspects of Indian banking efficiency through DEA approach". In this research paper, author adopted DEA approach to measure various efficiencies. By way of performance based efficiency, the author divided the same into Deposit Mobilizing efficiency, Fund conversing efficiency, off-balance sheet activities based efficiency and cost revenue management efficiency. On the basis of approach, the author analysed Intermediate approach Based efficiency and production approach based efficiency. The data for two years, 2009-10 and 2010-11 for total of 30 banks was selected for the study. Out of these efficiency parameters, 14 banks found to be efficient in all the criteria, 7 banks were found to be efficient in 5 criteria, 4 banks were found to be efficient in 4 criteria and the last one in three criteria.

•   **Manas Baidya, (2012),** "An analysis of the technical efficiency of Indian public sector banks through DEA approach" In this research paper, researcher selected different input variables such as Number of employees, non-labour operating cost, loanable fund and different output variables such as non-interest income and net interest income. The data for the time period of 2009-10 is taken for study. Total of 26 banks were selected as a sample of study. Researcher found that total 7 banks were efficient, 6 were marginally efficient, 7 were inefficient and 6 were distinctively inefficient.

•   **Jayanta Kumar Nandi,** (2013),"Efficiency analysis of selected public and private sector banks in India through data envelopment analysis". In this research paper, the authors compared total of 10 public and 10 private sector banks for the period of 2011-12. Total of two input variables, Interest cost and Operating cost are considered and interest income and other income are considered as output variables. Out of total PSU banks, number of 4 were efficient under constant return to scale, 7 banks were efficient under variable returns to scale. Out of total private sector banks, 3 were efficient as per constant returns to scale and 4 from variable returns to scale.

•   **Tarasankar Das, Swagata Sen (2015),** Rating of State Co-operative Banks in India: A DEA Approach.". the objectives of the study were to measure the efficiency of each state co operative banks and analyse the efficiency report. The study period was 2011-12 and data is selected as 31 state co-operative banks. The analysis shows that 80.65% banks were found to be efficient. The least efficient bank is Bihar co operative bank and the highest efficient is Sikkim co-operative bank.

•   **Suman Kumar, Santosh Rangnekar,** Performance of Public Sector Banks in India: A Study of Data Envelopment Analysis. In this research paper, researchers proposed 3 models for the measurement of input output. As per first, input variables were number of employees, fixed assets and number of output variables were investments, advances and non interest income. As per second model, input variable was expenditure on wages and output variables were non interest income and

deposits. The data from 2003-04 to 2010-11 is selected as study period. As per average of study period, 4 banks were efficient, 3 banks were inefficient and 19 banks were inefficient.

Research Methodology:

Type of Research	Analytical Research
Samples and selection criteria	5 banks namely State Bank of India, IDBI Bank, Punjab National Bank, Bank of Baroda and Indian Overseas bank with the criteria of top five banks based on market capitalization as on 3-11-2020
Tools and techniques for analysis	DEA Approach calculated by online website
Study period	Five years ending 2020
Objectives	• To understand the concept of DEA Approach • To analyze the banks based on DEA approach • To give suggestions thereof
Limitations of the study	• The study is limited to 5 years • The study is limited to five banks only • the variables selected by researcher are limited • the data is of secondary nature, it has its own limitations

Data Analysis and Interpretation

As per DEA approach, total of five banks were selected for the purpose of analysis. The DEA approach works on two ways, Input and output variables. Here, The Input variables for the bank are considered as fixed assets, number of employees and Interest expended. The output variable taken is Deposits. The influence of Fixed assets, Number of employees and Interest expended on deposits is checked by the researcher. The results and efficiency ranks are as below.

Table 1:- Efficiency score of selected Bank :-

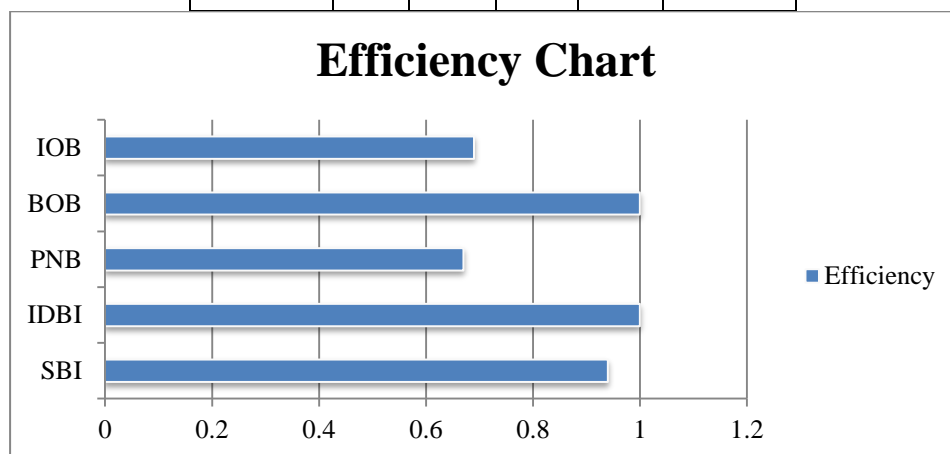| Bank	SBI	IDBI	PNB	BOB	IOB
Rank	4	1	5	1	3
Efficiency	0.94	1	0.67	1	0.69

Figure 1:- Efficiency score of selected Bank :-

The above analysis is based on efficiency and rank as per DEA approach. For the result, five banks' data for five years is considered and test is applied. The most efficient banks among all five are IDBI and BOB having efficiency score of 1 and rank as 1. The next efficient bank is SBI with rank 4 and efficiency of 0.94. The second least efficient bank is IOB with rank 3 and efficiency score of 0.69. The least efficient bank amongst all is PNB with rank of 5 and efficiency score of 0.67. the efficiency is measured on the basis of input variables namely Fixed assets, Number of Employees and Interest expended. The output variable is considered as deposits. From the above chart, we may find that Bank of Baroda and IDBI bank is efficient. Punjab National Bank is least efficient.

References

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