

## **Impact of Financial Crisis on the Sustainability of Public Sector Banks in India - A Data Envelopment Analysis**

Dr. Sangeetha R<sup>1</sup>, Dr. Jain Mathew<sup>2</sup>

<sup>1</sup>*Assistant Professor, Department of Management Studies Christ University, Hosur Road, Bangalore*

<sup>2</sup>*Professor & Head Department of Management Studies, Christ University Hosur Road, Bangalore.*

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**Abstract:** *Banking institutions play an important role in the economic development of the entire nation. Financial services industry is dominated by banking sector. Performance of any economy largely depends on the efficiency of commercial banks. Efficiency of banks depends upon diversified banking system that attracts savings and channelizes them into productive investments to generate income. The strength of the bank depends on efficiency of these operations. Banks need to convert its deposits into loans, advances and investments efficiently. Efficiency in operations results in productivity. Productivity brings in faster economic growth. The cost of these operations should be kept to the minimum in order that they are efficient. With stiff competition that characterises banking industry, the competitive advantage that one bank has over the other depends on various efficiencies. This research attempts to measure the various efficiencies of Public Sector banks (PSBs) in India and investigate the factors that influence the same. The present study uses DEA to measure the impact of financial crisis on the technical and cost efficiency of Public Sector Banks in India. In the second level Tobit regression is applied to identify the determinants of various efficiencies. This analysis uses the data from 2001-02 to 2012-13 which is extracted from RBI website and CMIE database. To measure the impact of financial crisis the study period is being classified into pre and post period. Pre period consists of six years between 2001-02 and 2006-07; whereas post period consists of 2007-08 to 2012-13. It has been found that out of 25 banks in PSBs, four banks were identified as the best performers with 100 percent technical efficiency. However, it is interesting to notice a fact that none of the bank has 100 percent cost efficiency during pre and post financial crisis period.*

**Key words:** *Cost efficiency, Data Envelopment Analysis, Financial Crisis, Public Sectors Banks, Sustainability, Technical Efficiency.*

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### **I. Introduction**

Banking institutions play an important role in the economic development of the entire nation. Financial services industry is dominated by banking sector. Performance of any economy largely depends on the efficiency of commercial banks. Efficiency of banks depends upon diversified banking system that attracts savings and channelizes them into productive investments to generate income. The strength of the bank depends on efficiency of these operations. Banks need to convert its deposits into loans, advances and investments efficiently. Efficiency in operations results in productivity. Productivity brings in faster economic growth. The cost of these operations should be kept to the minimum in order that they are efficient. With stiff competition that characterises banking industry, the competitive advantage that one bank has over the other depends on various efficiencies. This research attempts to measure the various efficiencies of scheduled commercial banks in India and investigate the factors that influence the same.

### **II. Review Of Literature**

Review of related Literature has been carried out to identify the research gap. Charnes, Cooper and Rhodes (1978) and Cooper, W. W., M, S. L., & Tone, K. (2007) proposed the DEA model to estimate the efficiency of the banking sector. Berger and Humphery (1997) in their extensive review on international literature studies have figured out 130 studies on efficiency of financial institutions covering 21 countries. A large majority of the studies the researcher has used frontier efficiency measurement techniques like “Stochastic Frontier Analysis (SFA), Data Envelopment Analysis (DEA) and Thick Frontier Analysis (TFA)” Kumar and Gulati (2008) have measured the technical efficiency of 27 public sector banks operating in India and ranked the banks on the basis of their efficiency. They used two Data Envelopment Models namely CCR model and Anderson and Patterson’ super efficiency model to check the technical efficiency of these banks using cross section data for the year 2004-05. The study revealed that only 7 out of 27 banks were efficient. The technical efficiency measurement showed that the Indian banks wasted an average inputs of 11.5 resulting in the efficiency levels ranging between 0.632 and 1. Andhra Bank was observed as the most efficient bank followed with Corporation Bank. Singh and Gupta (2012) have done a comparative analysis of the technical efficiency of top Indian banks during 2007-2011 the period of sub-prime crisis. The authors have recommended, “DEA can

be used as a suitable tool to measure the relative efficiency score of Indian banking Sector". Gupta and Garg (2011) have attempted to examine the competitiveness of commercial banks in India through the investigation of efficiency of 49 commercial banks using DEA. Gupta and Garg (2011) have attempted to examine the competitiveness of commercial banks in India through the investigation of efficiency of 49 commercial banks using DEA. The results reveal that out of 49 banks 19 banks have been technical as well as scale efficient. Bhattacharyya, Bhattacharyya, and Kumbhakar (1997) have studied the impact of deregulation on the growth in Total Factor Productivity (TFP) using Stochastic Frontier Approach (SFA). They have found that deregulation has created a positive impact on the TFP of Public Sector Banks in India. Ajoa and Ogunniyi (2010) estimate the productive efficiency of commercial banks in Nigeria considering 13 banks with detailed information. Three different types of efficiencies are calculated which exhibit that 25 percent of the banks are inefficient because of excessive use of the inputs despite mergers and acquisitions. It is suggested that environmental variables like intermediation ratio and market power positively affect the productive efficiency. Yang (2009) has attempted to evaluate 240 branches of one big Canadian bank in Greater Toronto Area and has used Data Envelopment Analysis (DEA). Special emphasis is placed on the ways to present the DEA results to management in order to guide them on how to manage and execute changes. This study has used production approach to examine how well different branches combine their resources to support the largest amount of possible services. Subandi and Ghozali (2014) have estimated the level of technical efficiency of banks using DEA for 110 conventional banks in Indonesia during 2006-They have found that size, type of banks, capital adequacy ratio, loans deposit ratio, operating expenses and net interest margin affect the level of technical efficiency significantly. Raphael (2013) has measured the productivity change of Tanzanian commercial banks through Malmquist productivity index. It is found that both the group of banks considered for the study have registered progress in technical efficiency but that progress has been due to pure technical efficiency rather than scale efficiency. Nandi (2013) has evaluated the relative performance efficiency based on Malmquist total factor productivity (TFP) of the selected public and private sector banks in India. It is found that the Public Sector Banks are better performers in terms of TFP growth as compared to the Private Sector Banks. PSBs have shown improvement in technological efficiency, which has played a major role in terms of TFP growth. It is also suggested to the RBI that, it should design a practicable protocol for technological standard requirement for the banking sector. Sekhri (2011) has measured the efficiency and productivity of public, private and foreign banks using the input output approach. He has applied DEA and Malmquist productivity index in the study to measure and compare the efficiency of the banking sector during 2004-09. The results show that the public sector banks have performed better than the private sector and foreign banks mainly because of their technical efficiency changes and usage of advanced technology. Their pure technical efficiency change index is far better than their counterparts in the private sector and the foreign banks. Haider, Yasi, Suhaib Aamir, Shahzad and Javed, (2013) have compared and analysed whether the privately owned banks perform better than state owned banks. The results appoint out the fact that the difference between the performance of public and private sector banks in Pakistan has not been significant. Qayyum and Riaz (2012) have estimated patterns of change in Malmquist Total Factor Productivity Index in periods immediately following macro economic crisis in Pakistan during 2008. Bootstrapping procedure is followed. It is found that, total factor productivity and its components have exhibited a negative growth in the year before the crisis. However, in the year following the crisis, TFP and its components have shown growth. The scale efficiency has declined in the post period showing scaling down in banking operations. This shows the impact of the crisis, which has already affected balance sheets of banks.

Among the studies, it is only 5 percent which study the efficiency of commercial banks in developing nations. As for the choice of sector, there are studies on private, public and foreign banks separately or in different combinations. None of the analyses have attempted to measure the TE of scheduled commercial banks with respect to financial crisis. This gap in studies has given the researcher scope to analyse the TE and CE of public sector banks in India. Only a very few studies have attempted to measure either technical or cost efficiencies. Studies abroad and in India have concentrated either TE or CE pertaining to different period. No attempt has been made to measure TE and CE together with determinants. Besides, only fewer of these studies attempt to measure the impact of the financial crisis on the operational efficiency of commercial banks. In addition, it is found that the studies carried out on commercial banks have not analysed the basic/primary operations which is the life blood of banks. Studies have either measured cost efficiency or technical efficiency. Fewest attempts have been made to study both. None of the previous studies in India have attempted to find out the determinants of efficiency in the banking sector. Thus the researcher is convinced that there is a strong gap in the efficiency analysis of Indian banks which necessitates an empirical analysis on the operational efficiency of Public Sector Banks in India.

### III. Data And Methodology

Secondary data is used to study the operational efficiency of PSBs in India. Operational efficiency in this study includes the banks with technical and cost efficiency. Technical and cost efficiencies are measured using the variables like fixed assets, loanable fund, employee, loans & advances and investments. The data base has been extracted from the published sources, like RBI website, CMIE (Center for Monitoring Indian Economy) data base and Indian Bankers Association (IBA). The study attempts to accomplish the objectives by dividing the data into four parts. The first part of the study identifies the technical efficiency score of public, Second stage of analysis focuses on the measurement cost efficiency of banks followed by identifying the efficiency drivers. Technical efficiency, cost efficiency and determinants of efficiency are analysed using loanable funds, fixed assets and employee as input variables and loans & advances and Investments as output variables. Technical efficiency of PSBs is analysed with regard to financial crisis. This study covers the time period of twelve years between 2001-02 and 2012-13. The total study period is divided into two taking 2007 – 08 as the starting of crisis period. It means that the period between 2001-02 and 2006-07 is considered as pre-financial crisis period. Post period includes 2007-08 to 2012-13.

#### 3.1 Statistical tools used for analysis

The analysis of the data has been carried out by using Data Envelopment Analysis (DEA) and Tobit regression. DEA is a linear programming technique for examining how a bank (decision-making unit or firm) operates relative to the other banks in the sample. The technique creates a frontier set by efficient bank and compares it with inefficient banks to produce efficiency scores. In addition, banks bordered between zero and one scores, a completely efficient bank will have an efficiency score of one. DEA assesses the efficiency of a bank, using relative efficiency score. Each inefficient financial institution will have a group of efficient institutions against which its performance is identified as inefficient. This group of efficient institutions is then described as being reference set for that inefficient institution. Using the result of DEA, ie., TE and CE score as the dependent variable Tobit regression is used to trace the determinants of TE and CE. Independent variables considered for the study are loanable funds, fixed assets and employee as input variables and loans & advances and Investments.

### IV. Results And Discussion

The TE of the PSBs is estimated using the input oriented DEA model and presented in Table 5.1. The yearly average TE of PSBs has ranged between 0.934 in the year 2001-02 and 0.985 in the year 2012-13. The mean score TE in PSBs during the study period has been 0.969. This indicates that on an average, commercial banks have used 3.03 (1-0.969\*100) percent extra inputs than required to produce the existing level of output. It means that, on average PSBs could have consumed about 3.03 percent lesser input to produce the same level of output. It indicates that, during the study period PSBs could have improved their efficiency by 3.03 percent on an average with reduced input. Standard Deviation (SD) 0.016 proves that dispersion among technical efficiency of the PSBs in India is very low. It is interesting to note that there is a continuous improvement in TE displaying consistency in the performance of banks in terms of optimum utilisation of input resources during the study period. However, the analysis confirms the presence of TIE. It means that, the banks could have reduced the quantity of input on an average by 6.6 percent, 5.3 percent, 4.9 percent, 2.4 percent, 3 percent and 2.7 percent in 2001-02, in 2002-03, in 2003-04, in 2004-05, in 2005-06, in 2006-07 respectively during the pre financial crisis period. In the same way, they could have reduced the quantity of input by 2.1 percent in 2007-08, 2.5 percent in 2008-09, 2 percent in 2009-10, 1.9 percent in 2010-11, and 1.5 percent in both 2011-12 and 2012-13 on an average during the post period.

**Table 5.1 – Technical efficiency of PSBs**

Year	TE	TIE	PTE	PTIE	SE	SIE
2001-02	0.934	0.066	0.958	0.042	0.975	0.025
2002-03	0.947	0.053	0.964	0.036	0.982	0.018
2003-04	0.951	0.049	0.967	0.033	0.983	0.017
2004-05	0.976	0.024	0.981	0.019	0.995	0.005
2005-06	0.970	0.030	0.986	0.014	0.983	0.017
2006-07	0.973	0.027	0.988	0.012	0.985	0.015
2007-08	0.979	0.021	0.987	0.013	0.992	0.008
2008-09	0.975	0.025	0.991	0.009	0.984	0.016
2009-10	0.980	0.020	0.990	0.010	0.990	0.010
2010-11	0.981	0.019	0.988	0.012	0.993	0.007
2011-12	0.985	0.015	0.994	0.006	0.991	0.009
2012-13	0.985	0.015	0.995	0.005	0.990	0.010
<b>Mean</b>	<b>0.969</b>		<b>0.982</b>		<b>0.986</b>	
<b>SD</b>	<b>0.016</b>		<b>0.012</b>		<b>0.005</b>	

In order to identify the sources of the technical inefficiency (TIE) of the banks, TE is further decomposed into two components i.e., PTE and SE. The PTE of the banks reported in Table 5.1 reflects the managerial performances of the banks in making economic utilisation of resources. The measure of PTE is determined using BCR model, which considers VRS assumption. It provides the technical efficiency score of the banks without the effect of SE. The SE score reflects the choice of appropriate scale of bank operation for a better conversion of input into output to achieve better TE. Hence, it can be stated that PTIE reflects inefficiencies resulting from poor utilisation of resources, a reflection of inefficient management of resources. On the other hand, SIE stems from inappropriate choice of scale or size of operation. Therefore, table 5.1 provides the decomposed TE to identify the sources of the TIE of banks, whether TIE is caused by wastage of economic resources (PTIE) or by wrong choice of scale of bank operation (SIE) or both.

In the light of the above explanation, PTE and SE score given in Table 5.1 is elucidated further. It can be inferred that the yearly average PTE of the banks has ranged between 0.958 percent in the year 2001-02 and 0.995 percent in the year 2012-13 while corresponding scores of SE are 0.975 percent in the year 2001-02 and 0.99 percent in the year 2012-13. Further, if the reason for TIE of 0.66 percent in the year 2001-02 is analysed through PTIE and SIE, the former contributes to 4.2 percent and the latter to 2.5 percent respectively to the TIE. It can be further explained that managerial inefficiency contributes more to the TIE than the inappropriate scale of operation.

The mean score PTE of PSBs over the study period is 0.962 percent and SE is 0.9869. This indicates that the 3.3 percent TIE of PSBs is caused by 1.8 percent of PTIE, and 1.4 of SIE. Hence, it can be stated that on average the PSBs during the study period could have improved their PTE by 1.8 percent, which is related to the managers efficiency in input utilisation and about 1.4 percent by better scale or size of operation to achieve 100 percent technical efficiency. This indicates the performance of individual banks. This would help policy makers to know about the position of banks in their primary operations.

**Table 5.2 TE of individual bank in PSB group**

S.No	Name of the Bank	TE	PTE	SE
<b>Pre Period</b>				
1	Corporation Bank	1	1	1
2	Oriental Bank of Commerce	1	1	1
3	State Bank of Patiala	1	1	1
4	State Bank of Travancore	1	1	1
<b>Post Period</b>				
1	Corporation Bank	1	1	1
2	Oriental Bank of Commerce	0.995	0.998	0.997
3	State Bank of Patiala	0.991	0.991	0.997
4	State Bank of Travancore	0.997	1	0.997

Table 5.2 shows that four banks namely, Corporation bank, Oriental bank of Commerce, State Bank of Patiala and State bank of Travancore have emerged as 100 percent efficient banks throughout the pre period. These four banks together define the best practices among the PSBs in India. The utilisation of resources by these banks has been at optimum level. This means that these banks have not wasted their resources during intermediation process.

**Table 5.3 – PSBs: Cost efficiency and its components**

Year	CE	CIE	AE	AIE	TE	TIE
2001-02	0.916	0.084	0.981	0.019	0.934	0.066
2002-03	0.922	0.078	0.973	0.027	0.947	0.053
2003-04	0.918	0.082	0.965	0.035	0.951	0.049
2004-05	0.939	0.061	0.962	0.038	0.976	0.024
2005-06	0.942	0.058	0.972	0.028	0.97	0.03
2006-07	0.96	0.04	0.987	0.013	0.973	0.027
2007-08	0.963	0.037	0.984	0.016	0.979	0.021
2008-09	0.959	0.041	0.983	0.017	0.975	0.025
2009-10	0.955	0.045	0.975	0.025	0.98	0.02
2010-11	0.955	0.045	0.974	0.026	0.981	0.019
2011-12	0.972	0.028	0.986	0.014	0.985	0.015
2012-13	0.967	0.033	0.981	0.019	0.986	0.014
<b>Mean</b>	<b>0.947</b>		<b>0.977</b>		<b>0.970</b>	
<b>SD</b>	<b>0.02</b>		<b>0.01</b>		<b>0.02</b>	

The results given in Table 5.3 reveal that there is substantial improvement in the CE levels of PSBs during the study period. In particular, it is to be noted that in the year 2001-02 the CE score has been 0.916, then it has reached the highest CE score of 0.972 in the year 2011-12 and has remained at 0.967 in the year 2012-13.

Nevertheless, there has been deterioration in the score of CE during 2003-04, 2008-09 and 2010-11. This indicates that PSBs have exhibited CIE of 8.4 percent in the year 2001-02, which has slowly reduced to 3.3 percent in the year 2012-13.

The overall mean score of 0.947 percent suggests that there has been 5.3 percent CIE within PSBs over the study period. This indicates that a bank with 100 percent CE in the sample could have produced the same level of output with 94.7 percent of the cost actually incurred. This can be otherwise stated that during each year of the study period, an average bank has used 5.3 percent more resources than required, and thus, has incurred more cost to produce the same output as an average efficient bank has done. After the discussion on the CIE, it is relevant to know the sources of CIE. It can be inferred from the above table that the CIE of 5.3 percent has been traced to 2.3 percent of AIE and 3 percent of TIE. It can be further explained that, approximately 2.3 percent CIE has been traced to inappropriate selection of the optimal combinations of inputs, given their prices and technology and the remaining has been caused by wastage of inputs (use of more inputs than required) in the intermediation process. This implies that the PSBs have not employed the best practices in intermediation operations to achieve the maximum outputs with minimum input costs. However, the PSBs could have achieved considerable cost savings with proper allocation and efficient use of resources.

**Table 5.4 CE of individual bank in PSB group**

S.No	Name of the Bank	TE	PTE	CE
<b>Pre Period</b>				
1	Corporation Bank	1	0.972	0.972
2	Oriental Bank of Commerce	1	0.947	0.947
3	State Bank of Patiala	1	0.992	0.992
4	State Bank of Travancore	1	0.998	0.998
<b>Post Period</b>				
1	Corporation Bank	1	0.994	0.994
2	Oriental Bank of Commerce	0.995	0.988	0.988
3	State Bank of Patiala	0.991	0.988	0.988
4	State Bank of Travancore	0.997	0.981	0.981

Table 5.4 exhibits the fact that none of the banks in the PSB group has secured 100 percent CE during the pre period. However, State Bank of Patiala, State Bank of Hyderabad and State Bank of Travancore have 100 percent CE during the 3 to 4 consecutive years. They have lost the frontier position by 0.8 percent, 0.5 percent and 0.2 percent respectively. Based on the bank wise average, most of the banks (19) have achieved above 90 percent cost efficiency.

In other words, the PSB group has incurred CIE of 4 percent on an average during the study period. It means that all the banks have used 4 percent more resources than required and thus have incurred more cost to produce the same output every year. This output could have been produced by an average CE bank with merely 96 percent input costs. Based on the above discussion it can be discerned that PSBs could have saved cost by 4 percent with efficient allocation and utilisation of inputs.

### 5.1 Determinants of TE and CE

Having discussed about the TE and CE it is important to know the determinants of TE and CE. Tobit regression is used to determine the same. The variables considered for analysing the TE and CE is collectively named as primary operating variables to apply the tobit regression. The results of DEA i.e., TE and CE score is considered as the dependent variable and the primary operating variables are taken as primary operating variables. To find out if the primary operating variables such as investments, advances, fixed assets, loanable funds and employees influence the TE Tobit Regression has been used. In the Tobit Regression analysis, the TE of PSBs has been entered as dependent variable and all the primary operating variables have been entered as independent variables. The results of the analysis are presented in Table 5.5. For this purpose, following hypotheses have been tested.

**H<sub>0</sub>:** Technical efficiency (TE) of Public Sector Banks in India is not influenced by primary operating variables.

**H<sub>1</sub>:** Technical efficiency (TE) of Public Sector Banks in India is influenced by primary operating variables.

Table 5.5 exhibits the determinants of technical efficiency of PSBs in India. It shows that TE is determined significantly by the variables considered for the study. However, it could be perceived that the contribution of investments and advances is such that increase in these two variables has increased the TE. On the other hand, TE has decreased for every increase in fixed assets, loanable funds and employee. It can be further explained that TE has increased by 0.270297 and 0.165451 for an increase of investments and advances respectively. At the same time TE has decreased by -0.03153, -0.37422, and 0.03254 for an increase of fixed assets, loanable funds and employee respectively. Based on the above findings, it can be stated that the null hypothesis has been rejected. It means that TE is influenced by primary operating variables.

**Table 5.5 - PSBs: Determinants of technical efficiency**

Variable	Co-efficient	Std. Error	z-Statistic	Prob.
C	1.027789	0.059227	17.3534	0.0000
Investments	0.270297	0.033619	8.040106	0.0000
Advances	0.165451	0.024727	6.691043	0.0000
Fixed assets	-0.03153	0.005207	-6.05531	0.0000
Loanable funds	-0.37422	0.055409	-6.75375	0.0000
Employee	-0.03254	0.007512	-4.33206	0.0000

Tobit Regression analysis is also done on the CE of PSBs entering CE score as dependent variable and all the primary operating variables as independent variables. The results of the analysis are presented in Table 5.6. For this purpose, following hypotheses have been tested.

**H<sub>0</sub>:** Cost efficiency (CE) of Public Sector Banks in India is not influenced by primary operating variables.

**H<sub>1</sub>:** Cost efficiency (CE) of Public Sector Banks in India is influenced by primary operating variables.

**Table 5.6 - PSBs: Determinants of cost efficiency**

Variable	Co-efficient	Std. Error	z-Statistic	Prob.
C	0.990162	0.140388	7.053055	0.00000
Investments	0.211345	0.025536	8.276323	0.00000
Advances	0.335483	0.034259	9.792647	0.00000
Fixed assets	-0.01928	0.004779	-4.03491	0.00010
Loanable funds	-0.45184	0.0557	-8.1121	0.00000
Employee	-0.07515	0.010113	-7.43126	0.00000
Price of fixed assets	-0.22624	0.098518	-2.29646	0.02160
Price of loanable funds	0.253683	0.182031	1.393622	0.16340
Price of employee	-0.18622	0.10445	-1.78281	0.07460

The determinants of CE of PSBs in India are presented in table 5.6. The results indicate that CE has been determined by the entire variable except two i.e., price of loanable funds and price of employee. It represents that the price of loanable funds and the price of employee have not considerably influenced the enhancement or decline of CE. Furthermore, investments and advances have contributed positively towards CE. However, fixed assets, loanable funds, employee and price of fixed assets have shown negative impact. For example CE has been increased by 0.211345 and 0.335483 for the addition every single unit of investments and advances. Nevertheless CE has reduced by -0.01928, -0.45184, -0.07515 and -0.22624 for an extra unit of investment in fixed assets, loanable funds, employee and price of fixed assets. Based on the above findings, it can be stated that the null hypothesis has been rejected. It means that TE is influenced by primary operating variables and price of fixed assets. There is no significant influence of price of loanable funds and price of employee on the CE of PSBs in India.

## V. Conclusion

Based on the TE and CE score attained by the PSBs during pre period, the best performers have been identified. These banks score during the post period have been checked to know the impact of financial crisis on the efficiency of banks in India. It has been revealed that, the chosen banks with best performers from PSBs have experienced a downtrend in the efficiency level during the post period. Out of six banks, only two banks have depicted a growth in their efficiency level. Hence, it is concluded that, there has been an impact created by the financial crisis on the efficiency scores of the PSBs. The second stage analysis i.e., determinants of efficiency has showcased that the primary operating variables have significantly influenced the TE scores. Precisely PSBs' TE have been influenced by investments more than the advances. This indicates to the policy makers that the loanable funds i.e., deposits and borrowings, should be deployed in the form of loans & advances first and then as investments. Analysis also reveals that CE scores have not been influenced by price of input variables. Hence, it can be concluded that investments, loanable funds and employee have more contribution to the efficiencies than the other variables. A better efficiency score can be attained if these variables are taken care by policy makers and bank officials. Individually the banks with the best TE score (minimum wastage of inputs), though not have a better AE score (not allocated the resources efficiently), have achieved a better CE (minimum cost). Corporation Bank defines the best practices and has become the reference set (with 100 percent TE and CE) for the remaining 24 PSBs in India during pre and post crisis period. Hence the remaining banks can follow the corporation bank to make the PSBs more sustainable.

## Implications

Operational efficiency and sustainability of the banks depends upon its ability to manage and convert the resources into output (without any waste) at minimum cost. Banks with less than 100 percent TE should concentrate on reducing the wastage of resources. Findings indicate to the policy makers and bank officials,

along with the expansion or extension of activities, banks should concentrate more on optimum utilization of existing resources to make banks more sustainable. It will automatically lead the organization to reach the optimum level of technical and cost efficiency, resulting in better sustainability.

### **Scope For Further Studies**

Efficiency of Public sector banks can be compared with the efficiency of banks in other sectors like private and foreign bank in India. Efficiency of Indian banks can be compared with the efficiency of banks in foreign countries. Macro economic variables like GDP, Inflation and money supply can be further added to measure the efficiency of banks. Comparative studies can be undertaken to focus exclusively on (one sector) PSBs with PSBs in other countries.

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