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Efficiency of Regional Rural Banks in India with reference to Select Branches of Assam Gramin Vikash Bank

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Abstract

The main objective of the paper is to measure the level of technical efficiency, pure technical efficiency and scale efficiency of Assam Gramin Vikash Bank branches. It is assumed that technical efficiency analysis can show an organisation's ability of utilising its resources for generating business transactions. In this paper, an attempt is made to explore the influential determinants that affect the level of technical efficiency. The paper is empirical in nature and is based on primary data by using Data Envelopment Analysis under input and output oriented approaches; further, Tobit regression approach has been applied to find out the factors responsible for inefficiencyof for the study, for the a sample of ninety seven branches has been taken for the analysis for the financial year 2015-2016 and 2016-2017.The result shows that the level of technical efficiency is not uniform amongsample branches of Assam Gramin Vikash Bankduringthe study period. Though, there are good number of efficient Assam Gramin Vikash Bank branches, but the number of inefficient Assam Gramin Vikash Bank branches is higher than the efficient ones. Further, the tobit regression results reveal that off-balance sheet activities, loan quality and non interest expenditure have been identified as the most influentialdeterminants of technical efficiency.

Key words:AGVB, Branch, Data Envelopment Analysis, Efficiency, Tobit Regression
JEL Classification: C14, C67, E59, G21

Introduction:

Bank, irrespective of the commercial banks or regional rural banks, play a vital role in the economic development of a country. Banks, particularly commercial banks are the dominant financial institutions in developing countries like India. They represent the major source of financial intermediation. Evaluating their overall performance and monitoring their financial condition is important to various stakeholders,potential investors, depositors, managers and, of course,regulators.Hence, it is essential for a bank to know the efficiency of its branches. Once the efficiency of each branch is known, the management of the bank is in a position to rank the branches according to their efficiencies, to see where the inefficiency is coming from, and to suggest ways of improving the performance. In comparing a network of branches, a branch can be said to be efficient relative to another branch if it produces the same level of output with fewer

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inputs, orit produces more output with the same levelof inputs. Now-a days, government has started concerned about the measurement of bank efficiency. For example, recently, a circular is issued by Manipur Government to prepare ranking of all banks in state on the basis of the services provided by them to the people (Manipur Govt. to Prepare, 2018). The present paper, however, focuses on the efficiency of Regional Rural Banks (RRBs) with reference to Assam Gramin Vikash Bank (AGVB). This is the largest RRBs which is operating in Assam.

The RRBs were established in India in 1975based on the RRB Act. 1976with a vision to improve rural economy by providing rural credit to agricultural laborers, farmer's artisans and small entrepreneurship. They have been brought into existence by the mutual efforts of the central government, state government and commercial banks. At present, there are 56RRBsin India. In Assam, there are two RRBs namely, Assam Gramin Vikash Bank (AGVB), and Langpi Dehangi Rural Bank(LDRB). AGVB came into existence on 12th January, 2006. It is sponsored by the United Bank of India.

Significance of the Study:

Efficiency studies not only throw a light on the proper utilization of input, but also give a direction on minimisation of cost and allocation of resources. Such studies can also help the organization to formulate policies to improve their level of outputs by minimisation of cost. The present study based on AGVB branchesnot only finds out the efficient branches amongst themselves by using Data Envelopment Analysis (DEA) but also analyses the factors responsible for inefficiency of the inefficient branches. Such studies are highly significant today; because, in the competitive market, the efficient organisations can easily face the challenges. Hence, the AGVB branches in Assam would be able to challenge the competition, if they are efficient.

Review of literature:

This section provides an overview of literature on bank branch level of efficiency studies published during the period from 2000 to 2018. There are a number of studies conducted with regard to efficiency of banks and branches by using Data Envelopment Analysis (DEA) technique with the objective of measuring efficiency of bank branches; some of them are Athanassopoulos and Giokas, (2000); Cook and Hababou, (2001); Manandhar and Tang, (2002); Stanton, (2002); Paradi and Schaffnit, (2004); Camanho and Dyson, (2005); Camanho and Dyson, (2006), McEachern and Paradi, (2007); Al-Tamimi and Lootah, (2007); Camanho and Dyson, (2008); Noulas *et al.,* (2008); Valami, (2009); Lotfi *et al.* (2010), Paradi *et al.* (2011), Tsolas (2010), Deb, J. (2011), Minh, *et al.* (2012), Zarinkamar andAlam-Tabrizb(2014), Azarbad *et al.* (2015), Chanu and Das (2016), and Das and Chanu (2017). However, only two studies on AGVB has been found, they are**Chanu and Das,** (2018);**Chanu and Das,** (2018, March)and the summary of this studies are mentioned below.

Chanu & Das, (2018)conducted a study to measure the level of efficiency of 70AGVB branches for the year 2016-2017 by using DEA. The findings revealed that there was variance in the efficiency score among the AGVB branches. The findings clearly revealed that inefficient use of scarce resources, managerial irregularities and regional offices were found to be the major causes of concern in emerging technical inefficiency among the branches.

Chanu & Das, (2018, March) measured the operating performance of 19 branches of AGVB by using DEA and tobit regression model in the financial year 2016-2017. The result showeda variation in the level of operating efficiency of the various AGVB branches during the study period. The findings revealed that there was variance in the level of efficiency score among

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all thebranches of AGVB. Further, it was also found that out of different variables, off balance sheet activities and geographical locations had significant bearing on efficiency of the branches.

Research gap:

The review of literature reveals that there are sizable numbers of studies on the technical efficiency analysis of bank branches in India and abroad. However, few studies based on bank branches operating in the North Eastern Region (NER) of India are found in the literature. Any comprehensive study on technical efficiency analysis on AGVB(except two studies conducted by Chanu and Das, 2018 (March); Chanu and Das, 2018)is not found in the existing literature.Therefore, the present study is an attempt to fill up the existing research gap.

Objectives of the present study:

1. To measure the technicalefficiencyof the selected AGVB branches; and
2. To find out the influential factors that affects the technical efficiency of the AGVBbranches.

Methodology :

Type of study : Theoretical and empirical in nature.

Type of data : The present study is based on primary data.

Sources of data : Data have been collected from primary sources.

Sample size determination design: Purposive design (though there are 413 AGVB branches which are operating in Assam, data of only 97 branches are taken due to in the financial year 2010-2011, these banks have been installed CBS system).

Population Size : 413 branches.

Sample Size : 97 branches.

Period of Study : Twoyear (2015-2016 to 2016-2017).

Software Used : Data is analyzed by using the DEA Excel Solver, Zhu (2003) and Gretl software for Tobit Regression model.

Limitations of the Study : The data is contemporary in nature and the analysis is based on the data provide by the concerned office of the AGVB. Hence, errors cannot be avoided. Though, there are number of efficiency methods only DEA is taken into consideration. Only two financial years have been considered.

Scope of the study :Technical efficiency of 97 branches which have been proving CBS since 2010-2011 is conducted and two inputs along with three outputs are considered in the present paper.

Selection of Inputs and Outputs Variables:

In empirical studies on efficiency of banking sector, an important and controversial issue is selection of inputs and outputs. According to Berger and Humphrey (1997), there are two main approaches – the production approach and the intermediation approach. In the present study production approach has been used to measure the efficiency and on the basis of this approach following inputs and outputs variables have been chosen. Table 1 shows different input and output variables and their details explanations respectively.

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Table:1Details of input & output Variables

Inputs	Interest Expended	Interest on deposits, interest to bank to deposits
	Operating Expenditure	Payments to employees, printing and stationary, Advertisement and publicity, Law charges etc.
Outputs	Loans and Advances	Bills purchased and discounted, Cash credits, Overdrafts and loans repayable on demand, Term loads, Secured by tangible assets, Unsecured.
	Interest Earned	Interest on Advance, interest on loan.
	Other Income	Commission, exchange, brokerage etc.
	Deposits	Current Account, Saving Bank Deposits, Term Deposits

Source: Researcher's compilation

In the present study Input Oriented and output oriented measures are taken to analyse the level of efficiency. Efficiency measures can also be estimated with broadly two types of approaches which are parametric and non-parametric approach. However, in the present study non-parametric- Data Envelopment Analysis has been used under constant return to scale and variable return to scale.

Models used for the study:

Technical Efficiency under Data Envelopment Analysis (DEA):

In economic terms, the technical efficiency of a banking industry is referred as producing maximum output bundles using given level of input bundles or using minimum input bundles for producing given level of output bundles (Goyal, 2018). DEA is a linear programming-based technique to measure the level of efficiency of organizational units like bank and its branches; here, branches are known as Decision Making Unit (DMU). The performance of DMUs is assessed in Data Envelopment Analysis by using the concept of efficiency which is the ratio of weighted outputs (virtual output) to weighted inputs (virtual inputs). The best performing DMU is assigned an efficiency score of unity (or 100 percent) and the performance score of a DMU vary between 0 and 1. The operating units of branches have multiple inputs such as staff size, locations, operating expenses and NPA of operation, advertising budget as well as multiple outputs such as profit, total deposits, loans and advances, interest earned and other income. In this situation, it is often difficult for a manager to determine which operating units are inefficient in converting their inputs into outputs. In such situation, this problem can be easily solved by Data Envelopment Analysis and the analysis may be conducted by using statistical software DEA-Solver. Technical efficiency is founded by Charnes, Cooper, & Rhodes (1978) and Pure Technical Efficiency is founded by Banker, Charnes, &Cooper (1984).

Here, TechnicalEfficiency = Pure Technical EfficiencyXScale Efficiency.

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Empirical Results:

Efficiency results under Input and Output Oriented Approaches in TE_{CRS}, PTE_{VRS} and SEModels for the Financial Year 2015-2016 and 2016-2017:

Table: 2 Statistical Summary of Efficiency Scores for the Year 2015-2016

Particulars	Input Oriented Approach			Output Oriented Approach		
	TE_{CRS}	PTE_{VRS}	SE	TE_{CRS}	PTE_{VRS}	SE
Total number of DMUs	97	97	97	97	97	97
Number of efficient DMUs	7	12	7	7	12	7
Number of inefficient DMUs	90	85	90	90	85	90
Max efficiency score	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
Min efficiency score	0.46180	0.55083	0.61930	0.46180	0.49779	0.67883
Std. dev of efficiency	0.12898	0.11856	0.08675	0.12898	0.14249	0.06984
Average efficiency score	0.70545	0.81770	0.86226	0.70545	0.77905	0.90910
Average inefficiency score	0.29455	0.18230	0.13774	0.29455	0.22095	0.09090
Percentage of the DMUs in 1	7.22%	12.37%	7.22%	7.22%	12.37%	7.22%

Source: Researcher's calculation

Table:2 presents statistical summary of efficiency score of 97 AGVB branchesrespectivelyfor the financial year 2015-2016.

Efficiency Results under Input Oriented Approach:

Table:2 indicates that the number of efficient branches under TE_{CRS} and SE are 7 each and under PTE_{VRS}, there are 12 branches. It is found that there are 90 inefficient branches in the TE_{CRS} and SE, under PTE_{VRS}, there are 85 inefficient branches. The table also shows that the lowest score stands at 0.46180, 0.55083 and 0.61930 under TE_{CRS}, PTE_{VRS} and SE models respectively. Average efficiency score of ninety seven branches is 0.70545, 0.81770 and 0.86226 under TE_{CRS}, PTE_{VRS} and SE models respectively; and their average inefficiency score is 0.29455, 0.18230 and 0.13774 under the same models respectively. The result implies that inputs could be decreased proportionately without having any affecton the level of outputs. All the selected branches in average are not efficient under any model.

Efficiency Results under Output Oriented Approach:

Table:2 indicates that the number of efficient branches under TE_{CRS} and SE are 7 each and under PTE_{VRS}, there are 12 branches. It is found that there are 90 inefficient branches in the TE_{CRS} and SE, under PTE_{VRS}, there are 85 inefficient branches. The table shows that the lowest score stands at 0.46180, 0.49779 and 0.67883 under TE_{CRS}, PTE_{VRS} and SE models respectively. Average efficiency score of ninety seven branches is 0.70545, 0.77905 and 0.90910 under TE_{CRS}, PTE_{VRS} and SE models respectively; and their average inefficiency score is 0.29455, 0.22095 and 0.09090 under the same models respectively. The results indicate that output variable could be proportionately increased without introducing the additional inputs. Further all the selected branches in average are not efficient. Standard deviation score stands at 0.12898, 0.14249 and 0.06984 under TE_{CRS}, PTE_{VRS} and SE models respectively.

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Table: 3 Statistical Summary of Efficiency Scores for the Year 2016-2017

Particulars	Input Oriented			Output Oriented		
	TE_{CRS}	PTE_{VRS}	SE	TE_{CRS}	PTE_{VRS}	SE
Total number of DMUs	97	97	97	97	97	97
Number of fully efficient DMUs	9	17	9	9	17	9
Number of inefficient DMUs	88	80	88	88	80	88
Max efficiency score	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
Min efficiency score	0.35404	0.46352	0.76380	0.35404	0.35736	0.76945
SD	0.12559	0.12718	0.05921	0.12559	0.14077	0.05756
Average of efficiency	0.76165	0.81660	0.93318	0.76165	0.80032	0.95575
Average of inefficiency	0.23835	0.18340	0.06682	0.23835	0.19968	0.04425
Percentage of the DMU in 1	9.28%	17.53%	9.28%	9.28%	17.53%	9.28%

Source: Researcher's calculation

Table: 3 presents statistical summary of efficiency score of ninety seven AGVB branches under TE_{CRS}, PTE_{VRS} and SEmodels under input and output oriented approaches for the financial year 2016-2017.

Efficiency Results under Input Oriented Approach:

Table: 3 indicates that out of ninety seven branches, there are 9, 17 and 9 fully efficient branches that is their score is equal to one and 88, 80 and 88 are not fully efficient branches because their score is less than one under TE_{CRS}, PTE_{VRS} and SE models respectively. The table also shows that lowest score stands at 0.35404, 0.46352 and 0.76380 under TE_{CRS}, PTE_{VRS} and SEmodels respectively. Average efficiency score of ninety seven branches is 0.76165, 0.81660 and 0.93318 under TE_{CRS}, PTE_{VRS} and SEmodels respectively; and their average inefficiency score is 0.23835, 0.18340 and 0.06682 under the same models respectively. The result implies that inputs could be decreased proportionately without decreasing the level of outputs. All the selected branches in average are not fully efficient under any model. Further, inside into efficiency scores then find that pure technical inefficiency rather than scale inefficiency is the main cause of technical inefficiency of the branches. Standard deviation stands at 0.12559, 0.12718 and 0.05921 under TE_{CRS}, PTE_{VRS} and SE models respectively. Large dispersion is measured under $TE_{CRS}$and PTE_{VRS}models.

Efficiency Results under Output Oriented Approach:

Table:3 indicates that out of ninety seven branches, there are 9, 17 and 9 fully efficient branches that is their score is equal to one and 88, 80 and 88 are not fully efficient branches under TE_{CRS}, PTE_{VRS} and SEmodels respectively. The table also shows that lowest score stands at 0.35404, 0.35736 and 0.76945 under TE_{CRS}, PTE_{VRS} and SEmodels respectively. Average efficiency score of ninety seven branches is 0.76165, 0.80032 and 0.95575 under TE_{CRS}, PTE_{VRS} and SEmodels respectively; and their average inefficiency score is 0.23835, 0.19968 and 0.04425 under the same models respectively. The result implies that output variable could be proportionately increased without introducing the additional inputs. Further all the selected branches in average are not fully efficient. Standard deviation score stands at 0.12559, 0.14077 and 0.05756 under TE_{CRS}, PTE_{VRS} and SEmodels respectively. Large dispersion is measured under TE_{CRS},and PTE_{VRS} models.The above table also shows that efficiency scores under PTE_{VRS} model is lower than the SE model. Therefore, pure technical inefficiency rather than scale inefficiency is the main cause of technical inefficiency of the branches.

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Factors of responsible for Efficiency and Inefficiency:

Tobit Regressionanalysis is pursued to test a series of hypotheses concerning the relationship between level of technical efficiency and other indicators related to AGVB branch namely, branch size, Exposures to off- balancesheet activities, Staff Productivity, Loan quality, and Non-Interest Expenses. Tobit model used in this study may be specified as:

$$Y_i^* = \alpha + \beta_1(\text{Size}) + \beta_2(\text{OFF\_BALANCE}) + \beta_3(\text{SP}) + \beta_4(\text{LQ}) + \beta_5(\text{NIE}) + \varepsilon$$

Table4:Description of the Independent Variables and expected signs of the predictors included in the regression analysis

SL. No.	Predictor	Descriptions	Expected Sign	Hypotheses
1	Branch Size(Size)	Log(Total Assets)	±	A branch bank size is not expected to have any ascertained relationship with efficiency measure
2	Exposures to off-balance sheet activities (OFF_BAL)	$\frac{\text{Non-Interest Income}}{\text{Total Assets}}$X100	+	More the exposure of bank branches in nontraditional activities, higher will be the bank branches' efficiency
3	Staff Productivity (SP)	$(\frac{\text{Total Business}}{\text{Staffs}})$	+	A positive relationship with efficiency is expected
4	Loan Quality (LQ)	NPA	-	Higher levels of NPAs will indicate in lower efficiency levels
5	Non-Interest Expenses (NIE)	$\frac{\text{Non-Interest Expense}}{\text{Total Assets}}$X100	-	A negative relationship with efficiency is expected.

Source: Researcher'scompilation

In the second stage analysis, the DEA efficiency scores are regressed on ninety seven branch's specific characteristics in order to identify sources of efficiencies/ inefficiency. Since level of efficiency scores range between 0 and 1, thus, Tobit model is employed. Negative coefficients show fall in the level of efficiency whereas Positive coefficients show a rise in the level of efficiency.

The log-likelihood is the expression that it's value maximizes to determine optimal values of the estimated coefficients (β).

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Table:5Determinants of Efficiency of AGVB Branches

Variables	Coefficient	Std. Error
Constant	0.946468**	0.379656
Size	0.0825115	0.195348
Off_Balance	65.9442***	13.8785
Staff Productivity	−0.118146	0.216811
Loan Quality	−0.0771251**	0.164288
NIE	−0.344413***	0.064465
Chi-square	69.65891	
Log-likelihood	62.44596	
No. of Observations	194	

Source: Researches' computation

Table: 5 indicates the results of the tobit regression technique. Out of five independent variables included in the model (in the table 4), three variables turned out to be statically significant. Off_Balance sheet activities has a positive and significant impact while loan quality and NIE have a negative and significant impact on DEA scores. In our analysis, it is find that in order to improve the efficiency scores among the selected branches should focus to increase off_balance sheet activities; develop innovative idea to recover the bad loans and try to decrease NIE.

Conclusion and Future Research:

The result shows that TE scores for the ninety seven AGVB branches range from0.46180 to 1.000, with mean value of 0.70545 in the financial year 2015-2016 and 0.345 to 1.000, with mean value of 0.7616 in the financial year 2016-2017 under the input and output oriented approaches. It means that on an average the selected AGVB branches have potential to decrease inputs bundle with a simultaneous increase in output bundle by29.45 percent (in 2015-2016) and 23.83 percent (in 2016-2017) out of 97 branches included in the sample, only seven branches (in 2015-2016) and onlynine branches (2016-2017) have been observed to be fully efficient with technical efficiency score equal to 100 percent (that is equal to 1).

The present study also indicates that the level of technical efficiency is not uniform among the ninety branches of AGVBduring2015-2016 and 2016-2017. Though there are good number of efficient AGVB branches, the number of inefficient AGVB branches is higher than the efficient ones. Further, the tobit regression results reveal that off-balance sheet activities, Loan quality and NIE have been identified as the most influentialdeterminants of technical efficiency.Hence, there is aserious need to check the issues instantly in order to make further reforms in otherbranches of AGVB. In brief, DEA and tobit regression models clearly witness that there exists a substantial possible for the improvement of technical efficiency in AGVB branches.

The future research might extend our work in several ways. Using data over a longer period, one may use the DEA-Malmquist Productivity Index input and output oriented to measure efficiency of AGVB branches.The present study analyses technical efficiency and productivity change of the select AGVB branches and an interesting direction for further research would be the investigation of their cost efficiency and allocative efficiency.

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