

# Technical Efficiency of Nepalese Banking Sector

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## Abstract

*The paper estimates and assesses the technical efficiency at individual and aggregate levels and categorizes groups of banks at various ranges of efficiency. The commercial and development banks established before 2005 in Nepal has been considered as the population of the study and 20 banks are selected using systematic random sampling. The 180 observations of nine year's panel data from FY 2006/07 to FY 2014/15 has been used. Stochastic Frontier Approach is used taking three input variables i.e. capital, deposit and human resource cost, and one output variable i.e. loans and advance of sampled banks for analysis. The study found that the average technical efficiency (TE) by nature of banks provide commercial banks as the more efficient than development banks. The joint venture banks are the most efficient than other categories of banks. The average efficiency of banks established inside the Kathmandu valley (Head Office located inside Kathmandu) is lower than the average efficiency of banks established outside the Kathmandu valley (Head Office located outside Kathmandu). Similarly, the banks established after 1995 are found more efficient than the banks established before 1995. The study has important implications for the policymakers to take corrective actions for improving the efficiency of the Nepalese banking sector with respect to human resource policy, deposit collection policy and loan management policy.*

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**Keywords:** Technical Efficiency, Stochastic Frontier Approach, Panel Data, Nepalese Banking Sector

**JEL Classification:** C33, C34, C73, C87, G21

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## I. INTRODUCTION

The overall growth of an economy depends to a great extent on the efficiency, productivity and soundness of its banking system (Thangam & Thoushifia, 2016). The banking system is considered as a backbone of a country's economic development. Understanding bank efficiency and relationship between this efficiency and banking industry development are considered as important issue for the sustainable development of an economy (Thao & Thuy, 2015).

A sound banking system serves as an important medium for pushing economic growth by mobilization of small savings of unproductive domestic sector and putting them to the productive use. They are not only essential for the security and strength of the financial system, but also in making significant contributions to the economy across the country. They continue to pursue all the opportunities available to enhance their productivity and competitiveness. The efficiency of the banking system is pivotal to the attainment of economic growth and development in developing countries (Arjomandi, 2011).

Nepalese banking sector has delivered a significant role in facilitating for economic growth of Nepal. Nepalese banking sector has played an important role in the mobilization of savings and credit facility for the different sector of the economy. A soundness of the banking sector is essential to cope with the challenges of financial sector. The efficiency analysis may be important tools for the banking sector of Nepal. Therefore, the objective of the study is to estimate and assess the technical efficiency at individual and aggregate levels and categorize groups of banks at various ranges of efficiency.

## II. REVIEW OF LITERATURE

Tahir and Haron (2008) examined the technical efficiency of the Malaysian commercial banks over the period of 2000-2006 using the stochastic frontier approach (SFA). They showed that the average overall efficiency of Malaysian commercial banks was 81 percent implying an input waste of 19 percent. They also found that the level of efficiency increased during the period of study and domestic banks were found to be more efficient relative to foreign banks.

Samad (2009) examined inefficiencies of Bangladesh banking industry using the stochastic frontier production function model and the time invariant cross-sectional data. The measure of technical efficiency indicates that the efficiency of Bangladesh commercial banks lies between 12.7 and 94.7 percent; the industry average rated at 69.5 percent. He also found that about 30 percent of the commercial banks in Bangladesh fell below the industry average.

Hasan et al. (2012) examined the technical efficiency of the Malaysian domestic banks listed in the Kuala Lumpur Stock Exchange (KLSE) market over the period 2005–2010. Using Stochastic Frontier Approach (a parametric approach) they found that Malaysian domestic banks exhibited an average overall efficiency of 94 percent, implying that sample banks wasted an average of 6 percent of their inputs. Among the banks, RHBCAP was found to be highly efficient with a score of 0.986 and PBBANK with the lowest efficiency score of 0.918. They also showed that the level of efficiency increased during the period of study, and that the technical efficiency effect fluctuated considerably over time.

Wei and Wang (2000) studied the technical efficiency of the commercial banks in China and found that on an average, the newly established banks were relatively more technically efficient than the state-owned commercial banks.

Based on agency theory and budgetary constraints theory, Yao et al. (2007) argued that ownership reforms and hard budgetary constraints might be important for raising Chinese banking efficiency levels. The study applied a single-stage SFA model to investigate the effects of ownership structure and hard budget constraints on Chinese banking efficiency over the period from 1995 until 2001. The empirical results showed that the average level of technical efficiency over the sample period was about 63 percent. Yao et al. (2007) also found that Chinese joint-stock banks were more efficient than their state-owned counterparts. In addition, banks facing harder budgetary constraints tended to outperform banks that were heavily capitalised by the state or regional governments.

Bhattacharya and Pal (2013) estimated technical efficiency of Indian commercial banks from 1989-2009 using a multiple-output generalized stochastic production frontier. The study showed 64 percent efficiency on an average during the sample period, and that efficiency declined in both public and private banks during most parts of the post-reform period.

Gajurel (2010) studied the cost efficiency of Nepalese commercial banks for a 9-year period (2001-2009) by using semi-parametric methodology. At first stage, efficiency and growth of productivity estimated by using data envelopment analysis (DEA) – a non-parametric methodology. At second stage, efficiency estimates from DEA were regressed with firm specific attributes (independent variables) to find their determinants. The study reported that there was a considerable level of cost inefficiency due to technical inefficiency and there existed comparatively low level of external (particularly regulatory) influences on input mix as indicated by a very low level of allocative inefficiency. The study reported growth of productivity to be negative mostly resulting from lack of technological progress. The study also found that State-owned banks appeared with less cost efficiency than private banks (domestic and foreign). The study also

showed consistently inverse impact of size of the firm on cost efficiency; banks with higher financial capital, larger loan ratio and higher profit tended to be more cost efficient, however banks with higher credit risk tended to be less cost efficient.

Jha and Hui (2012) compared the financial performance of different ownership structured eighteen commercial banks in Nepal for the period 2005 to 2010 using econometric model (multivariate regression analysis). They showed that the public sector banks were significantly less efficient than their counterpart are; however domestic private banks were equally efficient to foreign-owned (joint venture) banks. Furthermore, the estimation results revealed that return on assets was significantly influenced by capital adequacy ratio, interest expenses to total loan and net interest margin, while capital adequacy ratio had considerable effect on return on equity.

Poudel and Hovey (2013) investigated the impact of corporate governance on efficiency of 29 Nepalese commercial banks from the data of 2005-2011 time spans. Using the non-performing loan as variable for bank's efficiency, they found that bigger board and audit committee size and lower frequency of board meeting and lower proportion of institutional ownership led to better efficiency in the commercial banks.

Thagunna and Poudel (2013), using data envelopment analysis (DEA), studied performance of Nepalese banks by using data from during 2007-08 to 2010-11. They revealed that efficiency level was reported relatively stable and increased on overall. They also found no significant relationship with efficiency level and ownership structure of banks and there were no notable differences in the efficiency levels of banks according to their asset size.

Neupane (2013) studied the change in efficiency and productivity of banking industry during the period of 2007/08 to 2011/12 and analyzed the effects of various indicators on the efficiency of the twenty-two commercial banks in Nepal. Malmquist Index was used to measure the efficiency and productivity whereas Tobit regression was used to analyze the determinants of efficiency. He showed that the productivity changes of commercial banks in Nepal improved over the sample period and that the increase in productivity change in Nepalese commercial banks was due to the technical progress rather than efficiency components. He also reported that the decline in efficiency change was due to decline in both pure efficiency change and scale efficiency change. With the use of Tobit regression model the study found positive relationship between debt to equity ratio and efficiency as well as between capital adequacy and efficiency. Further, profitable banks with lower leverage and higher capital adequacy ratio

were found to be more efficient and bank loans seemed to be more highly valued than alternative bank outputs i.e., investments and securities.

Panta and Bedari (2015) examined the level of cost efficiency of 18 “A” class commercial banks during the period of 2005/06 to 2011/12 by using stochastic frontier analysis. Their result indicated that the level of cost efficiency increased substantially over the period of time with small size banks exhibiting a higher cost efficiency as compared to the medium size ones. Similarly, the result also showed that change in the regulation after 2008 even though it was positively related with the cost, was not statistically significant.

Luintel, Selim and Bajracharya (2017) conducted a study on liberalization, bankers’ motivation and productivity: A simple model with an application. They found that financial liberalization has made Nepalese bankers more effort oriented – evidence shows a clear rise in the level of bankers’ efforts following liberalization. Nepalese bankers’ optimal level of effort has increased considerably (by 43 percent during the period under analysis) and appears on an upward trajectory, albeit at a slower pace. Likewise, the banking sector’s effort (incentive) driven productivity has also risen by 1 percent a year, on an average, post-liberalization (2003–2012). The association between the optimal levels of effort and optimal productivity seemed very close in the early years of liberalization but appeared somewhat opaque in later years. They also found that effort-driven productivity accounts for slightly over 40 percent of banking sector TFP (measured by Solow Residuals) in Nepal. Remarkably, the overall proportion of performing loans to total loans has increased from 76 percent in 2003 to over 96 percent in 2012. Nepalese banks earned an average bank spread (profit per unit of bank output) of 3.25 percent points during the sample period but this has slightly declined in recent years (3.17 percent points), perhaps reflecting the competitive pressure. However, a downside is that the banking services in Nepal have become costly in recent years – the average cost and price per unit of bank output has increased notably. They also concluded that financial liberalization and reforms have been a good experience for Nepal, especially from the perspectives of more incentivized (effort oriented) bankers, increased optimal productivity and higher volume of deposits, credit and bank profitability.

## **Research Gap**

The review of banking efficiency literature showed the efficiency score using stochastic frontier analysis (SFA) is slightly higher than data envelopment analysis (DEA) in some studies. But other studies show different results in the efficiency score in SFA and DEA. There are no unanimous views in the measurement of efficiency, neither in defining output and input and nor there is consistency in results. There is no consensus in the study of efficiency of banking

institutions. There are differences from the nature and types of variables inclusions, model specification, however the findings of the study in some of the cases are consistent. The study conducted at one period of time may not be relevant for all the time. In Nepal, different studies are conducted on the efficiency and performance of commercial bank based mostly on ratio analysis. There is thus a pronounced dearth of studies and information in this sector. Consequently, there is a need for testing various models in Nepalese context too. Therefore, there is a need for the study of efficiency of Nepalese banking sector (commercial and development banks).

### III. METHODOLOGY

#### Research Design

Following the objective of the study, the basic framework involves measuring input output and human resource cost, deposit, loan and advance, capital have been processed, and analyzed. The population of banks includes both commercial and development banks established before 2005. The systematic random sampling has been used for the selection of banks.

#### Population and Sample Size

The commercial and development banks established before 2005 have been considered as the population of this study. Out of thirty commercial banks, only 15 banks have recorded their establishment before 2005. Similarly, out of seventy six development banks, only 10 banks have found their establishment before 2005. So, the population of the study constituted 25 banks (total of commercial and development banks except merged and in the process of merger) scattered in different places of the country.

In determining the sample size, there is no clear explanatory variable that reflects the banking characteristics and situations. Therefore, the growth of banks till 2005 is considered as a basis for determining sample size. The growth rate of banks from 1937 to 2005 comes 5.65 percent. Assuming the probability,  $p = 0.0565$ , the expected growth,  $q = 1-p$  within a couple of year is 0.9435, the reason for taking growth rate is that even if there is sharp fluctuation in the bank establishment it does not affect in the sample size determined.

Setting confidence level  $(\frac{Z\alpha}{2})$  at 95 percent and precision also at 95 percent, the

sample size as per  $n = \frac{(\frac{Z\alpha}{2})^2 * p * q}{\delta^2}$  comes 81. As the finite population is 25, it requires adjustment for correcting the population. Therefore, using the correction factor as per  $s = \frac{n}{1 + \frac{n}{N}}$  the sample size is determined at 20 banks.

## Sampling Frame and Sample Selection

In the process of preparing the sampling frame of banks, a list of all commercial and development banks has been obtained from Nepal Rastra Bank. After obtaining a list of commercial banks and development banks with their establishment date, a sampling frame was prepared in the order of the date of establishment. After the process, a systematic random sampling was used to pick up the banks for study. First, a sample unit was selected using the lottery technique and after the first selection, a sample interval was used to select other sample units. The sample interval is calculated with  $\frac{N}{S}$  where, N is population and S represents the sample size.

## Variables Included

To analyze the efficiency of Nepalese banking sector, three input variables i.e. capital, deposit and human resource cost, and one output variable i.e. loans and advance of sampled banks were specified for the model. Brief descriptions of the variables are as follows:

**Loans and advance:** It includes the loans and advances provided by sample banks to their customers in various sectors. Loans and advance are considered here as an output following Dong (2009), Sealey & Lindley (1977), Rajan, Reddy and Pandit (2011), Tahir & Haron (2008), Kumbhakar & Sarkar (2004), Samad (2009).

**Human resource costs:** Human resource costs include various expenses made for the betterment of employees of the banks such as salary, allowance, contribution to provident fund, training expenses, uniform expenses, medical expenses, pension and gratuity, staff bonus and other staff expenses. Labour (human resource) expenses are commonly used in the literature as the inputs (Kenjegalieva et al., 2009, Luo, 2003) for obtaining output.

**Deposit:** It includes total deposits collected by bank through interest bearing and non-interest bearing accounts like fixed deposits, savings deposits and call deposits as well as current accounts from individuals and corporations. Deposits are here considered as an input following Mester (1993).

**Capital:** It is the fixed asset which includes all tangible long term assets such as land, buildings, furniture and equipment. Capital is here considered as an input following Dong (2009), Tahir & Haron (2008), Kumbhakar & Sarkar (2004), Baten & Kamil (2010).

## Data Description

Data were collected from the audited balance sheets of the sampled banks' annual reports. The 180 observations of nine year's panel data from FY 2006/07 to FY 2014/15 of 20 sample banks were used for the study of technical efficiency. Human resource cost includes the sum of expenses paid to employees by banks such as salary, allowances, provident fund contributions, training, uniform, medical, insurance, provision for gratuity/pension, bonus and other expenses (table 1). Deposit includes the sum of deposit which was collected by banks including interest bearing and non-interest bearing accounts (table 2). Capital includes the sum of fixed assets of banks such as building, vehicles, machinery, office equipment and others (table 3). Loans and advance includes the sum of various types of loan, advances and bills purchased by banks (table 4).

## Model Specification for Efficiency

Stochastic Frontier Approach (a parametric approach) was used to compute the technical efficiency of sampled banks. For a parametric approach, technical efficiency is derived from a frontier production function which considers production possibility. The production function describes the relationship between the output variables with quantities of input variables plus the inefficiency and random error (Mokhtar, Abdullah & Habshi, 2006).

Technical efficiency (TE) has two types of indication. If it is an output-oriented measure, TE is a bank's ability to achieve maximum output given its sets of inputs. An input-oriented TE measure, however, reflects the degree to which a bank could minimize its inputs used in the production of given outputs. A value of 1 indicates full efficiency and operations on the production frontier. A value of less than 1 reflects operations below the frontier. The wedge between 1 and the value observed measures the technical efficiency (Mokhtar, Abdullah & Habshi, 2006).

The production function which was proposed by Aigner, Lovell and Schmidt (1977) and Meeusen and Van den Broeck (1977) can be written in a natural logarithm form as follows:

$$\ln y = f(x) + \ln U_t - \ln V_t$$

Where  $\ln y$  represents observed outputs,  $f$  denotes some functional form,  $x$  is the vectors of inputs,  $U_t$  is the inefficiency error term and  $V_t$  is the random error term which accounts for measurement error or other errors such as effect of weather, strike or luck on the value of output.

For a parametric technique, the inefficiency and random error components of the composite error term are disentangled by making explicit assumptions about their distribution. Following Aigner, Lovell and Schmidt (1977), this study assumes the distribution of the error term or statistical noise,  $V_t$ , to be a two-sided normal distribution while the inefficiency term,  $U_t$ , is assumed to be one sided (half normal distribution).

This study used the truncated normal distribution for estimating inefficiency which was also used by Cebenoyan, Cooperman and Register (1993) and Berger and DeYoung (1997).

This study also used the translog functional form as described by Mester (1993); Bauer et al. (1998); Rogar (1998) and Isik and Hassan (2002). It does not impose any restrictions on the first and second order effects (Kaparakis et al., 1994). This flexibility serves as an advantage for banking efficiency studies because it is difficult to identify exactly the functional form that fit the production function (Kaparakis et al., 1994). The translog model allows homogeneity of degree one by simply imposing restrictions on the translog model parameter (McAllisster & McManus, 1993).

The translog functional form of technical efficiency can be rewritten as follows:

$$\ln y_i = \alpha_0 + \sum_{i=1}^n a_i \ln x_i + E_i$$

Where,  $y_i$  is the output variable for the production function,  $X_i$  is the vector of quantities of  $i$  variable inputs,  $Y_i$  is the vector of quantities of variable outputs,  $E_i$  is the stochastic error term where  $E_t = U_t - V_t$  is for the production function.

This study employs the intermediation approach which was widely used in evaluating the efficiency of banks (Sealy & Lindley, 1977).

#### IV. LIMITATIONS

The limitations of the study are as follows:

1. There are various models and approaches for measuring the efficiency of organization but the present study employs stochastic production frontier analysis (a parametrical tool of analysis).
2. The study includes the development and commercial banks established before 2005. This provides altogether 25 banks (except merged and in the process of merger) as a population of the study.

3. The study has included financial data of the audited balance sheets of the banks starting from the fiscal year 2006/2007 to 2014/2015. This provides a panel data of 180 observations.

## **V. DETERMINATION OF TECHNICAL EFFICIENCY**

The technical efficiency of sampled banks was determined using time-invariant inefficiency model in STATA (Statistics/Data Analysis) program. To run the stochastic frontier model for panel data in STATA (Statistics/Data Analysis) version 12, natural logarithm of loans and advance, capital, deposit and human resource cost were included in the model. Bank was taken as Panel ID variable and year as time variable for data set. Panel data of 20 groups (banks) of 9 years with 180 observations from excel sheet was imported in STATA software.

### **Technical Efficiency of Individual Banks**

With the set of data of banking sector efficiency of all banks have been measured by using stochastic production frontier. The table 5 exhibits the technical efficiency score of individual banks. The highest efficient bank is Everest bank limited with TE score 93.99 percent and the least efficient bank is NIDC development bank limited with TE score 32.11 percent. There is a great variation in the efficiency.

Out of 20 sampled banks, the TE of 11 banks is higher than average efficiency i.e. 73.95 percent. All the government owned banks' TE is less than the average efficiency of Nepalese banking sector. Among the joint venture banks, the efficiency score of Standard Chartered Bank Nepal limited and Nepal Bangladesh Bank limited is less than the average efficiency (table 5).

### **Technical Efficiency of Various Groups of Banks**

The average TE of commercial banks and development banks is 78.14 percent and 68.82 percent respectively which indicates that commercial banks are more efficient than development banks in Nepal. Two government owned banks i.e. Nepal bank limited and Rastriya Banijya bank limited are running at only 58 percent efficiency level while Everest Bank Limited and Laxmi Bank Limited are running at 93.99 percent and 92.73 percent efficiency level (Table 6). Likewise, the Siddhartha Development Bank and Excel Development Bank are running at 90 percent efficiency level and NIDC Development Bank and Gorkha Development Bank (Nepal) limited are running at only near about 33 percent efficiency level.

The average TE of joint venture banks is the highest i.e. 82.98 percent and followed by Nepalese private banks (76.22 percent) and government owned banks (54.71 percent) that indicates most of the joint venture banks are running more

efficiently. It was opposite with the results of Tahir and Haron (2008) who found domestic banks are more efficient than foreign banks.

Based on ownership structure, joint venture banks are more efficient than other groups of banks. Similarly, based on the classification of bank by old and new banks, the old banks established before 1995 are lesser efficient than the new banks which established after 1995. All the government owned banks and joint venture banks fall in the category of old banks having average efficiency score of 71.67 percent which is lower than average efficiency score of new banks of (76.22 percent). It indicates that new banks are more capable of mobilizing their resources efficiently like deposit, capital, human resource etc. than old banks. Same type of results is found in the study by Wei and Wang (2000).

The average efficiency scale of banks operating inside the Kathmandu valley (70.11 percent) is less than the average efficiency scale of banks which were established outside Kathmandu valley (79.71 percent). The efficiency scale of banks outside Kathmandu valley is more consistent than banks inside Kathmandu valley. Looking at the efficiency of individual bank operating inside Kathmandu valley, there is a great variation in the level of efficiency from 93.99 percent to 32.11 percent. All banks outside Kathmandu valley have more than 60 percent efficiency but four banks (Nepal Bank Limited, NIDC Development Bank Limited, Rastriya Banijya Bank Limited and Gorkha Development Bank (Nepal) Limited) inside Kathmandu valley have less than 60 percent efficiency.

### **Various Levels of Technical Efficiency of Banks**

Among 20 banks, two development banks (NIDC Development Bank Limited and Gorkha Development Bank Nepal Limited) lie below 50 percent efficiency level, six banks (Nepal Bank Limited, Rastriya Banijya Bank Limited, Agriculture Development Bank Limited, Standard Chartered Bank Nepal Limited, Karnali Bikas Bank Limited, Western Development Bank Limited) lie between 50 percent to 70 percent efficiency level, eight banks (Nabil Bank Limited, Himalayan Bank Limited, Nepal SBI Bank Limited, Nepal Bangladesh Bank Limited, Nepal Credit and Commerce Bank Limited, Sahayogi Bikas Bank Limited, Shubhechha Bikas Bank Limited, Gandaki Bikas Bank Limited) lie between 70 percent to 90 percent efficiency level and four banks (Everest Bank Limited, Siddhartha Development Bank Limited, Laxmi Bank Limited, Excel Development Limited) lie above 90 percent efficiency level. It shows that most of the banks are running at 70 percent to 90 percent efficiency level (table 7).

## **VI. CONCLUSION**

Among 20 banks, two development banks which constitute 10 percent of sampled banks lie below 50 percent efficiency level, six banks including three government

owned commercial banks which accounts 30 percent of sampled banks lie between 50 percent to 70 percent efficiency level, eight banks which includes 40 percent of sampled banks lie between 70 percent to 90 percent efficiency level and four banks which accounts 20 percent of the sampled banks lie above 90 percent efficiency level which shows that the most of the banks are running at 70 percent to 90 percent efficiency level. The government owned banks are not utilizing their resources effectively due to different reasons like lack of sufficient adaptation of advanced technology, proper staff motivation with reward and punishment, attractive business with high service quality in all branches all over the country. Among the selected banks, the Gorkha Development Bank Nepal Limited faced some restriction in business activities by the central bank of Nepal due to poor management led to serious economic and financial problems.

The average technical efficiency (TE) of commercial banks is higher than development banks. Previous studies also show that commercial banks have utilized their resources more effectively than development banks because most of the employees of banking sector starts their career in development banks and later after gaining skills and knowledge of banking job shift their job in commercial banks. Besides this, the fresh, capable and talented people put the first priority to join the commercial bank which helps in getting more capable and talented human resources as employees of banks. This is also confirmed with the views of chief executive officer, head of human resource department, branch managers, and employees of various departments of bank.

The average technical efficiency of joint venture banks is the highest i.e. 82.98 percent followed by other group of banks (76.22 percent) and then government owned banks (54.71 percent) which indicate that the joint venture banks are the most efficient than other categories of banks. The reason for lower efficiency level of government banks is that the motive of government owned banks is to provide banking service to all over Nepal. Therefore, it has many branches in remote and underdeveloped part of the country with limited resources. But the focus of business of joint venture banks and other group of banks is mainly in urban and developed areas of the country which can utilize the resource easily compared to government owned banks.

The average efficiency of banks established inside the Kathmandu valley (Head Office located inside Kathmandu) i.e. 70.11 percent which is lower than the average efficiency of banks established outside the Kathmandu valley (Head Office located outside Kathmandu) i.e. 79.71 percent. Similarly, the banks established after 1995 are found more efficient 76.22 percent than the banks established before 1995 (71.67 percent).

## **VII. IMPLICATIONS**

From the results of this study, following implications can be derived at different levels:

- (a) Banks of Nepal need further to develop in terms of both efficiency and effectiveness. Simply earning profits and ensuring returns to investors, though considered one of the primary goals, is adequate. They must be able to play pivotal role commensurate with requirement of market situation, satisfy consumers' needs and while accomplishing these goals must contribute in the nation building process as they are not only depository of funds but also major institutions in the national arena. For this, sound and efficient human resource is the first requisite. Hence, banks should be encouraged to design, adopt and implement human resource policies and strategies that will ensure attaining higher goals cost efficiently while taking the services to global standards.
- (b) The central bank of Nepal (Nepal Rastra Bank) should play an intervening role by further providing guidelines and directions for developing sound human resource policy, deposit collection policy, loan management policy and interest rate policy and liquidity management policy of Nepalese banking sector.
- (c) The monetary policy of Nepal should incorporate policies regarding efficient resource mobilization of banks focusing on their resources such as saving, capital and human resource efficiently and transparently, ensure proper liquidity management as per the specific needs of the time, situation and overall government policies and guide determination of interest rates creating balance between resource mobilization and their use particularly orienting towards efficient and effective utilization.
- (d) The Nepal Rastra Bank should examine the efficiency of the banking sector from time to time for the long term development and strategic planning of the banking sector, and provide guidelines and directions accordingly to improve the efficiency, capacity and effectiveness of the financial sector.

## **VIII. FURTHER RESEARCH**

This study is conducted to find out the technical efficiency of Nepalese banking sector using stochastic frontier model taking loans and advance as output variable and human resource cost, deposit and capital as input variables. Further study can be done taking other variables such as operating expenses, investment, operating income, operating profit etc. The study of efficiency of the banking sector with comparison of stochastic frontier approach and data envelop approach can also be done in the future.

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## Appendices

Table 1

### Human Resource Cost of Banks in million Rs.

Bank	Year								
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
<b>NBL</b>	1147.92	1378.27	1735.53	2999.41	1712.16	1918.87	1937.11	2496.48	2489.94
<b>NIDC</b>	31.92	114.72	41.04	66.74	50.86	96.88	92.36	182.90	99.71
<b>RBBL</b>	918.40	1013.30	1570.45	2081.96	1300.68	1801.98	2472.52	2416.44	2889.60
<b>ADBL</b>	1402.40	1909.11	1976.54	2630.13	2367.13	2641.58	2571.47	3479.91	3218.11
<b>NABIL</b>	339.67	371.81	487.76	529.46	646.05	743.79	965.84	986.31	1045.20
<b>SCBL</b>	301.39	344.59	399.78	466.60	525.82	554.37	595.83	672.34	692.77
<b>HBL</b>	362.66	402.36	467.64	490.56	641.37	773.14	820.65	875.95	1042.62
<b>NSBI</b>	87.69	109.69	166.29	184.17	320.78	357.82	527.56	574.27	707.98
<b>NBB</b>	112.55	217.04	376.98	267.20	175.92	107.55	331.64	403.71	437.82
<b>EBL</b>	131.59	223.83	276.05	345.16	426.23	517.85	671.91	733.47	912.26
<b>NCC</b>	56.16	133.48	144.76	157.14	140.13	170.22	196.18	280.83	273.56
<b>SDBL</b>	5.70	9.28	18.44	38.77	54.56	48.59	18.22	68.43	96.42
<b>LBL</b>	58.35	81.64	113.01	169.12	211.60	229.17	267.42	307.40	331.74
<b>SBBL</b>	2.79	4.09	6.11	9.12	12.44	16.55	21.58	28.25	32.73
<b>KBBL</b>	4.01	3.47	6.69	14.20	14.29	17.63	17.46	23.15	22.80
<b>ShuBBL</b>	2.45	3.18	6.19	9.72	13.71	16.61	18.05	23.76	24.11
<b>GoDBL</b>	1568.95	1081.32	31.46	54.02	53.20	43.73	21.11	21.43	18.71
<b>GaDBL</b>	2.40	3.57	7.67	14.23	20.28	24.72	30.72	36.55	52.98
<b>EDBL</b>	1.72	2.82	6.66	14.24	18.90	21.76	30.10	41.03	42.75
<b>WDBL</b>	1.66	2.73	4.03	6.20	7.93	9.16	12.72	19.33	23.14
<b>Total</b>	6540.36	7410.31	7806.19	10548.15	8714.05	10111.96	11620.44	13671.94	14454.93

*Source: Annual reports of sampled banks (2006/07 – 2014/15)*

Table 2

**Deposit Liability of Banks in millions Rs.**

Bank	Year								
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
<b>NBL</b>	39014	41829	45194	42882	46808	56052	62984	69338	77999
<b>NIDC</b>	220	80	77	91	288	512	993	1421	1200
<b>RBBL</b>	50464	58333	68161	68626	73941	87782	91094	107270	124222
<b>ADBL</b>	32416	32554	35160	32473	34395	43264	54478	65898	77035
<b>NABIL</b>	23342	31915	37348	46341	51259	55217	63506	75361	103957
<b>SCBL</b>	24647	29744	35351	35183	37999	35966	39466	46299	57286
<b>HBL</b>	30048	31843	34682	37611	40921	47731	53072	64675	73538
<b>NSBI</b>	11445	13715	27957	34896	42415	53337	58920	54493	51628
<b>NBB</b>	9386	10884	9998	10052	11512	16953	17752	25707	33833
<b>EBL</b>	18186	23976	33323	36932	41128	50006	57720	62108	83094
<b>NCC</b>	6500	7320	9128	10825	10951	16485	21651	22257	26661
<b>SDBL</b>	550	1002	1719	348	4002	4954	4847	6259	6981
<b>LBL</b>	7612	10917	16051	18083	18300	22832	25961	30592	40154
<b>SBBL</b>	161	218	360	518	876	1398	1629	1904	2101
<b>KBBL</b>	201	304	425	654	798	990	1031	1270	1470
<b>ShuBBL</b>	164	282	467	646	798	1058	1197	1401	1738
<b>GoDBL</b>	1096	1501	3366	5380	3260	979	1944	1700	1167
<b>GaDBL</b>	225	645	1115	1404	1587	2074	2477	3103	4516
<b>EDBL</b>	159	314	9	1274	1566	2330	2485	2760	2963
<b>WDBL</b>	105	201	291	379	479	760	952	1336	1685
<b>Total</b>	255941	297579	360184	384597	423283	500681	564161	645152	773230

Source: Annual reports of sampled banks (2006/07 – 2014/15)

Table 3

**Capital of Banks in million Rs.**

Bank	Year								
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
<b>NBL</b>	380	380	380	380	380	1773	3716	6465	6465
<b>NIDC</b>	416	416	416	416	416	640	969	416	416
<b>RBBL</b>	1172	1172	1172	1172	1172	5498	8589	8589	8589
<b>ADBL</b>	7528	10778	10778	9438	9474	9474	9637	9861	10374
<b>NABIL</b>	492	689	1449	2029	2030	2436	3046	3657	4755
<b>SCBL</b>	413	621	1398	1608	1610	1852	2039	2246	2810
<b>HBL</b>	811	1014	1216	2000	2400	2760	2898	3333	4499
<b>NSBI</b>	648	875	875	1861	2103	2356	2650	3049	3884
<b>NBB</b>	720	744	1860	1860	2009	2009	2210	2431	3039
<b>EBL</b>	518	831	1030	1280	1392	1761	1921	2137	2743
<b>NCC</b>	699	1400	1400	1400	1400	1470	1470	2029	2353
<b>SDBL</b>	50	108	645	645	693	645	645	645	716
<b>LBL</b>	730	913	1098	1614	1694	1694	1948	2338	2893
<b>SBBL</b>	20	20	36	60	90	113	143	180	258
<b>KBBL</b>	20	25	26	41	80	80	80	120	131
<b>ShuBBL</b>	24	28	54	69	119	129	131	150	177
<b>GoDBL</b>	320	480	656	712	662	662	662	662	199
<b>GaDBL</b>	50	50	100	100	220	250	250	352	433
<b>EDBL</b>	14	20	20	80	80	100	150	203	255
<b>WDBL</b>	11	16	27	60	73	73	73	109	157
<b>Total</b>	15036	20579	24636	26824	28098	35776	43228	48970	55147

*Source: Annual reports of sampled banks (2006/07 – 2014/15)*

Table 4

**Loans and Advances of Banks in millions Rs.**

Bank	Year								
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
<b>NBL</b>	11058	13252	17615	23561	24671	27671	35612	39036	50971
<b>NIDC</b>	151	39	30	147	374	962	1482	1743	1772
<b>RBBL</b>	17329	21136	26188	31424	32573	36780	45599	57293	72079
<b>ADBL</b>	27252	30589	32603	33877	34460	39427	49686	57186	68578
<b>NABIL</b>	15546	21365	27590	32269	38034	14077	46370	54684	65502
<b>SCBL</b>	10503	13719	13680	15957	18427	19576	22829	25977	27681
<b>HBL</b>	16998	19498	24793	27981	31567	34965	39724	45320	53476
<b>NSBI</b>	9460	12114	15132	17481	21366	26142	28788	35280	39979
<b>NBB</b>	4409	5458	6705	7810	8453	10330	12810	18641	25331
<b>EBL</b>	13664	18339	23885	27556	31058	35911	43393	47572	54482
<b>NCC</b>	3708	4418	6858	7995	8835	12443	15426	17267	20832
<b>SDBL</b>	516	784	1473	2850	3657	3353	3595	4776	5445
<b>LBL</b>	6437	9681	13316	14560	15200	16477	19694	22724	31163
<b>SBBL</b>	132	189	292	410	611	943	1226	1548	1775
<b>KBBL</b>	163	184	247	392	464	632	643	762	763
<b>ShuBBL</b>	183	276	485	647	749	809	993	1016	1273
<b>GoDBL</b>	1058	1541	3401	4370	2393	577	302	225	201
<b>GaDBL</b>	242	436	901	1034	1191	1467	2103	2616	3801
<b>EDBL</b>	106	232	561	873	1022	1281	1385	1795	2098
<b>WDBL</b>	87	134	219	270	336	404	627	848	1095
<b>Total</b>	139003	173384	215972	251465	275442	284227	372288	436307	528299

Source: Annual reports of sampled banks (2006/07 – 2014/15)

Table 5

**Technical Efficiency of Individual Bank**

<b>S.N.</b>	<b>Name of Banks</b>	<b>Abbreviation</b>	<b>TE in Percentage</b>
1	Nepal Bank Ltd.	NBL	58.21
2	NIDC Development Bank Ltd.	NIDC	32.11
3	Rastriya Banijya Bank Ltd.	RBBL	58.74
4	Agriculture Development Bank Ltd.	ADBL	69.8
5	Nabil Bank Ltd.	NABIL	86.95
6	Standard Chartered Bank Nepal Ltd.	SCBL	69.19
7	Himalayan Bank Ltd.	HBL	89.03
8	Nepal SBI Bank Ltd.	NSBI	88.11
9	Nepal Bangladesh Bank Ltd.	NBB	70.62
10	Everest Bank Ltd.	EBL	93.99
11	Nepal Credit and Commerce Bank Ltd.	NCC	82.16
12	Siddhartha Development Bank Ltd.	SDBL	90.97
13	Laxmi Bank Ltd.	LBL	92.73
14	Sahayogi Bikas Bank Ltd.	SBBL	76.03
15	Karnali Bikash Bank Ltd.	KBBL	60.49
16	Shubhechchha Bikas Bank Ltd.	ShuBBL	83.59
17	Gorkha Development Bank (Nepal) Ltd.	GoDBL	33.57
18	Gandaki Development Bank Ltd.	GaDBL	85.46
19	Excel Development Bank Ltd.	EDBL	90.88
20	Western Development Bank Ltd.	WDBL	66.31
<b>Average of Sampled Banks</b>			73.95

Table 6

**Technical Efficiency of Various Groups of Banks with some of the Selected Characteristics**

Bases of Bank Categorization		Bank		Average TE in percent
		Number	percent	
Nature of Banks	Commercial Banks	11	55	78.14
	Development Banks	9	45	68.82
Ownership Structure	Government Banks	4	20	54.71
	Joint Venture Banks	6	30	82.98
	Other Groups of Banks*	10	50	76.22
Age	Establishment before 1995	10	50	71.67
	Establishment after 1995	10	50	76.22
Location	Head Office Inside Kathmandu Valley	12	60	70.11
	Head Office Outside Kathmandu Valley	8	40	79.71

\* Includes the banks which do not come under government and joint venture banks.

Table 7

**Banks Operating at Various Levels of Technical Efficiency**

Basis	Efficiency Score	Banks		Average TE in Percentage
		Number	percent	
Efficiency in percent	Below 50 percent	2	10	32.84
	50 percent to 70 percent	6	30	63.79
	70 percent to 90 percent	8	40	82.74
	Above 90 percent	4	20	92.14