A FINANCIAL PERFORMANCE EVALUATION OF COMMERCIAL BANKS IN NEPAL USING AHP MODEL

Ashish Bhandari
Institute of Engineering,Tribhuvan University,Nepal
aashishbhandari@gmail.com

Amrit Nakarmi
Institute of Engineering, Tribhuvan University,Nepal
amritnakarmi@ioe.edu.np

ABSTRACT

The inference of this study lies mainly in identifying and prioritizing financial parameters based on which financial institutions are considered efficient. This study attempts to find out the current performance of commercial banks in Nepal and develop a multi criteria model to check the health and status of these banks. This research will explore the Key Performance Indicators based on the Analytic Hierarchy Process and identify how these are affecting a bank's performance in Nepal. The study reveals the financial positions of three public and ten private commercial banks. The data are mainly obtained from the Central Bank of Nepal annual audited financial statements of commercial banks (published by the respective banks), and a yearly economic survey. An average of four year ratios from 2008/09 to 2011/12 was evaluated to assess the financial performance of the commercial banks. Thirteen commercial banks were selected for the analysis in this study. The financial ratios used to assess bank performance were taken based on the Analytic Hierarchy Process framework in which hierarchical criteria were determined based on CAEL (Capital Adequacy, Asset Quality, Efficiency and Liquidity.

Keywords: AHP; bank performance; Nepal

1. Introduction

Banking is a major financial institutional system in Nepal, which accounts for more than 70% of the total assets of all the financial institutions. The establishment of commercial banks is growing rapidly in the Nepalese contemporary situation. This has consequently generated high flows of money in the market, but has also led to massive investments. On the basis of ownership, the commercial banks in Nepal can be categorized into two groups, public and private banks. As of mid-July 2012 there were 3 public banks and 29 private sector banks. Rastriya Banijya Bank Limited, a public bank, is the largest bank in terms of deposit mobilization in government ownership. The Government of Nepal owns a 40.49% share in Nepal Bank Limited, another public bank. Likewise, the Government of Nepal now owns 53.5% of the shares of Agriculture Development Bank Limited (ADBL). Private banks in Nepal can be further re-grouped into local private banks and foreign joint-venture banks. Banks with local private investment are local private banks

while banks that have joint investments with foreign financial institutions and local private investors are the joint-venture banks. As of mid-July 2012, there were seven private joint-venture banks, and 22 locally owned banks.

2. Literature review

2.1 Performance of banks in Nepal

The growth of major balance sheet indicators of banks in Nepal (Figure 1) shows that a major dip in their liquidity position in 2010/11 in Nepal was due to poor investment decisions by commercial banks. According to Jha & Hui (2012) Capital Risk (CAR), Liquidity Risk (CDR), and Profitable Ratios (ROA and ROE) have influenced efficiencies, however Credit Risk (NPL) reduces the levels of efficiency of banks in Nepal. All the banks, except two public sector banks, namely Nepal Bank Limited (NBL) and Rastriya Banijya Bank Limited (RBBL), have met the minimum regulatory capital. Similarly, the asset quality of the banking industry also remained well below the red line (5 percent) in the review year. Capital funds of banks have significantly improved from 2005 to 2012 (Nepal Rastra Bank, 2012). The liquidity positions of commercial banks have also significantly improved by 59.9% over the previous year 2011. Furthermore, Nepal Rastra Bank (2012) states that the financial health of public banks was very poor and thus a reform program was initiated in two banks (except ADBL). Normally, the financial performance of commercial banks and other financial institutions in the world has been measured using a combination of financial ratios analysis, benchmarking, measuring performance against budget or a mix of these methodologies.

The overall performance of the banking industry in the subsequent FY 2011/12 was satisfactory, with total assets of the banks increasing by 23.04 percent, in comparison to the growth of 10.17% in the previous year, the capital adequacy position of the commercial banks also improved significantly (Sapkota, 2012). The financial health of joint-venture banks in the CAMEL framework concluded that the health of joint-venture banks is better than that of the other commercial banks (Baral, 2005). Researchers have tested the structure performance hypotheses in the context of the Nepalese banking industry for the period of 2001-2009 under the Berger and Hannan empirical framework (Gajurel & Pradhan, 2011). Other researchers have developed a performance model using a frontier approach known as Data Envelopment Analysis (DEA) for the periods 2007-08 to 2010-11 to measure the relative efficiency and potential improvement capabilities of Nepali banks by scrutinizing intermediation aspects (Thagunna & Poudel, 2013).
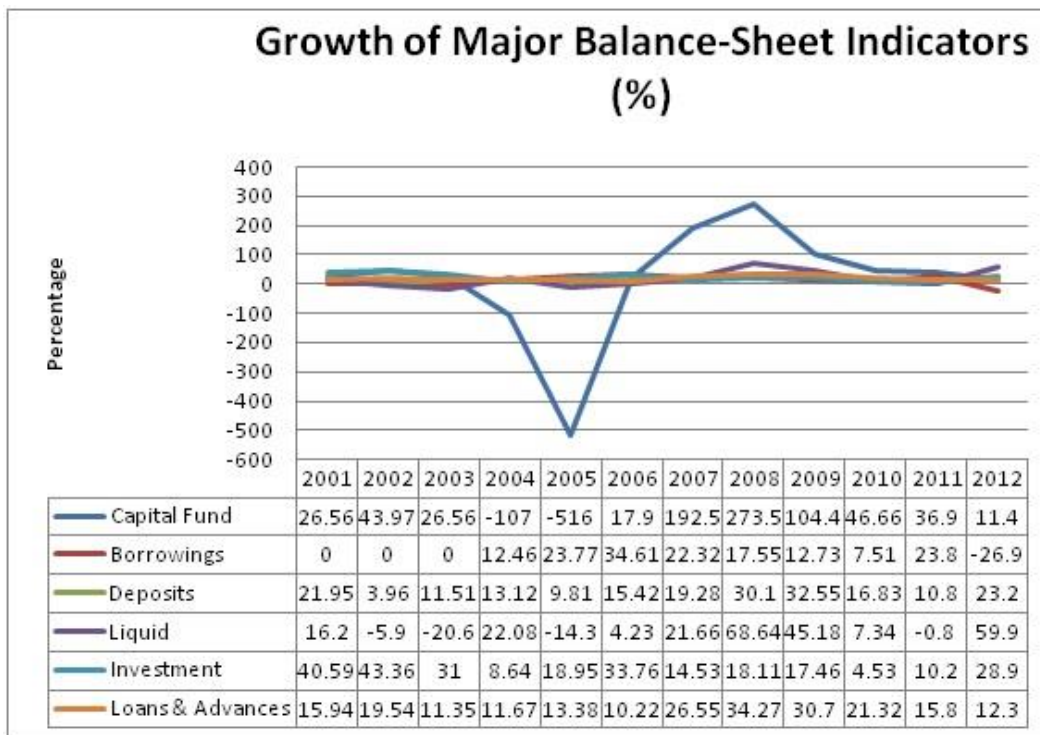
Growth of Major Balance-Sheet Indicators (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Capital Fund	26.56	43.97	26.56	-107	-516	17.9	192.5	273.5	104.4	46.66	36.9	11.4
Borrowings	0	0	0	12.46	23.77	34.61	22.32	17.55	12.73	7.51	23.8	-26.9
Deposits	21.95	3.96	11.51	13.12	9.81	15.42	19.28	30.1	32.55	16.83	10.8	23.2
Liquid	16.2	-5.9	-20.6	22.08	-14.3	4.23	21.66	68.64	45.18	7.34	-0.8	59.9
Investment	40.59	43.36	31	8.64	18.95	33.76	14.53	18.11	17.46	4.53	10.2	28.9
Loans & Advances	15.94	19.54	11.35	11.67	13.38	10.22	26.55	34.27	30.7	21.32	15.8	12.3

Figure 1. Growth of major balance sheet indicators of commercial banks in Nepal (Nepal Rastra Bank. (2012). *Bank Supervision Report)*

2.2 Bank performance evaluation

The traditional performance rankings of banks is based on simple and consistent factors such as financial returns, Returns on Asset (ROA) and Returns on Earning (ROE) and a mix of multiple linear regression techniques for bank performance have also been used (Almazari, 2011; Bakar & Tahir, 2009; Naceur, 2003). Nevertheless, performance rankings conducted using ROA may not precisely describe institutions that embrace strategies for sustaining top performance. Off-site tools like financial ratios from periodic balance sheets and income statements and econometric models (information from financial ratios) have been used (Gilbert, Meyer, & Vaughan, 2002). There have been bank performance evaluations where a function of multiple factors such as quality of assets, liquidity position, capital base, management quality, market sensitivity and earnings have been taken into account (Saunders & Cornett, 2004; Dang, 2011). It is usual to measure the performance of banks using financial ratios such as profits, liquidity, asset quality, attitude towards risk, and management strategies and risk and solvency to assess banks efficiency (Wirnkar & Tanko, 2008; Samad & Hassan, 2000). The choice of explanatory variables for bank failures is guided by measures of financial fragility arising from the banking industry classified as liquidity, credit risk, profitability and taxes, size and growth, loan mix, and securities (Vilén, 2010). Yalçın, Ali, & Cengiz (2009) identify several criteria such as capital adequacy, assets quality, liquidity, profitability, income expenditure structure, group share and sectoral share. Bank performance evaluation encompasses econometric models which gather information from financial ratios from

periodic balance sheets, and income statements which play an important role in off-site surveillance (Gilbert, Meyer, & Vaughan, 2002).

In addition there are internationally adopted practices like Advanced Risk Response Operating Framework (ARROW), and Financial Inspection Rating System (FIRST) which assess risk in banks by looking into banks policy development and implementation, internal control, risk management, accounting policy, account opening and anti-money laundry policies, legal compliance, customer protection management, comprehensive risk management, capital management, credit risk management, asset assessment management, market risk management, liquidity risk management, and operational risk management. It is the financial ratios analysis which can spot better investment options for investors, and this can be dealt with as a multi criteria problem in bank performance evaluation (Steuer & Paul, 2003). Nepal's central bank, Nepal Rastra Bank (NRB)'s Banking Supervision Department (BSD) uses CAMELS (capital adequacy, asset quality, management quality, earnings, liquidity, and sensitivity to market risk) as the six factors to evaluate banks on a scale from 1 (robust) to 5 (very unstable).

2.3 Developing an AHP based model for bank performance evaluation

Though the central bank in Nepal, Nepal Rastra Bank (NRB), is closely monitoring commercial banks through offsite and onsite surveillances, there is a need to use appropriate decision tools to identify and mitigate problems in banks. Some researchers convey the imperativeness of the ability of integrated/holistic decision analysis, putting subjective and objective information into a single framework for decision analysis in financial institutions in Nepal (Bhattarai & Shivjee, 2009). The research also states that the application of AHP specifically in the banking and finance sector is less than 3% percent of the total application and that it has become more intense in academic research only after 2000. This research forms the basis of developing an AHP model for bank performance evaluation in Nepal. There is a growing need of AHP-based decision support systems in the banking sector. It is also important to note that the financial ratios of banks can be compared without any model. An expert can make comparisons of financial ratios of two or more banks and come up with valuable conclusions. This is because financial ratios are absolute values and can be interpreted by experts. The problem arises when someone wants to compare banks according to more than a few financial ratios. It is easy to conclude which bank is better or best according to one financial ratio, but it is slightly more difficult to determine which bank is better or best in certain business segments or in general. The problem is considerably more complex when someone needs to compare several banks according to their businesses. For such complex problems a model has to be developed in order to measure key performance indicators. The application of AHP in finance emerged mostly after 1990. Specific applications of AHP in banking, like credit rating, risk assessments in banking and investment are more apparent after 2000. Early AHP approaches for performance evaluation of banks have taken multi criteria like equity capital, capital/assets ratio, profit/income ratio, EVA (Economic Value Added), organization efficiency, and Value Added Intellectual Capital (VAIC) (Babić, Belak, & Tomić-Plazibat, 1999).

Conventional credit rating and bank evaluation tools like CAMEL and Basel II have more recently been combined with AHP, and were found to give more insights on risk

assessments when such combined applications were made. AHP is one of the most widely used multiple criteria decision making tools. Many studies have been done based on AHP, including applications of AHP in different fields such as planning, selecting a best alternative, resource allocations, resolving conflict, optimization, etc. (Vaidya & Kumar, 2006). In this paper, a model based on the Analytic Hierarchy Process is proposed (Saaty, 1980).

There are various studies in the literature where the bank performance evaluation has taken AHP into consideration. Jabalameli & Rasolinezhad (2011) used the combined Data Envelopment Analysis-Analytic Hierarchy Process (DEA-AHP) method for performed evaluation and ranking of branches of Saderat Bank in Tehran. Lu, Wang, & Lee's (2013) method for bank evaluation uses Analytic Hierarchy Process (AHP) to evaluate a bank's operation risk rating in various stressed scenarios and to prioritize rating items, which would simplify the evaluation process for bank failure prevention. The overall criteria selected were finance, legal compliance, consumer protection and risk management. An integrated AHP/DEA model by Hunjak & Jakovčević (2001) uses financial criteria such as liquidity, efficiency, profitability and asset quality for qualitative rating of banks in Croatia. The use of financial ratios divided into four groups including, balance sheet ratios, income statement ratios, profitability ratios and market ratios and several subgroups to analyze banks in Croatia forms a basis of this multi criteria decision analysis (Čehulić, Hunjak, & Begičević, 2011). An AHP model to evaluate banks in Montenegro has been used by Rakocevic & Dragasevic (2009), and the financial criteria were liquidity, efficiency, profitability and asset quality.

3. Objectives

The basic objective of the study is to assess the competency of commercial banks in Nepal with respect to their financial performance. The objectives of this study are given below:

a. To review AHP based bank assessment literature and contribute to the gap;
b. To establish priorities for performance measurement of commercial banks among liquidity, efficiency, profitability, capital adequacy and asset quality indicators;
c. To develop and use an AHP based framework to evaluate commercial banks in Nepal

4. Research design/methodology

4.1 Selection of banks for purpose of study

The purpose of this study is to evaluate the factors determining the performance of Nepalese commercial banks. The data are mainly obtained from the Nepal Rastra Bank Bulletin (published by the Central Bank of Nepal), annual audited financial statements of commercial banks (published by the respective banks), and a yearly economic survey. Averages of four year ratios from 2008/09 to 2011/12 were evaluated to assess the financial performance of the commercial banks in Nepal. Thirteen commercial banks were selected for the analysis in this study. The financial ratios used to assess bank performance were taken based on the AHP framework in which hierarchical criteria were

determined based on CAEL (Capital Adequacy, Asset Quality, Efficiency and Liquidity). Out of the banks selected, 3 were public banks; Agriculture Development Bank Limited, Nepal Bank Limited and Rastriya Banijya Bank Limited. The following banks were selected from the private list of banks: Citizen Bank, Everest Bank Ltd, Himalayan Bank Ltd, KIST Bank, NABIL Bank Ltd, Nepal Investment Bank Ltd, NMB Bank, Prime Bank, Standard Chartered Bank Ltd and Sunrise Bank. The selection of major criteria and sub criteria was based on literature findings, Nepal Rastra Bank's key performance indicators for commercial banks, literature reviews, and expert reviews. The AHP model was used to assess the performance of the banks and obtain their normalized rankings. The usual AHP concepts of laying out a hierarchical structure, pairwise comparing to establish priorities of the criteria throughout the structure, then synthesizing to get the priorities of the alternatives are followed. The Key Financial Ratios that were used to develop the model is shown below:
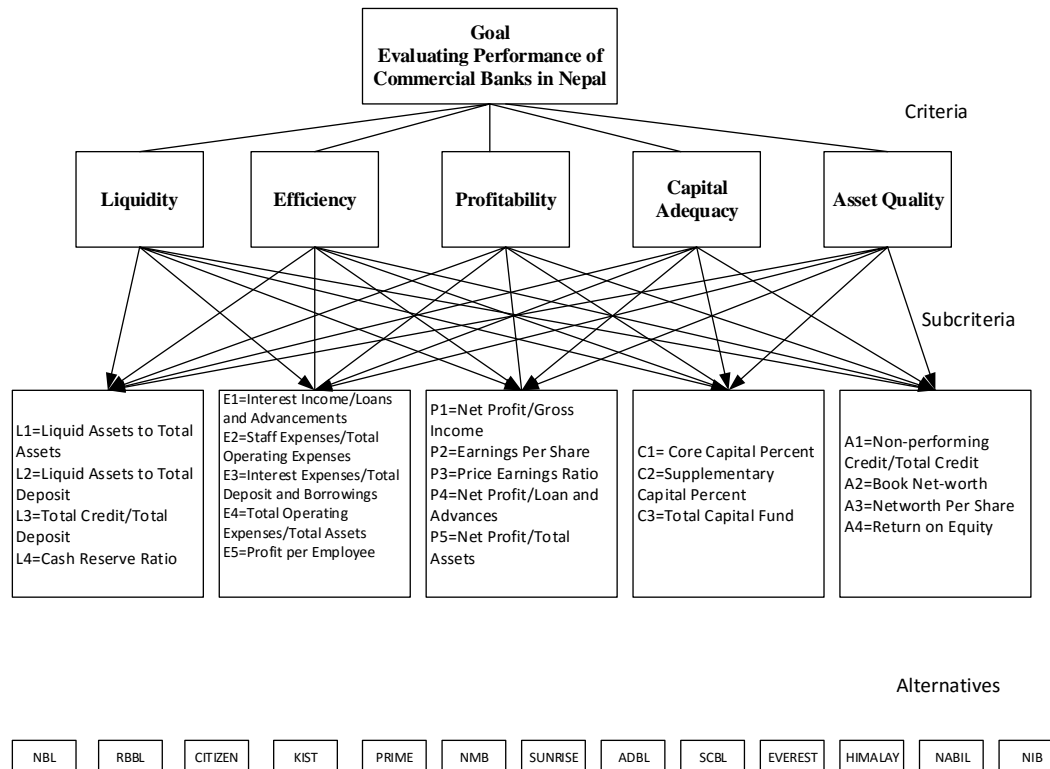

Figure 2. AHP Model

*International Journal of the
Analytic Hierarchy Process*

323

*Vol. 8 Issue 2 2016
ISSN 1936-6744
http://dx.doi.org/10.13033/ijahp.v8i2.368*

Table 1
Criteria and sub criteria for bank performance evaluation

Criteria	Sub Criteria
Liquidity	L1=Liquid Assets to Total Assets
	L2=Liquid Assets to Total Deposit
	L3=Total Credit/Total Deposit
	L4=Cash Reserve Ratio
Efficiency	E1=Interest Income/Loans and Advancements
	E2=Staff Expenses/Total Operating Expenses
	E3=Interest Expenses/Total Deposit and Borrowings
	E4=Total Operating Expenses/Total Assets
	E5=Profit per Employee
Profitability	P1=Net Profit/Gross Income
	P2=Earnings Per Share
	P3=Price Earnings Ratio
	P4=Net Profit/Loan and Advances
	P5=Net Profit/Total Assets
Capital Adequacy	C1= Core Capital Percent
	C2=Supplementary Capital Percent
	C3=Total Capital Fund
Asset Quality	A1=Non-performing Credit/Total Credit
	A2=Book Net-worth
	A3=Networth Per Share
	A4=Return on Equity

5. Data analysis

5.1 Financial analysis

The mean financial values were calculated from the annual reports of the respective banks and the table below shows the data.

Table 2
Calculation of financial parameters

Banks	Liquidity				Efficiency					Profitability					Capital Adequacy			Asset Quality			
	L1	L2	L3	L4	E1	E2	E3	E4	E5	P1	P2	P3	P4	P5	C1	C2	C3	A1	A2	A3	A4
Sunrise	0.26	0.32	0.80	29.51	9.07	44.54	6.8	1.93	288.07	8.24	7.71	29.18	0.9	0.006	11.48	0.795	12.27	0.038	1747462	107.17	0.08
Prime	0.23	0.26	0.83	12.4375	11.78	33.81	7.24	11.105	1146.19	13.69	19.49	12.59	1.8	1.323	11.39	0.918	12.31	0.333	1433153	118.63	0.31
NMB	0.36	0.60	0.80	10.475	9.75	41.01	6.1525	1.29	723.19	11.07	7.19	56.80	1.4	0.820	16.66	0.598	17.52	0.983	1977676	114.57	0.07
KIST	0.25	0.30	0.79	7.6675	12.62	37.86	7.505	2.0475	193.88	17.47	4.85	48.36	0.9	0.570	14.45	0.765	15.22	1.723	2117802	105.89	0.05
Citizen	0.22	0.26	0.81	12.765	12.83	32.05	7.1275	3.7925	853.96	11.35	14.19	32.80	1.6	1.078	12.39	0.875	13.27	0.873	1737628	109.00	0.11
RBBL	0.31	0.35	0.49	13.07	9.94	42.26	2.4625	4.9725	826.01	26.33	432.68	0.00	4.7	2.163	-19.14	0.000	-19.14	0.109	-8446909	-720.54	1.85
ADBL	0.20	0.32	1.07	27.4225	13.96	47.24	5.1425	9.165	615.83	17.65	62.92	1.06	4.4	3.053	13.98	4.273	18.25	9.663	11636570	422.37	0.76
NBL	0.21	0.25	0.75	23.675	13.41	55.44	2.4775	7.395	738.80	8.74	95.19	0.00	1.7	0.748	-10.26	0.000	-10.26	0.016	-1200	-315.47	5.38
NABIL	0.21	0.25	0.75	6.3875	11.15	15.48	4.885	5.88	3432.54	25.18	87.87	26.39	3.8	2.538	8.91	1.788	10.70	0.016	4249065	270.75	1.32
Nepal Inve	0.22	0.25	0.80	9.85	11.23	40.35	5.675	1.2	2022.92	20.40	39.15	19.88	2.7	1.875	8.79	2.158	10.95	1.378	4925734	171.00	0.62
SCBL	0.37	0.42	0.47	10.855	10.14	23.52	2.1475	3.405	4125.42	33.71	82.44	36.89	6.9	2.653	12.42	1.918	14.34	0.007	3555531	263.25	1.29
Himalayar	0.23	0.26	0.75	6.9975	11.56	47.12	4.5	2.20975	1864.29	28.05	44.58	20.83	2.6	1.693	8.99	1.870	10.86	2.998	3843969	219.02	0.70
Everest	0.30	0.33	0.75	14.14	10.51	10.43	4.74	5.6975	2344.34	17.51	92.97	16.41	2.9	2.008	8.75	2.143	10.89	0.455	2982825	316.74	1.45

It is seen that Standard Chartered Bank has the highest Liquid Asset to Total Asset ratio of 0.37, and Agriculture Development Bank has the lowest ratio of 0.20. Liquidity was the most important criteria in determining the soundness of Banks (31.1%), Capital Adequacy, Asset Quality, Efficiency and Profitability were 21.6%, 18.5%, 14.9% and 13.9% respectively. The ranking of commercial banks was done after prioritization of the financial criteria. It was evident that Standard Chartered Bank was the most efficient and profitable bank with a normalized efficiency and profitability score of 100%. Two public sector banks, Nepal Bank Limited and Rastriya Banijya Bank, were ranked in the bottom two in the ranking list. This was particularly due to Negative Capital Adequacy Ratios. The average Total Capital Adequacy Fund for these banks was –14.87% which is below the minimum Capital Adequacy Requirement (CAR) of 10% prescribed by Nepal Rastra Bank (NRB). On the contrary ADBL bank was performing above average in comparison to the other two public banks. Some banks like Prime Bank and Sunrise Bank had sound liquidity positions, but these banks have not been maximizing profits which justify their rank. This type of analysis is based on indicators by which central bank Nepal Rastra Bank (NRB) evaluates bank performance where the financial data is compared with the CAMEL benchmark already set. AHP, on the other hand, will first prioritize and rank performance evaluation indicators/criteria because the performance evaluation measures and benchmarks are susceptible to changes in central bank policies. The AHP method will allow experts to first prioritize the indicators and then analyze the already computed financial data to rank banks and also perform a sensitivity analysis.

5.2 Performance evaluation of banks by AHP
The set of the AHP questionnaire was constructed through Expert Choice Software ver. 11. Extensive analysis of the literature and expert views on defining parameters determining performance of banks and bank soundness was determined. The questionnaire prepared was distributed to a group of banking and finance experts, and the corresponding results were synthesized by the AHP method using Expert Choice Software. A total of 15 banking and finance experts from commercial banks, a credit rating agency, a central bank of Nepal and chartered accountants were provided the

questionnaire through email. A total of 13 experts (86.66%) responded. The questionnaire analysis was interpreted through Expert Choice ver. 11 Software. The eigenvalues, consistency indices and consistency ratios obtained from the processing of the information supplied by the participants including the facilitator revealed that the consistency indices (CI) were less than 0.1, indicating consistency in judgmental values of the respondents. To come to the decisions were checked to make sure they were in compliance with the CI. The following tables show the combined pairwise comparison matrices.

Table 3
Pairwise comparison matrix with respect to: Liquidity (Inconsistency: 0.03):

	L1	L2	L3	L4
L1	1.0	1.53	0.76	0.80
L2	0.65	1.0	0.90	1.07
L3	1.31	1.12	1.0	1.61
L4	1.25	0.94	0.62	1.0

Table 4
Pairwise comparison matrix with respect to: Efficiency (Inconsistency: 0.10)

	E1	E2	E3	E4	E5
E1	1.0	5.3	2.16	2.5	1.4
E2	0.19	1.0	0.37	0.7	2.0
E3	0.46	2.7	1.0	1.0	3.4
E4	0.40	1.47	1.01	1.0	3.2
E5	0.72	0.51	0.30	0.3	1.0

Table 5
Pairwise comparison matrix with respect to: Profitability (Inconsistency: 0.01)

	P1	P2	P3	P4	P5
P1	1.0	0.8	1.36	1.8	1.12
P2	1.25	1.0	1.84	3.15	1.09
P3	0.74	0.54	1.0	1.11	0.72
P4	0.55	0.32	0.9	1.0	0.70
P5	0.89	0.91	1.39	1.43	1.0

Table 6
Pairwise comparison matrix with respect to: Capital Adequacy (Inconsistency: 0.09)

	C1	C2	C3
C1	1.0	6.06	0.58
C2	0.16	1.0	0.24
C3	1.71	4.21	1.0

Table 7
Pairwise comparison matrix with respect to: Asset Quality (Inconsistency: 0.03)

	A1	A2	A3	A4
A1	1.0	2.9	3.1	3.1
A2	0.35	1.0	0.81	0.5
A3	0.32	1.23	1.0	0.47
A4	0.32	2.02	2.12	1.0

Table 8
Pairwise comparison matrix with respect to Goal ((Inconsistency: 0.04)

	Liquidity	Efficiency	Profitability	CAR	Asset Quality
Liquidity	1.0	2.5	1.74	2.06	1.27
Efficiency	0.40	1.0	0.91	0.58	1.31
Profitability	0.57	1.10	1.0	0.66	0.51
CAR	0.49	1.72	1.51	1.0	1.54
Asset Quality	0.79	0.76	1.97	0.65	1.0

Based on pairwise comparisons of the financial criteria and sub criteria it was seen that we obtained the priorities of Liquidity in Banks (W= 0.311), Capital Adequacy (W=0.216), Asset Quality (W=0.185), Efficiency (W=0.149), and Profitability (W=0.139). The overall inconsistency was 0.04 which is acceptable as it is <0.1. Further the Data Grid function in Expert Choice software was used to assess the relative importance of the financial parameters based on the maximum and minimum value of the financial data. The data grid function determines the importance of the financial parameters modeled. The following table depicts how performance of the commercial banks is determined in terms of parameters classified using increasing and decreasing utility curves to measure their ranking. The data grid assesses the relative importance of the financial parameters based on the maximum and minimum value of the financial data and convert raw data to prioritized information.

Table 9
Priorities of financial parameters

	Local Weight	Global Weight	INCR or DECR
Liquidity	**L: .311**	**G: .311**	
L1=Liquid Assets to Total Assets	L: .245	G: .076	INCR
L2=Liquid Assets to Total Deposit	L: .221	G: .069	INCR
L3=Total Credit/Total Deposit	L: .305	G: .095	DECR
L4=CRR	L: .229	G: .071	INCR
Efficiency	**L: .149**	**G: .149**	
E1=Interest Income/Loans and Advancements	L: .375	G: .056	INCR
E2=Staff Expenses/Total Operating Expenses	L: .108	G: .016	DECR
E3=Interest Expenses/Total Deposit and Borrowings	L: .223	G: .033	DECR
E4=Total Operating Expenses/Total Assets	L: .192	G: .029	DECR
E5=Profit per Employee	L: .101	G: .015	INCR
Profitability	**L: .139**	**G: .139**	
P1=Net Profit/Gross Income	L: .223	G: .031	INCR
P2=Earning Per Share	L: .291	G: .041	INCR
P3=Price Earning Ratio	L: .151	G: .021	INCR
P4=Net Profit/Loan and Advances	L: .124	G: .017	INCR
P5=Net Profit/Total Assets	L: .211	G: .029	INCR
Capital Adequacy	**L: .216**	**G: .216**	
C1= Core Capital Percent	L: .401	G: .087	INCR
C2=Supplementary Capital Percent	L: .090	G: .019	INCR
C3=Total Capital Fund	L: .509	G: .110	INCR
Asset Quality	**L: .185**	**G: .185**	
A1=Non-performing Credit/Total Credit	L: .497	G: .092	DECR
A2=Book Net-worth	L: .130	G: .024	INCR
A3=Net worth Per Share	L: .140	G: .026	INCR
A4=Return on Equity	L: .233	G: .043	INCR

5.3 Ranking of commercial banks

The ranking of commercial banks was done after prioritization of the financial criteria. Aggregation of the results from individual comparison of the financial criteria and sub criteria and assessing the financial data using data grid functions were done to finally achieve holistic ranking of commercial banks. The results suggest that Standard Chartered Bank is the most efficient bank whereas Rastriya Banjiya Bank and Nepal Bank Limited are the least efficient banks. Agriculture Development Bank on the contrary shows above average efficiency. The normalized ranking of the commercial banks is shown in the figure below.
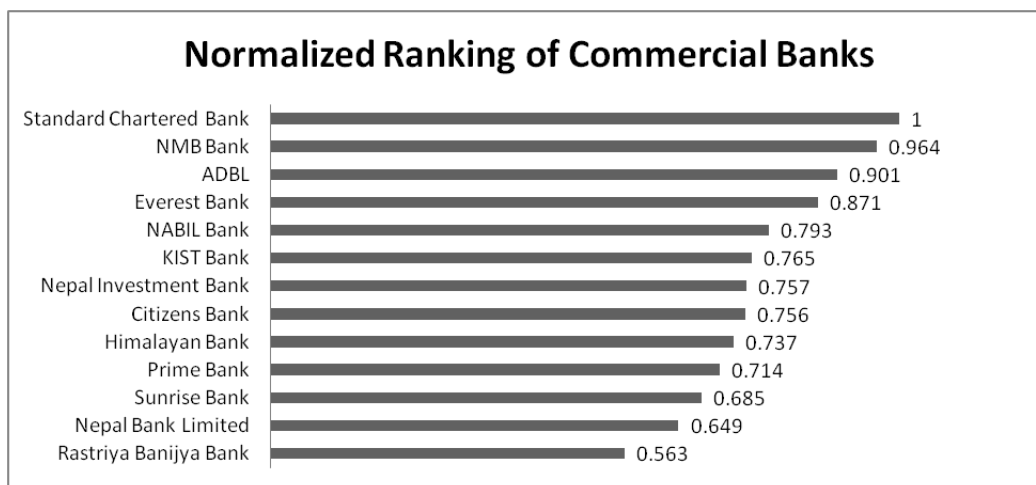
Figure 3. Normalized ranking of commercial banks

6. Sensitivity analysis

The sensitivity analysis is where the input data are slightly modified in order to observe the impact on the results. If the ranking does not change the results are said to be robust. The sensitivity analysis is best performed with an interactive graphical interface. The sensitivity analysis for the least efficient banks, Rastriya Banijya Banks and Nepal Bank Limited, has been performed. The relative ranking of Rastriya Banijya Bank can be improved if the Capital Adequacy factor is improved as the sensitivity analysis. Figure 4 shows that the performance of these banks is highly dependent on Capital Adequacy. These two banks must improve the Capital Adequacy. Standard Chartered Bank is seen as the most efficient bank and has a strong position in terms of all the financial parameters defined for this study. Liquidity holds the maximum priority followed by Capital Adequacy according to the sensitivity graph shown.
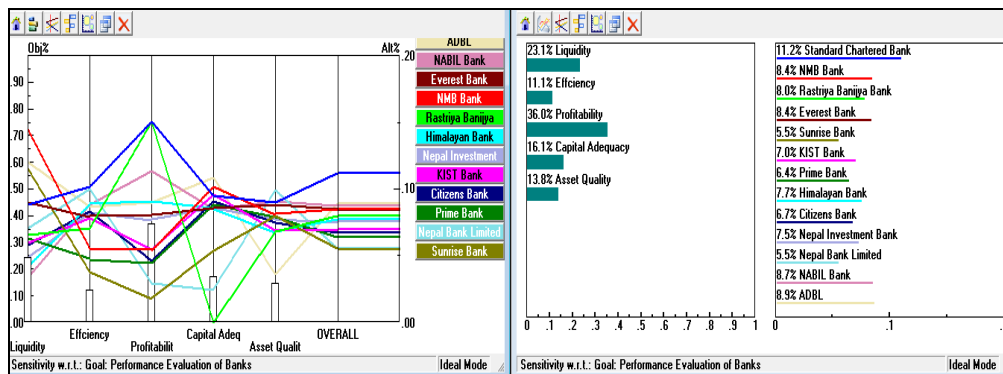
Figure 4. Sensitivity graph

7. Limitations

There are some limitations which narrowed the generalization of this study, e.g., inadequate coverage of the industry, the time period taken, availability of data and other variations. The study is perhaps limited by following factors:

1) This study is limited to a period of only a 4 year trend of the concerned banks, and hence the conclusion drawn is confined only to the above period.
2) This study deals with only 13 commercial banks; other commercial banks have not been considered.
3) This study is based on data derived from the published annual reports of the thirteen banks.
4) This study does not consider management efficiency, market risks and customer satisfaction in evaluating bank performance.

8. Conclusions and recommendations

The ranking of commercial banks was done after prioritizing the financial criteria. Two public sector banks, Nepal Bank Limited and Rastriya Banijya Bank, were ranked at the bottom in the ranking list. This was particularly due to Negative Capital Adequacy Ratios. The average Total Capital Adequacy Fund for these banks was –14.87% which is below the minimum Capital Adequacy Requirement (CAR) of 10% prescribed by Nepal Rastra Bank (NRB). On the contrary ADBL bank was performing above average in comparison to the other two public banks. Some banks such as Prime Bank and Sunrise Bank had sound liquidity positions, but these banks have not been maximizing profits to justify their risk. The commercial banks in Nepal, and in particular the public sector bank's lower (negative) capital adequacy values, are associated with lower performance. These banks need to strengthen their Capital Adequacy Ratios above 10% (out of which 6% is core capital percentage). The main reason for the banks not being able to maintain minimum capital is due to the increase in non-performing loans, as such an increase in non-performing loans could decrease the profit. The banks with lower non-performing loans will have to focus on risk management and should act to recover their bad debts.

Deposit organizations such as banks that show a lower than regulatory Cash Reserve Ratio in their annual accounts might lead to depositor mistrust of the bank. It is not mandatory for banks to maintain a minimum percentage of their deposits as investments in government securities in Nepal, therefore the banks have to maintain Cash Reserve Ratio as their mandatory liquidity factor.

The results of this study show that a Multi Criteria Decision based approach such as the Analytic Hierarchy Process can be used as a supplementary decision support tool to the CAMELS rating system in the bank examination process. The Analytic Hierarchy Process based systems approach explicitly explores the financial characteristics of the banking system and compares the banks with respect to these characteristics, thus, determining differences in the financial structures and positions of the banks. This study also adds to the literature that demonstrates the utility of AHP-based bank evaluations applied to the Nepalese banking community, which not only evaluates the performance of banks but also gives insights about where to focus in improving a particular bank in comparison to others. The ability of the dynamic sensitivity analysis feature available with the AHP processing software further helps to overcome the accuracy of the data available from the individual banks, which could be of added value to bank regulators and more comprehensive Multi Criteria Decision Analysis methods including sensitivity components as well as qualitative criteria like management efficiency, customer satisfaction and legal compliance which could be incorporated in future research.

REFERENCES

Almazari, Ahmed Arif (2011). Financial performance evaluation of some selected Jordanian commercial banks. *International Research Journal of Finance and Economics 68*, 50-63.

Babić, Z, Belak, V and Tomić-Plazibat, N. (1999) Ranking of Croatian banks according to business efficiency. *Proceedings of the 5th International Symposium on Operational Research*. Preddvor, Slovenia.

Bakar, N and Tahir, I M. (2009). *Applying multiple linear regression and neural network to predict bank performance.* International Journal of Business Research and Management 2 (4), pp. 176-183. doi: http://dx.doi.org/10/5539/ibr.v2n4p176

Baral, K. J. (2005). Health check-up of commercial banks in the framework of CAMEL: A case study of joint venture banks in Nepal. *The Journal of Nepalese Business Studies 2(1)*, 41-55. doi: http://dx.doi.org/10.3126/jnbs.v2i1.55

Bhattarai, Shashi and Shivjee, Yadav Roy (2009). AHP application in banking: unfolding Utility in a situation of financial crisis. *Proceedings of International Symposium on Analytic Hierarchy Process*, Pittsburgh, PA, USA.

Čehulić, Dejan, Hunjak, Tihomir and Begičević, Nina. Croatia (2011). Comparison of a bank's financial ratios using the Analytic Hierarchy Process. *Proceedings of the 22nd Central European Conference on Information and Intelligent Systems*, 187-193.

Dang, Uyen (2011). *The CAMEL rating system in banking supervision A Case Study.* Thesis Paper for Arcada University of Applied Sciences, International Business.

Gajurel, D. P., & Pradhan, R. S. (2011). Structure-performance relation in Nepalese banking industry. *International Conference on Economics Business* . doi: http://dx.doi.org/10.2139/ssrn.1665132

Gilbert, R, Meyer, A, & Vaughan, M. (2002). Could a CAMELS downgrade model Improve off-site surveillance? *Federal Reserve Bank of St. Louis Review,* 47-63.

Hunjak, T., & Jakovčević, D. (2001). AHP based model for bank performance. *Proceedings – 6th ISAHP,* Berne, Switzerland, 149-158.

Jabalameli, F., & Rasolinezhad, E. (2011). The ranking of chosen branches of Saderat Bank in Tehran City through the AHP and the DEA/AHP model. *Proceedings of the International Symposium on the Analytic Hierarchy Process,* Sorrento, Italy.

Jha, S., & Hui, X. (2012). A comparison of financial performance of commercial banks: A case study of Nepal. *African Journal of Business Management, 6(25)* , 7601-7611. doi: 10.5897/AJBM11.3073

International Journal of the
Analytic Hierarchy Process

332

Vol. 8 Issue 2 2016
ISSN 1936-6744
http://dx.doi.org/10.13033/ijahp.v8i2.368

Lu, T.-L., Wang, Y.-C., & Lee, Y.-C. (2013). A study on risk based banking supervision. *Business and Information*, 164-172.

Naceur, S. (2003). The determinants of the Tunisian banking industry. [Online] 2003. http://www.mafhoum.com/press6/174E11.

Nepal Rastra Bank. (2012). *Bank supervision report.*: Bank Supervision Department. doi: 10.4324/9781843140115

Rakocevic, S., & Dragasevic, Z. (2009). Analysis of the efficiency of banks in Montenegro using the AHP. *ISAHP,* Pittsburgh, PA, USA.

Saaty, T.L. (1980). *The Analytic Hierarchy Process: Planning, priority setting, resource allocation*, McGraw-Hill, Inc.

Sapkota, M. (2012). *Trend analysis of Nepalese banks from 2005-2010.* University of New Orleans Scholar Worls @ UNO.

Samad, A., & Hassan, M. K. (2000). The performance of Malaysian Islamic Bank during 1984-1997: An exploratory study. *International Journal of Islamic Financial Services 1(3)* , 1-14.

Saunders, Anthony and Cornett, Millon Marcia. (2004). *Financial markets and institutions.* Tata McGraw Hill Publishing Company.

Steuer, R. E., & Paul, N. A. (2003). Multiple criteria decision making combined with finance: A categorized bibliographic study. *European Journal of Operational Research 150 (3)* , 496-515. doi: http://dx.doi.org/10.1016/S0377-2217(02)00774-9

Thagunna, K. S., & Poudel, S. (2013). Measuring bank performance of Nepali banks:A Data Envelopment Analysis (DEA) perspective. *International Journal of Economics and Financial Issues, 3(1)* , 54-65.

Vaidya, O. S., & Kumar, S. (2006). Analytic Hierarchy Process: An overview of applications. *European Journal of Operational Research, 169*, 1-29. http://dx.doi.org/10.1016/j.ejor.2004.04.028

Vilén, M. (2010). *Predicting failures of large U.S. commercial banks.* Master's Thesis for Aalto Univeristy School of Economics, Department of Economics.

Dzeawuni, Wirnkar Alphonsius and Muhammad, Tanko, CAMELs and Banks Performance Evaluation: The Way Forward (June 24, 2008). doi: http://dx.doi.org/10.2139/ssrn.1150968

Yalçın, S. N., Ali, B., & Cengiz, K. (2009). Fuzzy performance evaluation in Turkish banking sector using Analytic Hierarchy Process and TOPSIS. *Expert Systems With Applications, 36* , 11699-11709. doi: http://dx.doi.org/10.1016/j.eswa.2009.03.013

333