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Risk management and its impact on profitability of commercial banks in Nepal

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Abstract
This study examines the risk management and its impact on profitability of commercial banks in Nepal. The return on assets and return on equity are the dependent variables. The independent variables are non-performing loan, capital adequacy ratio, credit to deposit ratio, cash reserve ratio, current ratio and liquid assets ratio. This study is based on secondary sources of data that are collected for 10 commercial banks through 2011/12 to 2020/21, leading to a total 100 observations. The data were collected from Bank Supervision Reports published by Nepal Rastra Bank and annual reports of the selected commercial banks. The study used both descriptive and inferential statistical tools to analyze the data. The regression models are estimated to test the significance of risk management and its impact on profitability of commercial banks in Nepal. The result shows that capital adequacy ratio is positively related to return on assets. Likewise, the study reveals that current ratio is positively related to return on assets and return on equity. However, the study reveals that capital adequacy ratio is negatively related to return on equity. Likewise, the study reveals that credit to deposit ratio, non-performing loan ratio, cash reserve ratio and liquid assets ratio are negatively related to return on assets and return on equity. The regression result shows that beta coefficients are negative for capital adequacy ratio, credit to deposit ratio, non-performing loan ratio and liquid assets ratio with profitability. However, the study reveals that beta coefficient is positive for current ratio with profitability. The recommendation is that banks should design and formulate strategies that will not only minimize the exposure of the banks to risk but will also enhance profitability.

Keywords: non-performing loan ratio, capital adequacy ratio, credit to deposit ratio, cash reserve ratio, current ratio, liquid assets ratio, return on assets, return on equity

Introduction

Banks are financial entities that act as economic mediators by directing financial resources from financially strong economic units to financially weak ones. They thus encourage capital development and saving in the economy. Banks are subject to a variety of hazards, which have an effect on their operation and performance. Banks are crucial in emerging economies as most borrowers do not have access to credit markets. As a result, the bank is seen as a middleman between depositors and borrowers. A commercial bank is a type of financial organization that offers financial services such issuing money in different forms, taking deposits, lending money, processing transactions, and establishing credit. (Campbell, 2007). In today's fast-moving business environment, banks are exposed to a large number of risks such as credit risk, liquidity risk, market risk, operational risk, interest rate exchange risk etc. All those many risks faced by bank, credit risk plays significant role on its financial performance as a large chunk of bank income is earned form loan provided to their customers in the form of interest income (Kolapo *et al*., 2012) [14]. whereas it is the risk of loss due to debtor's non-payment of a loan or other line of credit (either the principal or interest or both) (Campbell, 2007). The importance of credit risk management to a bank's profitability cannot be overstated. Credit risk management efficacy boosts both bank and depositor confidence. Many recent academic studies suggest that a sound credit risk policy is a necessary requirement for the bank, and that poor credit management and insufficient credit administration are the primary sources of issues in the banking environment. In this context, several researchers have investigated the influence of credit risk on commercial bank profitability in various aspects. There have been arguments and conflicts over credit risk analysis and management, as well as commercial bank profitability. However, other academics, such as Athanasoglou *et al*. (2008), have conducted substantial investigations on this issue, with inconsistent findings. Some have discovered that the impact of credit risk management has a positive effect on commercial bank profitability (Alshatti *et al*., 2015) [2], while others have discovered a negative relationship and suggest that other factors besides the impacts of credit risk management can influence profitability Specifically (Million *et al*., 2015) [38] found in a study of commercial banks in Ethiopia between 2003-2004 that there is a significant relationship between commercial bank profitability and credit risk management.

The term liquidity is frequently used in a variety of circumstances. The liquidity of an asset describes how quickly, simply, and cheaply that asset may be converted into cash (Berger & Bouwman, 2008) [4]. The liquidity in the commercial bank represents the ability to fund its obligations by the contractor at the time of maturity, which includes lending and investment commitments, withdrawals, deposits, and accrued liabilities (Amengor, 2010). The ratio may be used to calculate liquidity risk, which is the likelihood that a firm will be unable to pay its short-term commitments when they become due. This incompetence might lead to major financial troubles for a corporation. Furthermore, liquidity risk can be described in terms of the transaction's counterparty. In this context, the phrase refers to the risk that the counterparty would be unable to pay or

settle the transaction, even though they are in good financial standing, due to a lack of liquidity (Petria & Petria, 2009) [40]. It is evident that liquidity and liquidity risk is very emerging and important topic. Therefore banks and regulators are keen to keep a control on liquidity position of banks. However, The majority of indices used to measure corporate liquidity are functions of the components of working capital, hence liquidity management is typically seen from the perspective of working capital management. It is impossible to overstate how crucial liquidity management is to company success in today's economy. The most important aspect of managing working capital is preserving its liquidity in day-to-day operations to ensure that it runs smoothly and fulfills its obligations (Eljelly, 2004) [7]. Bourke (1989) found positive relationship between liquidity and profitability and argued that the relationship differs from a bank's business model and the state of the economy. In this regard, different researchers have examined the impact of liquidity risk on the profitability of commercial banks in different dimensions. There have been debates and controversies over the analysis and management of liquidity risk and the profitability of commercial banks. However, some researchers, such as Molyneux and Thornton (1992) and Goddard *et al*. (2004) [8] found diverse evidence of a negative relationship between the two variables for European banks in the late 1980s and mid 1990s respectively. According to Bassey and Moses (2015), there is a statistically significant relationship between bank liquidity and return on equity.

In this context, this research investigates the risk management and its impact on profitability of commercial banks in Nepal. The findings of this research can be helpful for bankers, investors and policymakers.

The objectives of this research are:

- To assess the relationship between non-performing loan, capital adequacy ratio, credit to deposit ratio, cash reserve ratio, current ratio, liquid asset ratio and ROA and ROE.
- To examine the effect of non-performing loan, capital adequacy ratio, credit to deposit ratio, cash reserve ratio, current ratio, liquid asset ratio on profitability of commercial banks in Nepal.

Review of Literature

Empirical Review

Tuladhar (2017) [46] revealed that coverage ratio, capital adequacy ratio, and bank size all have a positive impact on bank performance. Leverage ratio and non-performing loan ratio, on the other hand, have a negative impact on bank performance; however, liquidity ratio, assets quality ratio, and cash reserve ratio were found to be insignificant variables in determining bank performance.

Poudel (2018) [41] found that the credit risk has a significant negative impact on the profitability of Nepalese commercial banks. Furthermore, the solvency ratio, interest spread rate, and inflation have a negligible negative impact on profitability. In contrast, the profitability of Nepal's commercial banks is significantly positively impacted by the capital adequacy ratio, total assets, and GDP growth.

Million et. al., (2015) [38] examined the impact of credit risk on profitability of commercial banks in Ethiopia. The data were analyzed using a descriptive statics and panal data regression model and the result showed that credit risk measures: non-performing loan, loan loss provisions and capital adequacy ratio have a significant impact on the profitability of commercial banks in Ethiopia.

Felix and Claudine (2008) have investigated the relationship between bank performance and credit risk management. It could be inferred from their findings that return on equity (ROE) and return on assets (ROA) both measuring profitability were inversely related to the ratio of non-performing loan to total loan of financial institutions thereby leading to a decline in profitability.

Kithinji (2010) [13] has assessed the effect of credit risk management on the profitability of commercial banks in Kenya. Data on the amount of credit, level of non-performing loans and profits were collected for the period 2004 to 2008. The findings revealed that the bulk of the profits of commercial banks are not influenced by the amount of credit and nonperforming loans, therefore suggesting that other variables other than credit and nonperforming loans impact on profits.

Alshatti (2015) [2] has examined the effect of credit risk management on financial performance of the Jordanian commercial banks during the period 2005-2013 using capital adequacy ratio, credit interest/credit facilities ratio, provision for facilities loss/ net facilities ratio, leverage ratio and non-performing loans/gross loans ratio as independent variables. The dependent variables represent the profitability measured by ROA and ROE. The author concludes that all the credit risk management indicators used in the study have significant effect on the financial performance of the Jordanian commercial banks.

Saleem & Rehman (2011) showed that there is positive significant relationship between return on assets and current ratio of the companies in Saudi Arabia. Further, the study revealed that there is negative but insignificant relationship of return on assets with quick ratio and investment ratio of the companies in Saudi Arabia.

Ismail (2016) [10] found that liquidity variables such as current ratio and the cash conversion cycle have significant positive impact on profitability (ROA). High current ratio and longer cash conversion cycle lead firms towards better performance.

Gautam (2016) revealed that bank size and inflation rate have a positive impact on liquidity. However, non-performing loans, profitability and GDP growth rate have negative impact on liquidity of Nepalese commercial banks.

Khati (2020) [12] revealed that asset quality (AQ) has a negative and significant association with return on assets (ROA), but a positive and significant relationship with return on equity (ROE).Cash deposit ratio (CDR) has positive and insignificant relationship with return on assets (ROA) and return on equity (ROE). However, the study reveals that credit-deposit (CDR) has positive but insignificant relationship with ROA and has negative and insignificant relationship with return on equity (ROE).

Ndoka *et al*., (2017) examined the impact of liquidity risk management on the performance of Albanian Commercial Banks in Albania. According to the findings of the study, liquidity risk is predicted to have a significant impact on the profitability of Commercial Banks operating in Albania.

Research gap

The research gap in the topic of "Risk management and its impact on profitability of commercial banks in Nepal" could be the lack of studies on the specific methods and strategies used by commercial banks in Nepal to manage risk and the

impact it has on their financial performance. Another gap could be the limited analysis on the effectiveness of the current regulatory framework in Nepal for managing risks in the banking sector and its impact on the profitability of commercial banks. Additionally, there may be a lack of empirical evidence on the relationship between risk management practices and profitability in the Nepalese banking industry and the possible reasons for any observed trends. Further research in these areas can provide valuable insights and contribute to the development of effective risk management policies and practices in the Nepalese banking sector.

Research Methodology

Research Design

Descriptive research design and Causal comparative research design. Descriptive research design has been used to analyze the characteristics of sample banks, and causal comparative research design has been used to establish the relationship between the dependent and independent variables.

Population and sample size

As of Jul, 2022 (Licensed by NRB) there are 26 commercial banks operating in Nepal so, all the commercial banks operating in Nepal are consider as the population. Here all 26 commercial banks are population.

A sample is a collection of items or elements from a population. Hence, a sample is only a portion of subset of the population. Out of 26 commercial banks ten banks are taken as a sample.

Sampling method

Simple random sampling technique has been used.

Data collection

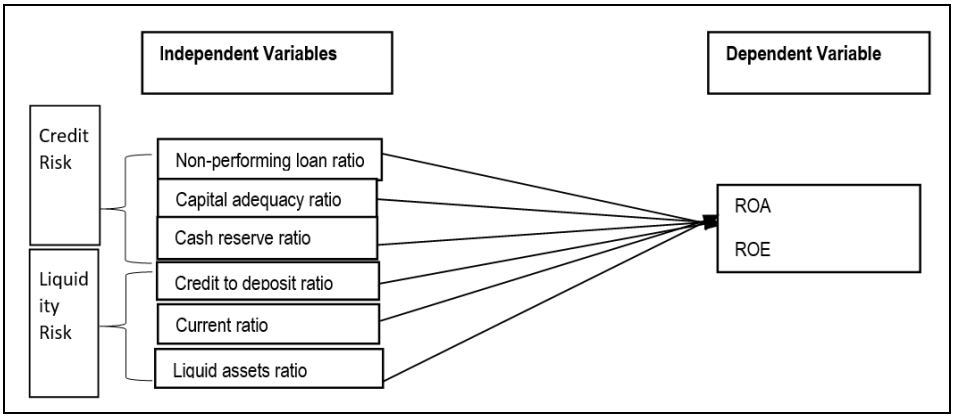
Quantitative nature of secondary data has been used for conducting the study. The secondary sources of data has been collected from the website of respective commercial banks annual reports especially from profit and loss accounts, balance sheet and other publications made by banks. Likewise some other related information are gathered from related banks and related agencies like Nepal Rastra Bank, Nepal Stock Exchange Limited.

Data analysis

This study was based in descriptive and inferential methods for the presentation and analysis of data. Table, Percentages, Means, Standard Deviation, Correlation and Regression are used for the purpose of presentation and analysis of data. Regression analysis is done to check the model's fit, and p-values generated from the regression have been analyzed to test the hypotheses.

The following are the hypotheses of the study:

- H1: There is a significant relationship between Non-performing loan ratio and profitability
- H2: There is a significant relationship between Capital adequacy ratio and profitability
- H3: There is a significant relationship between Credit deposit ratio and profitability
- H4: There is a significant relationship between Cash reserve ratio and profitability
- H5: There is a significant relationship between Current ratio and profitability
- H6: There is a significant relationship between Liquid asset ratio and profitability.
- H7: There is a significant effect of Non-performing loan on profitability
- H8: There is a significant effect of Capital adequacy ratio on profitability
- H9: There is a significant effect of Credit deposit ratio on profitability
- H10: There is a significant effect of Cash reserve ratio on profitability
- H11: There is a significant effect of Current ratio on profitability
- H12: There is a significant effect of Liquid asset ratio on profitability



Note: Adopted from Sharma R. (2021) and Gyawali S. (2020)

Fig 1: Theoretical Framework

The model in the study is:

Model 1: $ROA = \beta 0 + \beta 1NPLR + \beta 2CAR + \beta 3CDR + \beta 4CRR + \beta 5CR + \beta 6LAR + \in$ ..... (i)

Model 2: $ROE = \beta 0 + \beta 1NPLR + \beta 2CAR + \beta 3CDR + \beta 4CRR + \beta 5CR + \beta 6LAR + \in$ ..... (ii)

Where ROA= Return on Assets, ROE= Return on Equity, β_0 = Constant. β_1, β_2, β_3, β_4, β_5, and β_6 are the regression coefficients for Non-performing loan ratio, Capital adequacy ratio, Credit to deposit ratio, Cash reserve ratio, Current ratio and Liquid assets ratio, respectively, and e = error term in the model.

Results and Analysis

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	SD
Non -performing loan ratio (%)	100	0.01	24.29	1.9656	2.88065
Capital adequacy ratio (%)	100	8.41	15.75	12.4469	1.36661
Credit to deposit ratio (%)	100	65.38	96.69	82.6102	6.7476
Cash reserve ratio (%)	100	3.66	35.14	17.176	9.55615
Current Ratio (%)	100	0.09	0.33	0.1773	0.05191
Liquid assets ratio (%)	100	8.07	39.04	17.2408	6.64639
Return on Assets (%)	100	-3.43	3.25	1.4525	0.82889
Return on Equity (%)	100	-55.9	32.78	14.97	9.743

In the above table, we can see, in relation to the Non-performing loan ratio, the average was 1.96% with a standard deviation of 2.88%. For Capital adequacy ratio, the average was 12.44% with a standard deviation of 1.36%.
With respect Credit to deposit ratio, the average was 82.61% with a standard deviation of 6.74%. For Cash reserve ratio, the average was 17.17%, with a standard deviation of 9.55%. Regarding Current ratio, the average was 0.17% with a standard deviation of 0.05%.ForLiquid assets ratio, the average was 17.24%, with a standard deviation of 6.64%. For Return on assets, the average was 1.45%, with a standard deviation of 0.82%.Finally, with respect to Return on equity, the average was 14.97%, along with a standard deviation of 9.74%.

Table 2: Pearson's correlation test

Correlation Probability	CAR	CDR	NPLR	CRR	CR	LAR	ROA	ROE
CAR	1							
CDR	0.5395*	1						
NPLR	-0.4297*	-0.2664	1					
CRR	-0.0148	-0.0634	-0.0453	1				
CR	0.1112	-0.053	-0.0631	-0.0277	1			
LAR	-0.2336**	-0.2387**	0.5554*	-0.1247	0.6139*	1		
ROA	0.1366	-0.019	-0.508	-0.0293	0.0588	-0.3833*	1	
ROE	-0.2354**	-0.2647	-0.0238	-0.0394	0.0408	-0.1355	0.7589	1

**. Correlation is significant at the 0.05 level.
*. Correlation is significant at the 0.01 level.

The above table shows that there is a positive relationship of return on assets with capital adequacy ratio and current ratio. This indicates that higher the capital adequacy ratio and current ratio higher would be the return on assets. However, credit to deposit ratio, non-performing loan ratio, cash reserve ratio and liquid assets ratio have a negative relationship with return on assets. This indicates that an increase in credit to deposit ratio, non-performing loan ratio, cash reserve ratio and liquid assets ratio leads to decrease in return on assets. The return on equity is positively related to current ratio. It indicates that higher the current ratio higher would be the return on equity. Furthermore, return on equity is negatively related to capital adequacy ratio, credit to deposit ratio, non-performing loan ratio, cash reserve ratio and liquid ratio ratio. This indicates that higher the capital adequacy ratio, credit to deposit ratio, non-performing loan ratio, cash reserve ratio and liquid ratio ratio, lower would be the return on equity.

Table 3: Regression Analysis on ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Model Summary
Constant	4.029	1.015	3.968	0	R^2= 0.356
CAR	-0.026	0.064	-0.415	0.679	Adjusted R^2= 0.314
CDR	-0.021	0.012	-1.779	0.078	F-value= 8.570
NPLR	-0.078	0.037	-2.093	0.039	P-value=0.00
CRR	-0.009	0.007	-1.273	0.26	
CR	5.558	2.172	2.558	0.012	
LAR	-0.063	0.02	-3.122	0.002	

There is a negative relationship between each independent and dependent variable except for the cash reserve ratio. The relationship between independent variables (CR and LAR) and dependent variable (ROA) is statistically significant, as shown by the corresponding p-values. The highest beta for current ratio indicates that 5.55% variation in return on assets is explained by Current ratio and is followed by Non-performing loan ratio, whose coefficient is -0.078. Similarly, the beta coefficients of Liquid assets ratio is -0.063. In the model summary section of the table, the value of R2 is 0.356, which suggests that the independent variables explain a 35.6% variation in the dependent variable in the model. The F-value for the model is 8.570 and is significant, as shown by the p-value below 0.05, confirming that the relationship between dependent and independent variables is statistically significant and that the model is a good fit for the data.

Table 4: Regression Analysis on ROE

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Model Summary
Constant	64.151	13.102	4.896	0	R^2= 0.223
CAR	-1.673	0.837	0.837	0.048	Adjusted R^2= 0.173
CDR	-0.322	0.158	0.158	0.045	F-value= 4.466
NPLR	0.711	0.485	0.485	0.145	P-value=0.00
CRR	-0.119	0.094	0.094	0.209	
CR	89.022	28.036	28.036	0.002	
LAR	-0.976	0.263	0.263	0	

There is a positive relationship between dependent variable (ROE) and independent variable NPLR and CR and there is negative relationship between ROE and CDR, CAR, CRR and LAR. The relationship between independent variables (CAR, CDR, CR and LAR) and dependent variable (ROA) is statistically significant, as shown by the corresponding p-values. The highest beta for current ratio indicates that 89.02% variation in return on assets is explained by Current ratio and is followed by Non-performing loan ratio, whose coefficient is 0.711 Similarly, the beta coefficients of CAR, CDR are -1.673 and -0.322 respectively. In the model summary section of the table, the value of R2 is 0.223, which suggests that the independent variables explain a 22.3% variation in the dependent variable in the model. The F-value for the model is 4.466 and is significant, as shown by the p-value below 0.05, confirming that the relationship between dependent and independent variables is statistically significant and that the model is a good fit for the data.

Table 5: Hypothesis Testing

Independent variables	Dependent variable	P-values	Hypothesis support
Capital adequacy ratio	Return on Assets	0.00 (p>0.05)	H_1 rejected
Credit to deposit ratio	Return on Assets	0.00 (p>0.05)	H_2 rejected
Non-performing loan ratio	Return on Assets	0.00 (p<0.05)	H_3 accepted
Cash reserve ratio	Return on Assets	0.00 (p>0.05)	H_4 rejected
Current ratio	Return on Assets	0.637 (p<0.05)	H_5 accepted
Liquid assets ratio	Return on Assets	0.00 (p<0.05)	H_6 accepted
Capital adequacy ratio	Return on Equity	0.00 (p<0.05)	H_7 accepted
Credit to deposit ratio	Return on Equity	0.00 (p<0.05)	H_8 accepted
Non-performing loan ratio	Return on Equity	0.00 (p>0.05)	H_9 rejected
Cash reserve ratio	Return on Equity	0.00 (p>0.05)	H_{10} rejected
Current ratio	Return on Equity	0.637 (p<0.05)	H_{11} accepted
Liquid assets ratio	Return on Equity	0.00 (p<0.05)	H_{12} accepted

From the above table, we can see that in relation to ROA, there was significant impact of Non-Performing loan ratio, Current ratio, Liquid assets ratio on ROA, as suggested by p-values less than zero. On contrary, there was insignificant impact of Capital Adequacy ratio, Credit to deposit ratio, and Cash reserve ratio on ROA, as suggested by p-values which were greater than zero.

Now, in relation to ROE, significant impact of Capital adequacy ratio, Credit to deposit ratio, Current ratio, and Liquid Assets ratio was seen on ROE, as suggested by p-values that were less than zero. On the contrary, insignificant impact of Non-performing loan ratio, Cash reserve ratio was seen on ROE, as suggested by p-values which were greater than zero.

Discussion

In this study, Bivariate correlation coefficient result shows that there is positive relationship between CAR and ROA. Similarly, there is negative relationship between CAR and ROE. This result is consistent to the result of (Nelson, 2020) [39]. However, this result is contradicts to the findings of (Bhattarai, 2014) [5]. Likewise, there is a negative relationship between CDR and profitability. This result is consistent to the result of (Samad & Hassan, 2000). However, this result is contradicts to the findings of (Chowdhury & Zaman, 2018) [6]. Similarly, there is a negative relationship between NPLR and profitability. This result is similar to the result of (Nelson, 2020) [39]. However, the result is contradicts to the findings of Li and Zou (2014) [48] and also there is a negative relationship between CRR and profitability. This result is consistent to the result of (Nelson, 2020) [39]. However, this result is contradicts to the findings of (Uremadu, 2012) [47]. The CR is positively correlated with profitability. The result is consistent to the findings of (Pradhan & Gautam, 2019) [42]. However, this result is contradicts to the findings of (Saleem & Rehman, 2011). Furthermore, there is a negative relationship between LAR and profitability. The result is consistent to the findings of (Pradhan & Gautam, 2019) [42]. However, this result is contradicts to the findings of (Chowdhury & Zaman, 2018) [6].

The study shows that the current ratio has significant positive effect on profitability. This result is consistent with the findings of (Pradhan & Gautam, 2019) [42]. However, this result is contradicts to the findings of (Saleem & Rehman, 2011). Likewise, the study reveals that LAR has significant negative effect on profitability. This finding is consistent with the findings of (Pradhan & Gautam, 2019) [42]. However, this result is contradicts to the findings of (Chowdhury & Zaman, 2018) [6]. Similarly, the result shows that NPLR has significant negative effect on profitability. This finding is consistent with the findings of (Bhattarai, 2014) [5]. However, this result is contradicts to the findings of (Nelson, 2020) [39]. Likewise, the result shows that CAR has significant negative effect on profitability. This finding is consistent with the findings of Bhattrai (2014) and this result is contradicts to the findings of (Pradhan & Gautam, 2019) [42]. Similarly, the result shows that CDR has significant negative effect on profitability. These finding is similar with the findings of (Samad & Hassan, 2000). However, this result is contradicts to the findings of (Khati, 2020) [12].

Conclusion and Implications

This study conducted on the topic of risk management and its impact on profitability of commercial banks in Nepal. The estimated results regression models reveal that capital adequacy ratio, credit to deposit ratio, non-performing loan ratio and liquid assets ratio have significant negative impact on profitability. Therefore it can be concluded that capital adequacy ratio, credit to deposit ratio, non-performing loan ratio and liquid assets ratio are major explanatory variables of profitability. Management should focus on capital adequacy ratio, credit to deposit ratio, non-performing loan ratio and liquid assets ratio to build competitive position. Similarly, current ratio has significant positive impact on profitability of commercial banks in Nepal. Thus, this study concludes that capital adequacy ratio, credit to deposit ratio, non-performing loan ratio, current ratio and liquid assets ratio influence the profitability. When capital adequacy ratio, credit to deposit ratio, non-performing loan ratio and liquid assets ratio rise, the profitability of commercial banks may fall. Similarly, if current ratio rise profitability of commercial banks also increased.

The findings of this study have several implications for future research and for the management of commercial banks in Nepal. Firstly, the study found that capital adequacy ratio, credit to deposit ratio, non-performing loan ratio and liquid assets ratio have a significant negative impact on profitability, which suggests that these variables are major explanatory factors of profitability. This highlights the importance of risk management practices in commercial banks, specifically focusing on these ratios, to build a competitive position. Secondly, the study found that the current ratio has a significant positive impact on profitability, which suggests that this variable is also an important explanatory factor of profitability. This implies that management should focus on maintaining an appropriate level of current ratio to increase profitability. Finally, the study found that capital adequacy ratio, credit to deposit ratio, non-performing loan ratio, current ratio and liquid assets ratio influence the profitability. These findings provide insights for management to focus on these ratios to maintain profitability. Overall, the study highlights the importance of risk management practices in commercial banks and the need for management to focus on maintaining appropriate levels of capital adequacy ratio, credit to deposit.

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