

**CREDIT RISK MANAGEMENT OF COMMERCIAL BANKS IN
NEPAL**

**A Dissertation Submitted to Office of Dean Faculty of Management in Partial
Fulfillment of Requirement for the Degree Master of Business Studies [MBS]**

BY

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CERTIFICATE OF AUTHORSHIP

I hereby corroborate that I have researched and submitted the final draft of dissertation Entitled “**Credit Risk Management of Commercial Banks in Nepal**”. This dissertation’s work has never been submitted for a degree to be awarded, nor has it been suggested and presented as a prerequisite for any other academic reason.

The assistance and cooperation that I have received during this research work has been acknowledged. In addition, I declare that all information sources and literature used are cited in the reference section of this dissertation.

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REPORT OF RESEARCH COMMITTEE

Ms. Laxmi Poudel has defended dissertation entitled “**Credit Risk Management of Commercial Banks in Nepal**” successfully. The dissertation has been registered for further development by the research committee. It is advised to complete the work in accordance with supervisor Dr. Pitri Raj Adhikari recommendations and instructions before submitting the dissertation for review and a viva-voce test.

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APPROVAL SHEET

We, the undersigned, have examined the thesis entitled “**Credit Risk Management of Commercial Banks in Nepal**” presented by Ms. Laxmi Poudel, a candidate for the degree of Master of Business Studies (MBS Semester) and conducted the Viva voce examination of the candidate. We hereby certify that the thesis is worthy of acceptance.

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ABBREVIATIONS

C.V	Coefficient of Variation
CAR	Capital adequacy ratio
CDR	Credit deposit ratio
EBL	Everest Bank Limited
ER	Exchange rate
GIBL	Global IME bank Limited
HBL	Himalayan Bank Limited
IR	Interest rate
KBL	Kumari Bank Limited
LLPR	Loan loss provision ratio
LTD	Long-term debt
LTA	Long term assets
MBL	Macchhapuchchre Bank Limited
MQR:	Management quality ratio
M	Management
NPLR	Non-performing loan ratio
NRB	Nepal Rastra Bank
RWA	Risk Weighted Asset
S.D	Standard deviation
SPSS	Statistics package for social science

ABSTRACT

This study has completed research on topic credit risk management of commercial banks in Nepal with the objectives of to examine the credit risk position of the selected commercial banks in Nepal, determine the credit risk management, measurement system and practices used in sample banks, assess the association between credit risks with capital adequacy, non-performing loan, credit deposit ratio and loan loss provision of sample banks and evaluate the impact of adequacy, non-performing loan, credit deposit ratio and loan loss provision on credit risk of sample banks which is completed under the causal comparative research design taking 5 sample banks out of 20 commercial banks and sampling techniques is random sampling tools to select banks. There was quantitative nature of data from the published sources, where data analysis through the descriptive, correlation and regression model. Results provide additional support, revealing statistical significance for the overall model with an F-statistic of 6.83 and a p-value of 0.029, surpassing the conventional significance level of 0.05. The collective impact of the predictors is deemed significant in elucidating the variance in the dependent variable.

Key Words: *Credit Risk Amount, Credit deposit ratio, Non-performing loan ratio, Capital adequacy ratio and Management quality ratio.*

CHAPTER I

INTRODUCTION

1.1 Background of the Study

The danger that the promised cash flows from loans and assets held by financial institutions will not be paid in full is known as credit or default risk. If a borrower defaults, both the principle borrowed, and the projected interest payments are at danger. The possibility of a financial institution incurring a loss recommends that financial institutions should gather information on borrowers whose assets are in their portfolios and monitor those borrowers over time. The unpredictability connected with a borrower's loan repayments is referred to as credit risk. In general, when borrowers' asset values exceed their debts, they repay loans; nevertheless, when borrowers' asset values are smaller than loan values, they do not repay and may use their default option. Credit risk is by far the most serious. The risk faced by banks, and the profitability of their company, is more dependent on precise measurement and effective management of this risk than any other risk. Increases in credit risk boost the marginal cost of debt and equity, which raises the bank's cost of funding (Setiadi, 2015).

It is usually regarded as assuring that buyers pay on time, credit costs are kept low, and poor debts are managed in such a manner that payment is received without damaging the relationship with that buyer. A trade credit insurance company does all that. Either directly or in conjunction with a company's credit department. An approved credit management policy can offer assurances to a financing bank, which may facilitate financing. A function performed within a company to improve and control credit policies that will lead to increased revenues and lower risk including increasing collections, reducing credit costs, extending more credit-to-credit worthy customers, and developing competitive credit terms. It also called credit control. Policies should be periodically reviewed and revised to accommodate changes in the bank's strategic direction, risk tolerance, or market conditions. Policy review should consider the organizational structure, breadth and complexity of lending activities, capabilities and skills of lending personnel, and strategic portfolio quality and earnings objectives. All policy reviews should include the organizational unit

responsible for assessing compliance with policy (Hercher, 2005). Credit risk management is very important area for the banking sector and there are wide prospects of growth. Banks and other financial institutions are often faced with risks that are mostly of financial in nature. Management of risk has been very important component of business plan for the banks and an undercurrent of risk mitigation and planning has always been part of the banking business. Risk management plays a vital role in a bank's credit management. Banking professionals have to maintain the balance between the risks and the returns. For a large customer base banks need to have a variety of loan products that are reasonable enough. If the interest rates in loan products are too low, the bank will suffer from losses (Horcher, 2011).

Credit risk management is one of the commercial bank's most important and difficult duties. This is due to the fact that they collect consumer deposits and are required to pay them on demand. No consumer will accept the explanation that his money account is being paid on demand because it has been loaned to another client. As a result, appropriate loan management by commercial banks is required. Credit risk management is critical in determining whether a credit institution will succeed or fail. A systematic loan analysis, which deals with the process of investing those elements that cause debt nonpayment, is the key to effective company financing. The loan decision's effectiveness all criteria must be based on the officer's or manager's sound judgment. Effective credit risk management is the process of managing an institution's credit risk exposure-creating activities in a way that considerably decreases the possibility that such activities would have a negative impact on a bank's profits and capital. Credit risk is not limited to a bank's loan portfolio; it may exist in the bank's other assets and activities as well. Similarly, such risk might exist in both on-balance-sheet and off-balance-sheet accounts of a bank (Bessis, 2003).

Banks are the financial institution that accepts funds in the form of deposits repayable on demand or short notice. Banking as industry is very profitable and renowned business. The complexities aroused due to modernization and urbanization is made easy due to establishment of banks and financial institutions. The bank has simplified the complex transaction like money saving, fund transfer, lending etc. Banks in the economy in mainly to fulfill the need like mobilize savings, capital formation, monetization of the economy, permeation of employment, upliftment of poor, promotion of private investment, rapid economic development, safety of wealth,

transfer of money and so on. Accepting deposits and mobilization of deposits is major functions of the bank (Bhandari, 2003). The modern banking was begun from the establishment of Nepal Bank in 1994 B.S. Besides all these benefits and importance, we can consider Commercial banks are in the risk business. In the process of providing financial services, they assume various kinds of risks among them credit risk covers the significant portion of the total risk. While commercial banks have faced difficulties over the years for a multitude of reasons, the major cause of serious banking problems continues to be directly related to the lax credit standards for borrowers and counterparties, poor portfolio risk management, or a lack of attention to changes in economic or other circumstances that can lead to deterioration in the credit standing of a bank's counterparties. Since the exposure to credit risk continues to be the leading source of problem in commercial banks world-wide, the bank should now have a keen awareness of the need to identify, measure, monitor, manage and control the credit risk as well as determine that they hold adequate capital against these risks and that they are adequately compensated for the risks incurred. The risk that counterparty will not settle on an obligation for full value, either when due or at any time thereafter is credit risk. In exchange for-value systems, the risk is generally defined to include replacement risk and principal risk. In short credit risk is risk covered by loan. A "loan" is a financial asset resulting from the delivery of cash or other assets by a lender to a borrower in return for an obligation to repay on a specified date or dates, or on demand, usually with interest. Credit risk is measured in terms of the nature of credit provided, nature of collateral used and quality of credit provided. In contrast to the accounting driven, relatively dull, and routine history of credit risk, new technologies and methodologies have emerged among a new generation of financial engineering professionals who are applying their engineering skills and analysis to this risk topic.

Gole and Thagunna (2022) stated that the credit deposit ratio, a key indicator of a bank's lending activities relative to its deposits, plays a pivotal role in assessing the overall health of a financial institution. This ratio reflects the extent to which a bank relies on deposits to fund its lending activities and can influence its profitability and stability. In closely related terms, the non-performing loan (NPL) ratio is a critical metric that measures the proportion of loans in a bank's portfolio that are at risk of default. A high NPL ratio can adversely affect a bank's financial performance and erode its capital base. Zannat (2023) the capital adequacy ratio, another essential

parameter, assesses a bank's ability to absorb potential losses and withstand financial stress. It reflects the proportion of a bank's capital to its risk-weighted assets, providing insights into its resilience and regulatory compliance. Furthermore, the management quality ratio evaluates the effectiveness of a bank's leadership and governance in navigating risks and maintaining financial soundness. These parameters are intricately interconnected, as a high credit deposit ratio, if not managed prudently, can lead to an elevated risk of non-performing loans. A weakened capital adequacy ratio may exacerbate the impact of NPLs, potentially compromising the bank's stability. Effective management practices are crucial in maintaining a balanced relationship among these factors, ensuring that the bank operates within regulatory guidelines, minimizes risks, and sustains a healthy financial position. In essence, the association among credit, credit deposit ratio, non-performing loans, capital adequacy ratio, and management quality is a complex interplay that demands vigilant oversight for the sustained health of a financial institution (Singh, 2015).

Risk and credit risk management share an intimate relationship within the financial realm. Credit risk management, a subset of risk management, specifically focuses on evaluating, mitigating, and managing the potential for financial loss resulting from borrowers defaulting on their obligations. It encompasses a diverse range of activities aimed at assessing the creditworthiness of borrowers, setting appropriate lending terms, and employing strategies to minimize the impact of defaults (Alshatti & Sulieman, 2015). The broader concept of risk management, however, extends beyond credit risk and encompasses various other types of risks, such as market risk, operational risk, and liquidity risk. Yet, credit risk often holds a prominent position within risk management due to its direct influence on a financial institution's stability and profitability (Horcher, 2005). Effective credit risk management is integral to an institution's overall risk management framework. It involves the identification of potential credit risks associated with lending activities, the measurement and quantification of these risks, and the implementation of strategies to control and mitigate them. By understanding and managing credit risk effectively, financial institutions can make informed decisions regarding lending, optimize their capital allocation, and maintain a healthy balance between risk and reward. Moreover, a robust credit risk management system is crucial for maintaining the confidence of stakeholders, investors, and regulators. It provides assurance that an institution has

sound practices in place to navigate the complexities and uncertainties inherent in lending, thereby contributing to its long-term sustainability and success. Ultimately, the relationship between risk and credit risk management lies in the symbiotic nature of their functions, where effective management of credit risk significantly contributes to the overall risk management framework of an institution.

Therefore, this study based on credit risk management of Nepalese commercial banks. Management plays a pivotal role in ensuring the stability and longevity of Nepalese commercial banks. These financial institutions face a myriad of risks that necessitate comprehensive strategies for mitigation. Credit risk, stemming from potential borrower defaults, is managed through rigorous credit assessments, collateral valuation, and continuous monitoring. Market risk, influenced by interest and exchange rate fluctuations, demands effective hedging practices and robust Asset Liability Management (ALM).

1.2 Problem Statement

The credit risk management practices of commercial banks in Nepal present a critical area of concern for the country's financial sector. Despite efforts to mitigate risks, several challenges persist. One prominent issue is the adequacy of credit assessment frameworks, particularly in accurately evaluating the wealth of borrowers among Nepal's evolving economic situation. Additionally, the effectiveness of collateral management practices remains uncertain, raising questions about the reliability of asset-backed lending as a risk mitigation strategy. Further, concerns arise regarding the diversification of loan portfolios, with some banks potentially over exposed to borrower segments, heightening systemic risk. The complexity of regulatory compliance adds another layer of difficulty, as banks navigate stringent guidelines set forth by the Nepal Rastra Bank. Moreover, the need for enhanced credit monitoring systems to detect early warning signs of credit deterioration is evident, highlighting gaps in existing risk management infrastructure. More, stress testing and scenario analysis capabilities require improvement to ensure banks are adequately prepared for adverse economic conditions. Addressing these challenges is imperative to fortify the resilience and stability of Nepal's banking sector in the face of evolving credit risks (Chhetri, 2023).

Credit risk poses a significant challenge to the banking sector in Nepal, with major commercial banks like Nepal Bank Ltd (NBL) and Rastriya Banijya Bank (RBB) grappling with high Non-Performing Loan (NPL) ratios of 14.22% of Total Gross Loan (Bhattarai, 2016). The root causes of this issue lie in poor lending practices characterized by insufficient financial analysis of borrowers, inadequate collateral, and substandard portfolio analysis. Notably, even recently established banks such as Kumari Bank Ltd (KBL) and Machhapuchhre Bank Limited (MBL), which are the 14th and 15th commercial banks in Nepal, are not immune to these challenges. Despite being in the growth stage, these banks face similar hurdles and must address credit risk effectively to meet their growth targets. The study focuses on KBL and MBL, chosen due to their comparable establishment dates and capital sizes compared to the 27 other commercial banks in Nepal. While both banks have witnessed a gradual decrease in NPL, the study emphasizes the need for continued efforts to minimize NPL further (Chhetri, 2023). The research aims to shed light on credit risk measurement and management approaches, investigating whether credit risk is manageable in these banks. Challenges such as reliable data collection and accurate interpretation are anticipated, and subsequent chapters will present a comparative analysis of credit risk in these Nepalese banks.

This research is mainly conducted in order to find the solution for the following questions. The solution is explained through presentation of data in next chapters. The main questions are

- i. What is the credit risk situation of selected commercial bank in Nepal?
- ii. Is there significant association between credit risk with capital adequacy, non-performing loan, and credit deposit ratio and loan loss provision of sample banks?
- iii. Does their impact of capital adequacy, non-performing loan, credit deposit ratio and loan loss provision on credit risk?

1.3 Objectives of the Study

The study aims to examine and analyze how the selected Commercial Banks have managed mainly credit risk in this competitive Nepalese banking industry. The specific objectives of this study are:

- i. To examine the credit risk position of the selected commercial banks in Nepal.

- ii. To assess the association between credit risks with capital adequacy, non-performing loan, credit deposit ratio and loan loss provision of sample banks.
- iii. To evaluate the impact of adequacy, non-performing loan, credit deposit ratio and loan loss provision on credit risk of sample banks.

1.4 Rationale of the Study

The success of any organization is largely dependent on how properly the organization can manage the risk. Banking sector involves several risks, which need to be handled promptly for the survival and growth. As this research is made mainly to analyze the credit risks and their management in reference to NRB directives and measures, it will provide valuable insight to different stakeholders about the major problems of banks and bank's action for its 20 management. The key stakeholders who will be largely facilitated by this research includes,

- i. Commercial banks under study will highly be benefited by this research. This research identifies their current credit risk management styles, NRB guidelines on credit risk management and organization of basic compliance of such guidelines etc. Further, the banks will know not only the current performance but also the idea about their strength and weaknesses.
- ii. Individuals, who have keen interest in Nepalese economy and banking sector and will be benefited. This research provides an insight into the organizational credit risk management patterns within the standards set by NRB.
- iii. Policymakers will also be benefited as this paper identifies the problems in credit risk management and identifies the need for formulation of new policies or amendment of old policies.
- iv. Investors, depositors, borrowers also know about the credit risks with these banks to carry out business.

1.5 Limitations of the Study

Following are the limitations of study:

- i. The evaluation is made through the analysis of financial statement published and presented by the banks. Therefore, generalization of the whole banking industry cannot be made.

- ii. The secondary data of only ten years are taken i.e. from 2014 to 2023. Inaccessibility of sufficient information also limits the conclusion drawn from study.
- iii. For the data analysis researcher has used the descriptive and causal research design with descriptive statistical tools and regression line.
- iv. The total commercial banks in Nepalese financial system are 20 out of them Kumari Bank Limited (KBL), Machhapuchchhre Bank Limited (MBL), Everest Bank Limited (EBL), Himalayan Bank Limited (HBL) and Nepal banks limited (NBL).

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

It is the process of reading and assessing existing resources in the field of study. It aids in narrowing down a large area of researcher interest into a specific study subject. A literature review can help research choose how to perform his investigation. The researcher understands the theoretical foundation and technique of the investigation. Reading what others have written about your field of interest, gathering facts to back or refute our researcher's statements, and reporting discoveries are all critical stages. Although several activities are usually going on at the same time, and reading may even spill over into the data collecting stage of your research, the majority of your reading should ideally take place early in the process of investigation. The connection between the subject under investigation and previous research endeavors must be proved. It is critical in some subject areas to locate the issue within a theoretical framework, and in these cases, the underlying theory must also be addressed. When first scanning a field, work your way up from broad to specific to primary sources of information. The study is founded on a review of the following headings:

2.2 Theoretical

The research will be evaluated using relevant studies and NRB directions for the study. First, a review of the idea, forms of risk, and credit risk management will be presented briefly. The primary subject of this research would be an examination of Nepal Rastra Bank guidelines about Commercial Bank Credit Risk Management. The instructions that are issued on a regular basis are one of the weapons that the central bank uses to govern and supervise commercial banks. In the current setting, the NRB issues instructions on a regular basis. In 2005, the NRB issued unified directions to govern all three kinds of financial industries in Nepal, utilizing the authorities granted by the Nepal Rastra Bank Act 2058. Banking industry works in accordance with international standards, and the total financial sector has a more effective control system. Published and unpublished research and dissertations linked to the subject matter of this research will also be studied in order to depict the real credit risk environment at these five commercial banks. The term risk refers to the uncertainty

that investors experience while making an investment. It is possible that actual outcomes will differ from those predicted. Risk is defined as the chance of the actual return deviating from the predicted return. Risk is defined by Kupper (2000) as the volatility of a corporation's market value. Risk management, on the other hand, is the act of analyzing or quantifying risk and then designing solutions to deal to manage the risk. In general, the tactics used include passing the risk to another party, avoiding the danger, mitigating the risk's negative impact, and accepting some or all of the repercussions of a specific risk.

BIS Risk- Based Capital Requirement Approaches.

The Basel Committee on Banking Supervision issued Basel II, a set of international banking standards, in 2004. It enlarged the regulations for minimum capital requirements established by Basel I, the first international regulatory agreement, established a framework for regulatory oversight, and imposed additional disclosure requirements for assessing banks' capital adequacy. The Basel framework explains how to compute RWA for credit, market, and operational risk. The rules for computing RWA for credit risk and market risk enable banks to adopt a variety of methodologies, some of which must be approved by the supervisor. A bank's nominated techniques include all ways utilized to compute regulatory capital requirements that are not purely for internal purposes. The goal of the output floor calculation is described below. A bank's nominated approaches may comprise both those for which it has supervisory approval and those for which it does not.

Traditional Credit Risk Management Approaches.

Perform the bare least to appease the regulators when it comes to credit risk management, or do you want to deliver a superior service to your clients and wonder how to improve credit risk management across your enterprise? Hopefully, you went with the latter.

So, what are the best methods for managing credit risk? Join us as we go through the fundamental components of good credit risk management and the finest credit risk management tools, you'll need to ensure the success of your organization's procedures.

- Character: The credit history of the applicant

- Capacity: How much debt-to-income the applicant would have if the loan were issued
- Capital: The overall amount of money the applicant has or has access to
- Collateral: Any asset the client has that acts as a 'security item for the loan
- Conditions: The nitty-gritty, contract details, and why the loan is being issued

Option Theory, Credit Risk, and the KMV Approaches.

A innovative approach to the Merton model developed in 1984 and extended by the KMV Corporation²³, created in 1990 and now owned by the rating agency Moody's, has become a de facto standard for default-risk quantification in the realm of credit risk.²⁴ A brief overview of the Merton approach may be helpful in understanding the KMV model, because KMV Corporation's tools, namely (Credit Monitor) for estimating default probabilities and (Portfolio Manager) for managing credit portfolios, are based on a modification of Merton's asset value model.²⁵ The Asset Value Model (AVM), a significant contribution to modern finance, may be traced back to Merton and Black & Scholes.²⁶ Figure 2 shows that the KMV is an asset Model of Value.

J.P. Morgan's Credit Metrics and other VaR Approaches.

(J.P. Morgan and Co. Incorporated, 1997) Credit Metrics is the first publicly available credit risk portfolio model. Credit Metrics allows a corporation to aggregate credit risk throughout its whole organization and gives a statement of value-at-risk (VaR) owing to credit caused by upgrades, downgrades, and defaults. Credit Metrics will be valuable to all businesses throughout the world that deal with credit risk. It provides a methodology for quantifying credit risk across a wide range of instruments, including traditional loans, commitments, and letters of credit; fixed income instruments; commercial contracts like trade credits and receivables; and market-driven instruments like swaps, forwards, and other derivatives.

i. Credit Risk

Credit risk is simply the possibility that a bank borrower or counterparty may fail to satisfy its obligations in line with the conditions agreed upon. Credit risk, according to Anthony Saunders, is "the risk that the promised cash flows from loans and securities held by FIs (Financial Institutions) will not be paid in full." Credit risk refers to a

customers or counterparty's inability or reluctance to honor promises in lending, trading, hedging, settlement, and other financial activities. According to Santo Mero (1997), credit risk is comprised of transaction risk or default risk and portfolio risk.

ii. Market Risk

Market risk is the risk incurred in the trading of assets and liabilities due to changes in interest rates, exchange rates, and other asset prices. So, Market risk is exposure to the uncertain market value of the firm's asset.

iii. Operational Risk

The issues of accurately processing, settling, and accepting or making delivery on deals in return for cash are related with operational risk. It also occurs in record keeping, processing system breakdowns, and regulatory compliance. The Basel Committee on Banking Supervision defines operational risk as "the risk of loss resulting from inadequate or failed internal processes, people, and systems, or from external events," Basel September 2000. Lawrence has identified Basel II as a significant potential for risk management in the second quarter of 2006. The credit process has three stages: the first is straightforward risk control of the business-avoiding overconcentration in any one sector, predicting the possibility of defaulting, and measuring recovery. Collection and recovery are important in rising markets like as China. The structure of liens must be greatly enhanced, which will occur as new legal restrictions are enacted. However, as the Netting cases and sovereign jurisprudence have painfully demonstrated, banks cannot rely on the legal system. These are operational hazards that must be considered. The second stage involves the relationship between economic capital and return. Clearly, banks would wish to establish minimum rates of return on their portfolios after provisioning. The next step in improving credit risk management technique is to establish a relationship between economic benefit and risk.

2.3 Empirical Review

Empirical review involves the systematic examination and analysis of existing research studies and empirical evidence related to a specific topic or research question. It aims to provide a comprehensive overview of the current state of knowledge on the subject, identifying patterns, trends, and gaps in existing literature. Researchers conduct empirical reviews to inform their own study design,

methodology, and hypotheses by building on the findings of previous empirical studies. This process helps in establishing a solid foundation for new research endeavors and contributes to the ongoing development of knowledge in a particular field.

Chhetri (2023) conducted a study to assess the impact of credit and liquidity risk on the profitability of Nepalese commercial banks. With 100 observations, the panel least squares regression model was used to examine the balance data of ten commercial banks from 2012 to 2021. The non-performing loan ratio (NPLR), capital adequacy ratio (CAR), investment ratio (IR), capital ratio (CR), liquid assets to total assets (LTA), and liquid assets to total deposits (LTD) are independent variables, whereas return on equity (ROA) is dependent. The relevant data are gathered from the annual reports of sample banks, banking and financial statistics, and the Central Bank of Nepal's bank supervisory report. A descriptive and causal comparative research approach was adopted in this study. Similarly, Eviews-12 computer software was used for data diagnostics, model fit, and analysis. The study also employed descriptive statistics, Pearson's correlation analysis, and multiple regression models. Following model diagnostic with Eviews-12 computer program, the random effect model was chosen as fitting models. CAR has a positive and statistically significant influence on ROE, whereas IR has a negative and statistically significant effect on ROE, according to the regression model. CR, on the other hand, has a negative and statistically significant influence on ROE, whereas capital adequacy ratio, investment ratio, and capital ratio all have a substantial impact on ROE. As a result, a good credit and liquidity performance, as well as many non-performing loans, reduce the bank's profitability.

Anwer and Ibrahim (2023) investigated the influence of credit risk management on commercial bank performance in Erbil. Because of this approach of loan origination, banks have a significant risk of insolvency and financial difficulties. The KRG banking system's Commercial Bank Supervision Report discovered that most banks failed owing to inadequate credit risk management, as evidenced by large levels of nonperforming loans. The bank's profitability suffered as a result of the high proportion of non-performing loans. The study created five research hypotheses to assess the influence of credit risk management on commercial bank performance in Erbil. It was determined to evaluate the impact of credit risk management on

commercial banks' financial performance using a quantitative methodology. 88 as a convenience sample, personnel from the Credit Risk Management departments of numerous commercial banks across the country were chosen. Senior, intermediate, and practical level workers were among those who responded. According to the findings, commercial banks with lower levels of nonperforming loans and capital adequacy ratios had greater returns on assets, indicating more effective credit risk management practices. The amount set aside for losses is calculated by dividing total loans by the loan loss reserve ratio. As the ratio grows, so does the quality of a loan portfolio. The research suggested that credit risk identification, measurement, monitoring, and management be improved at selected commercial banks in Erbil.

Zannat (2023) focused on Al- Arafah Islami Bank Limited's credit risk case study. I prepared the report using both primary and secondary data. I also utilized Al- Arafah Islami Bank Limited's history, mission, and vision. Then, in the theoretical framework I've supplied, I've mentioned where we can collect credit-related information, as well as what things I should pay attention to while completing credit risk evaluation and credit scoring. In the analytical section, I conducted both qualitative and quantitative analysis. To do so, I utilized three years of Sapphire Design Limited data and then calculated it in Excel, which I then used in the report, followed by a graph of qualitative and quantitative analysis and a total graph. Also giving the evaluation criteria based on that I have done how Al-Arafah Islami bank Limited used to perform credit risk rating of their borrower at last in the results we present what things that Al-Arafah Islami Bank Limited followed and in the recommendation provide some ideas. Finally, we find Al- Arafah Islami Bank Limited always trying to improve their credit risk administration so that they may grow revenues and minimize damages.

Gole and Thagunna (2022) analyzed the credit risk management in the banking sector is critical not just because of the current Global Financial Crisis (GFC), but also because of its increased influence on bank financial performance, growth, and survival. Credit loans are one of the most important sources of income for commercial banks, hence credit risk management has a significant influence on the bank's profitability. The purpose of this research is to look at the influence of credit risk management on the profitability of Nepalese commercial banks. Data from 28 commercial banks were collected and analyzed using pooled regression analysis and panel data analysis from 2011 to 2015. Return on asset (ROA) and return on equity

(ROE) were utilized as bank profitability metrics in the model definition, although capital adequacy ratio (CAR) was not. As indicators of credit risk management, the liquidity ratio (LR), bank size (BS), asset quality (AQ), leverage ratio (LER), non-performing loan ratio (NPLR), cash reserve ratio (CRR), coverage ratio (CR), and the number of female board members (FBM) were employed.

Honey et al. (2019) conducted a study on assesses the influence of corporate governance on bank Loan Loss Provisions (LLPs). For the years 2011-2016, a linear regression model is used to well-balanced panel data acquired from eighteen commercial banks in Pakistan. The study uses LLPs as a proxy for credit risk and evaluates different corporate governance methods such as independent directors, boards of directors, Chairman-CEO duality, attendance at board meetings, and so on. Our data imply that, in the case of Pakistani banks, corporate governance has an impact on loan loss provisioning. The findings clearly show that bigger boards in Pakistani banks provide inefficient governance through increasing loan loss provisions, whereas independent directors and director attendance at meetings appear to be unimportant. On the other hand, if there is a single powerful family, when one member dominates, the CEO-Chairman duality tends to reduce the percentage of LLPs, resulting in lower credit risk. This demonstrates that the separation of these five jobs may result in more accountability and responsibility, since there is greater transparency with the division of tasks. The study finds that efficient corporate governance is vital in credit risk management in banks and suggests that legislation be implemented to further validate the legitimacy of CEO-Chairman duality in Pakistan.

Kamran et al (2019) conducted a study to analyze impact of bank-based risk measurements, country-related and international risk variables, capital ratios, and audit quality on stability indicators. This paper addressed a gap in the literature by addressing five financial stability measures: The Z score via return on assets and return on equity (ZROA and ZROE). From 2007 to 2016, a sample of 28 commercial banks was drawn from Pakistan's national financial market, with yearly observations made from 2007 to 2016. Under the robust title, panel regression models such as ordinary least squares (OLS), fixed effect, and random effect are used to investigate the influence of risk variables, capital ratio, and audit quality on financial stability (FS). According to the findings of the study, bank-based risk variables such as liquidity, credit, and operational both stability indices are significantly influenced by

risk. Excessive capital ratios appear to have a negative impact on financial stability indicators. Furthermore, increased auditor compensation raises audit quality, which has a beneficial impact on both stability indicators. Bank policymakers, financial analysts, and credit officers propose analyzing and reviewing the link between risk factors, capital ratios, and audit quality, as well as the FS of Pakistani commercial banks. This work, however, is restricted to commercial banks, with no attention given to developed financial institutions or industrial banks. Furthermore, there is no systematic use of sophisticated methods such as GMM.

Pradhan and Shah (2019) analyzed the credit risk management prevents major losses and improves bank financial performance. Good financial success rewards both employees and shareholders for their efforts and investments. Credit risk management is a major determinant of bank profitability. As a result, credit risk management has a significant influence on the bank's profitability. Data were obtained from a sample of 15 commercial banks operating in the Nepali economy from 2011 to 2020 and evaluated using mean, standard deviation, correlation, and regression analysis. The pooled regression analysis model (OLS) of panel data analysis is a key analytical tool. Return on equity (ROE) was employed as a bank profitability metric in the model definition, whereas capital adequacy ratio, cash as measures of credit risk management, the reserve ratio, loan loss provision ratio, non-performing loan ratio, and bank size were employed. According to the findings, credit risk has a major influence on the profitability of commercial banks in Nepal. According to the findings, the cash reserve ratio, loan loss provision ratio, and non-performing loan ratio have a negligible negative influence on the return on equity of Nepali commercial banks. According to the findings, bank size and liquidity ratio have a beneficial influence on return on equity. The study also found that the liquidity ratio has a considerable favorable influence on the return on equity of Nepali commercial banks. The capital adequacy ratio also demonstrates that it has a considerable negative influence on return on equity. As a result, this study suggests that credit risk management is a significant predictor. For the bank's profit. As a result, the bank's profitability is dependent on its credit risk management.

Akram and Rahman (2018) focused on analyze assesses firm-level elements that have a greater impact on the credit risk management of local and international banks in Pakistan. Secondary data from multiple data sources is used for the period 2001 to

2010. For checking stationary, the augmented Dickey Fuller test is utilized, while for long run relationships, the Johansson's Co integration test is employed. For coefficients analysis using OLS approaches, a linear regression model is utilized. The R2 result indicates that the model is best suited to both domestic and foreign institutions. Domestic bank size has a positive and substantial link with credit risk, whereas international bank size has a positive and negligible relationship. In domestic banks, liquid assets and credit risk have a positive and negligible connection, but in international banks, the association is negative and considerable banks. According to the study's conclusions, credit risk may be reduced if banks keep their size within a certain range and boost their liquidity.

Rai (2017) carried out research on a portion of the credit risk connected with certain institutions. The study is to explore and assess how the selected banks have managed primarily credit risk in this competitive Nepalese banking environment. These studies' key findings are as follows. Commercial bank loans and advances have been observed to be steadily growing as interest rates have fallen. An effective interest rate structure aids in the efficient use of resources, as measured by the loan to deposit ratio. The majority of banks have identical interest rate structures, which reduces the relevance of interest rate liberalization.

Bhattarai (2016) assessed the credit risk on the performance of Nepalese commercial banks was investigated. For the study, descriptive and causal comparative research designs were used. The regression model was used to examine the pooled data of 14 commercial banks from 2010 to 2015. The regression findings indicated that 'non-performing loan ratio' has a negative influence on bank performance while 'cost per loan assets' had a favorable effect. Bank size, in addition to credit risk indicators, has a beneficial influence on bank performance. The capital adequacy ratio and the cash reserve are not regarded as influencing elements on bank performance. According to the findings of this study, there is a considerable association between bank performance and credit risk indicators.

Singh (2015) described the important element for banks and financial organizations that needed to be effectively controlled. The danger that a borrower or counterparty might fail to satisfy its commitments in line with agreed conditions was referred to as credit risk. As a result of the bank's transactions with or lending to corporations, people, and other banks or financial institutions, credit risk arises. Credit risk was the

oldest and most significant risk that the bank had inherited due to the nature of its operation. There were several banks in existence in India at the time. State Bank of India, Punjab National Bank, Oriental Bank of Commerce, Bank of India, Indian Bank, Indian Overseas Bank, Syndicate Bank, Bank of Baroda, Canara Bank, Allahabad Bank, UCO are some of these public sector banks. Axis Bank, ICICI Bank, IndusInd Bank, ING Vysya Bank, Dhan Laxmi Bank, HDFC Bank, YES Bank, Kotak Mahindra Bank, Karnataka Bank, ABN Amro Bank, Federal Bank, and Laxmi Vilas Bank were chosen to investigate the impact of credit risk management on the profitability of Indian commercial banks. To assess its extent of influence, the researcher employed multiple regression models based on each bank's 11-year return on asset (ROA), non-performing asset (NPA), and capital adequacy ratio (CAR). For regression purposes, the researcher obtained data from RBI annual reports from 2003 to 2013.

Mushtaq et al (2015) analyzed study states the credit risk is one of the most significant risks in banking operations today, and credit risk management is critical for long-term financial performance. Non-performing loans are a major component of credit risk that negatively affects banking performance; to mitigate such risk, banks must maintain a certain percentage of capital as a cushion with the central bank in accordance with BASEL requirements.

Alshatti (2015) focused this study intends the effect of credit risk management on financial performance of Jordanian commercial banks from 2005 to 2013 with to investigate the impact of credit risk management on the financial performance of Jordanian commercial banks from 2005 to 2013. Thirteen commercial banks were chosen to represent the whole Jordanian commercial banks. Five mathematical models were developed to quantify this link, and the research demonstrated that credit risk management had an impact on the financial performance of Jordanian commercial banks as assessed by ROA and ROE. The study also indicates that the credit risk management indicators examined in this study have a substantial impact on the financial performance of Jordanian commercial banks.

Bizuayehu (2015) assessed the credit risk management on commercial banks profitability in Ethiopia with the objective to assess the influence of credit risk management on commercial bank profitability in Ethiopia using panel data analysis from 2003 to 2013. The following are the study's key findings. This random effect

regression model's findings Pandey (2002) conducted research to determine the impact of changes in NRB directives on the performance of commercial banks and whether the instructions were executed or not. According to his conclusions, if the orders are not adequately handled, they have the potential to destabilize the country's financial system. The directives are meaningless unless they are effectively implemented. The commercial aspect influences the implementation.

Srikanth and Kishore (2014) composed credit risk management in Indian Banks with study objective to investigate the influence of credit risk components on credit risk management performance and the rise of non-performing assets (NPAs) in Indian commercial banks. Data for the study's methodology were acquired from primary and secondary sources. The core data are gathered by distributing questionnaires to risk managers at Indian banks. The Centre for Monitoring Indian Economy gathered the secondary data on NPAs of Indian banks from yearly reports and the Prowess database. The models for the investigation are estimated using multiple linear regression. Results The findings indicate that identifying credit risk has a considerable impact on credit risk performance. The findings are strong since credit risk detection is inversely related to yearly increase in NPAs or loans. There is evidence to support the a priori hypothesis that private banks will outperform government banks in terms of credit risk performance. Practical consequences - The study has ramifications for Indian banks that are suffering from high levels of bad loan losses. Furthermore, it will have repercussions for the Reserve Bank of India's implementation of new Basel Accord regulations Basel III. Implications for society - In the absence of proper action by the government and central bank in the form of improvements in institutional and regulatory architecture, the high and growing level of NPAs would have negative effects for credit flow in the economy. Problems in the banking and financial services sectors will result in reduced industrial and aggregate economic growth. Employment growth that is slower or negative. There is limited information on Indian banks' credit risk management techniques and their association with credit risk performance and NPA growth. The necessity for an efficient risk management system to control credit risk becomes more important and pressing in light of Indian banks' high and growing NPAs and the ramifications for the Indian economy.

Shafiq and Nasr (2014) composed an article on risk management practices followed the commercial banks in Pakistan with the objectives to investigate the different risk

management strategies used by banks, primarily commercial banks in Pakistan. Primary and secondary data sources are employed to accomplish the goal. Risk management is one of the most significant strategies to adopt, particularly in banks, to get confidence about the dependability of their operations and processes. Nothing is stable in today's volatile climate but risk. Banking is not immune to risk, and all banks are subject to a number of hazards such as credit risk, liquidity risk, foreign currency risk, market risk, and interest rate risk. Time has come for an effective risk management strategy. Once risk has been recognized and quantified, one of the first duties is to manage it. Risk and return are inextricably linked, which implies that raising one will always raise the other, and vice versa. The goal of this research is to investigate the current risk management strategies used by banks, primarily commercial banks in Pakistan. Primary and secondary data sources are employed to accomplish the goal. The findings show that there is a considerable disparity in the implementation of risk management features by public sector commercial banks and local private banks. In addition, the financial soundness indicators vary in significance depending on the kind of commercial bank. Although there is a common knowledge of risk and its management among commercial bank staff, there is still a need for commercial banks to provide risk management training courses suited to the needs of banking personnel. The purpose of this research was to estimate the average returns on investment portfolios and the risk associated in the return on investment of portfolios in each of the selected insurance firms before and after GATS participation. To examine insurance investment activities, descriptive statistics, correlation analysis, Paired samples statistics, and multiple comparisons were employed. The analysis shows that there is a statistically significant difference in the average return on investment of each of Pakistan's insurance businesses before and after GATS. The risk in this investment was 1.74% before enrollment and grew to 12.869% after membership. Even when performing well, there is a significant rise in the risk of investing following GATS participation. The report is considered to be a significant resource for insurance management, as well as the Ministry of Finance and the Securities and Exchange Commission of Pakistan, in their efforts to oversee and enhance insurance performance in Pakistan.

Li and Zou (2014) analyzed several financial crises hit the banking industry the banking industry in recent decades. To analyze several financial crises have hit the banking industry in recent decades. In recent years, the US subprime loan crisis of

2007-08 has emerged as one of the biggest financial crises. Credit risk management has grown in importance as a result of the banking system's financial crises, which have impacted numerous nations throughout the world. Credit risk at a bank must be managed carefully and effectively since it influences the bank's existence, development, and profitability. The current study attempts to investigate an empirical relationship between credit risk management and bank financial performance. An attempt was made to determine the statistical impact of credit risk management indicators on the profitability of public sector commercial banks from 2010 to 2017. The current situation of study focuses on the top 10 public sector commercial banks based on total assets. The panel regression technique is used to analyze data. Credit risk management is regarded as an independent variable in the panel model equation, as measured by non-performing loans ratio (NPLR), loan loss provision ratio (LLPR), capital adequacy ratio (CAR), asset quality ratio (AQ), management (M), earnings (E), and liquidity (L), whereas bank profitability is regarded as a dependent variable as measured by return on assets (ROA). According to the findings of the study, credit risk management indicators have a considerable impact on the financial performance of selected public sector banks in India. According to the research studies, ROA (profitability) is positively associated to CAR, management quality, and earnings ability, whereas it has been discovered to be adversely connected to AQ and liquidity.

Kotreshwar (2014) composed an article on risk is the primary motivator of financial behavior. The financial system would be enormously simpler if there were no risk. However, in the actual world, danger is everywhere. To thrive in a very unpredictable environment, financial institutions must manage risk effectively. Banking's future will surely be determined by risk management dynamics. Only banks with effective risk management systems will be able to compete in the long run. Credit risk management is a vital component of comprehensive risk management, which is required for a financial institution's long-term performance. Credit risk is the oldest and most significant risk that a bank acquires by virtue of its basic nature of operation. This has, however, gained more prominence in recent years for a variety of reasons. The most prominent of these is the global wind of economic liberalization. India is not immune to this shift toward a market-driven economy. As experimentally demonstrated by the direct association between concentration credit risk profile and NPAs of public sector banks, better credit portfolio diversification improves the possibilities of lower concentration credit risk.

Hosna et al (2009) composed an article on risk management and profitability of commercial banks in Sweden. The primary goal of our research is to describe the influence of credit risk management on profitability in four Swedish commercial banks. The study's scope is confined to determining the link between credit risk management and profitability at four Swedish commercial banks. The study's findings are confined to the banks in the sample and cannot be extrapolated to all commercial banks in Sweden. Furthermore, because our study primarily employs a quantitative method and concentrates on the description of SPSS outcomes, the reasons behind this will not be examined or clarified. The quantitative technique is employed to achieve the primary goal of our study. To conduct the empirical investigation, we employed a regression model. We established ROE as a profitability measure in the model, whereas NPLR and CAR are credit risk management indicators.

Table 1

Summary of Article Review

S. N	Author (s)	Variables	Methodology	Major Findings
1	Chheri (2023)	To assess the impact of credit and liquidity risk on the profitability of Nepalese commercial banks.	descriptive and causal comparative research approach	Significant impact of risk management on profitability
2	Anwer and Ibrahim (2023)	to evaluate the impact of credit risk management on commercial banks' financial performance	Quantitative method	greater returns on assets, indicating more effective credit risk management practices
3	Zannat (2023)	to improve their credit risk administration	Case study	grow revenues and minimize damages

4	Gole and Thaguna (2022)	to look at the influence of credit risk management on the profitability of Nepalese commercial banks	Causal Research design	significant influence on the bank's profitability
5	Honey et al (2019)	To assesses the influence of corporate governance on bank Loan Loss Provisions (LLPs).	Descriptive and Analytical	efficient corporate governance is vital in credit risk management
6	Kamran et al (2019)	to investigate the influence of risk variables, capital ratio, and audit quality on financial stability	Causal Research design	significantly influenced by risk
7	Pradhan and Shah (2019)	Risk management impact on profitability		credit risk has a major influence on the profitability
8	Akram and Rahman (2018)	To analyze assesses firm-level elements that have a greater impact on the credit risk management of local and international banks in Pakistan.	ADF test	Domestic bank size has a positive and substantial link with credit risk, whereas international bank size has a positive and negligible relationship.
9	Rai (2017)	Interest rate, CDR, loan & advance		

10	Bhattara i (2016)	to examine the pooled data of 14 commercial banks from 2010 to 2015.	descriptive and causal comparative research designs	influence on bank performance
11	Singh (2015)	to investigate the impact of credit risk management on the profitability of Indian commercial banks.	Analytical research design	Significant impact of risk management on probability
12	Mushta q et al (2015)	To analyze the risk management and financial performance	Causal research design	credit risk that negatively affects banking performance
13	Alshatti (2015)	to investigate the impact of credit risk management on the financial performance of Jordanian commercial banks	Descriptive and analytical	impact on the financial performance
14	BIzuaye hu (2015)	To assess the influence of credit risk management on commercial bank profitability in Ethiopia	Analytical research design	commercial aspect influences the implementation
15	Srikanth and Kishore (2014)	To investigate the influence of credit risk components on credit risk management	Descriptive research design	Credit risk has a considerable impact on credit risk performance.

		performance		
16	Shafiq and Nasar (2014)	to investigate the current risk management strategies used by banks, primarily commercial banks in Pakistan	Descriptive research design	significant difference in the average return on investment of each of Pakistan's insurance businesses
17	LI & Zou (2014)	to investigate an empirical relationship between credit risk management and bank financial performance	Panel data analysis	credit risk management indicators have a considerable impact on the financial performance
18	Hosna et (2009)	to describe the influence of credit risk management on profitability in four Swedish commercial banks.	Descriptive research design	profitability measure in the model, whereas NPLR and CAR are credit risk management indicators

2.4 Research Gap

The research gap is a question or problem that has not been answered by any of the existing studies or research within your field. A several previous studies have been conducted by different students, experts, and researchers about credit risk management in Nepalese commercial banks.

Chhetri (2023) conducted a Study to assess the impact of credit and liquidity risk on the profitability of Nepalese commercial banks. With 100 observations and taking 8 years data. Pradhan and Shah (2019) Credit risk management prevents major losses

and improves bank financial performance, with 7 years data. Bhattarai,(2016) the influence of credit risk on the performance of Nepalese commercial banks, with five years data.

In previous studies, time duration has taken five/eight years. But this study has taken data up to ten years; from 2014 to 2023. Previous researcher has used different dependent and independent variable such as investment ratio (IR), capital ratio (CR), liquid assets to total assets (LTA), and liquid assets to total deposits (LTD) are independent variables, whereas return on equity (ROA) is dependent. This study has used a Credit Deposit Ratio (CDR), Non-performing Loan (NPLR), Capital Adequacy Ratio (CAR), Management quality ratio (MQR) & credit risk together, so this study fills the variables gap. Previous studies have used empirical, cross- sectional and this study used descriptive as well as casual-comparative research design. So, this study fills the methodology gap. We can't find as much as study in context of Nepal and existing study were conducted after long period of time. So, overall, this study fills the methodology gap, variables gap, time period gap as well as context gap in the existing literature,

CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology is the combination of two words research and methodology. Research means a careful investigation or inquire specially, through search for new facts in branch of knowledge. It is systematic and organizes efforts to inquire about specific problems that's need answer. Methodology is a systematic rules and procedures up to on which research is based. Research methodology depends on the various aspects of the research project. The size of the project, importance of the project, time frame of the project, impact of the project in the various aspects of the human life etc. Are the variables that determines the research methodology of the particulars project. In other words, research methodology describes the methods and proves applied in the entire aspect of the study.

This study of measuring the credit risk management of commercial banks in Nepal is also guided with the research design. It includes the methodology used, data gathering, and data analysis.

3.2 Research Design

This study has followed the descriptive research design to explain the feature, fact, data. The study has also used the causal comparatives research design to complete the study. The causal research design measures the association and impact among variables.

3.3 Population and Sampling

This study is based on the secondary data which are gathered for 20 commercial banks in Nepal. The main sources of data are banking and financial statistics published by Nepal Rastra Bank which is supplemented by NRB directives, legal provisions incorporated in companies act,2063 and concerned by-laws regarding credit risk management, the provisions on bank and financial institution act,2073; supervision reports of Nepal Rastra Bank and so on. The few banks are in the stage of merging with each other so in future the number of banks can further go down. For the purpose of this research, only four banks are selected as a sample. The base of only these five banks is selected as a consistently involved in CRS activities. The

selected of banks is based on purposive sampling. Moreover, in selecting the 5 national level commercial banks out 20 commercial banks for the study, due care is given to include banks such as: high paid-up capital, medium paid-up capital & low paid-up capital. The banks selected for the study are: Kumari Bank Limited, Machchapuchchhre Bank Limited, Everest Bank Limited, Himalayan Bank Limited & Nepal banks Limited. This study assumes that the study population (i.e. listed commercial banks of Nepal) has been fairly represented by the selected sample (i.e. KBL, MBL, EBL, HBL, & NBL). The sample which has taken represent all 20 commercial banks in Nepal. The list of selected banks with study period as present in Table 2.

S. N	Lists of Banks	Study Period
1	Kumari Bank Limited (KBL),	2014-2023
2	Machchapuchchhre Bank Limited (MBL),	2014-2023
3	Everest Bank Limited (EBL),	2014-2023
4	Himalayan Bank Limited (HBL)	2014-2023
5	Nepal Banks Limited (NBL).	2014-2023

Source: Nepal Rastra Bank annual Report 2024

3.4 Nature and Sources of Data

For this study, nature of data was quantitative with and secondary data are used. Secondary data are collected mainly from published sources like annual report of sample banks. Secondary data published in the annual reports of concerned organizations are collected through website of relevant sample banks. Similarly, financial accounts for fiscal years 2070/71 to 2079/80 or 2014 to 2023 are covered as a sample for the purposes of this document. The investigation. And the convenience sampling approach method is used to gather data quickly, cheaply, and in a short period of time.

3.5 Data Collection Instruments and Procedures

The data obtained from the different sources are in raw form. Required data are taken from the secondary source such as annual report of sample banks and presented in this study. For presentation, different tables and charts are used.

3.6 Data Analysis Tools and Techniques

To get the concrete results from the research, data are analyzed by using different types of tools. As per topic requirements, emphasis is given on statistical tools like Arithmetic Mean, Standard Deviation, and Coefficient of variation and Hypothesis Test rather than financial tools.

a. Arithmetic Mean

Arithmetic Mean of a given set of observations is the sum of the observation divided by the number of observations. In such as case all the items are equally important. Simple Arithmetic Mean is used in this study as per necessary for analysis.

We have,

$$Mean (\bar{X}) = \frac{\Sigma X}{n}$$

Where,

Σx = sum of all values of the observations

n = Number of observations

x = Value of variables

b. Standard Deviation (S.D)

The standard deviation is often represented by the letters (σ). Karl Pearson proposed it as a frequently used measure of dispersion and defined it as the distance between the supplied observations and their arithmetic mean of a collection of values. It is sometimes referred to as the root mean square deviation. In this study, standard deviation was utilized to quantify the degree of volatility of the interest rate and other variables as needed for the analysis.

We have,

$$Standard\ Deviation\ (\sigma) = \sqrt{\frac{\Sigma(X - \bar{X})^2}{n}}$$

c. Coefficient of Variation (C.V.)

The relative measure of dispersion based on standard deviation is called coefficient of standard deviation and 100-time coefficient of standard deviation is called coefficient of variation. It is denoted by C.V. Thus,

$$C.V. = \frac{\sigma}{\bar{X}} \times 100$$

Where,

σ = Standard Deviation

\bar{X} = Mean Value of Variables

The distribution having less C.V. is said to be less variable or more consistent. A distribution having greater C.V. is said to be more variable or less consistent.

d. Correlation Coefficient (r)

Correlation analysis is a statistical method that is commonly used to describe how closely one variable is connected to another. This tool is used to determine the intensity or magnitude of a linear connection between two variables X and Y, which is commonly denoted by 'r' and may be calculated as follows:

$$r = \frac{N \sum XY - \sum X \sum Y}{\sqrt{N \sum X^2 - (\sum X)^2} \sqrt{N \sum Y^2 - (\sum Y)^2}}$$

Where,

N = no of observation in series X and Y

$\sum X$ = Sum of observation in series X

$\sum Y$ = Sum of observation in series Y

$\sum X^2$ = Sum of square observation in series X

$\sum Y^2$ = Sum of square observation in series Y

$\sum XY$ = Sum of the product of observation in series X and Y

e. Regression analysis

Regression line refers to the relationship between dependent and independent variable. Where dependent variable values are finding through the regression analysis of independent variable.

$$CR = \alpha + \beta_0 CDR + \beta_1 NPLR + \beta_2 CAR + \beta_3 MQR \dots \dots \dots i$$

Where,

CR = Credit Risk

CDR = Credit Deposit Ratio

CAR = Capital Adequacy Ratio

NPLR = Non-performing Loan Ratio

CAR = Capital Adequacy Ratio

MQR = Management Quality Ratio

f. Coefficient of Determination (r^2)

It explains the variation percent derived in dependent variable due to the any one specified variable; it denotes the fact that the independent variable is good estimator of the behavior of the dependent variable. It is square of correlation coefficient.

consumers as bank deposits. Deposits are considered a liability by the bank. As a result, the credit-deposit ratio typically refers to the ratio of a bank's assets and liabilities. The credit-to-deposit (CTD) or loan-to-deposit ratio (LTD) is a measure of a bank's liquidity that is calculated by dividing the total loans distributed by the total deposits received. It shows how much of a bank's core funds are utilized for lending, which is the primary banking activity.

Management Quality Ratio (MQR): The management quality ratio is a key factor that assesses the effectiveness and efficiency of an organization's leadership. It reflects the ability of management to make strategic decisions, allocate resources wisely, and drive overall performance. A high management quality ratio suggests strong leadership, effective decision-making processes, and a well-executed organizational strategy. Conversely, a low ratio may indicate inefficiencies, poor decision-making, and potential challenges in achieving the company's objectives. It is measured through the operating expenses divided by the operating income/ total assets.

CHAPTER IV

RESULTS AND DISCUSSION

4.1 Introduction

This section of the study provides the result of risk management in Nepalese commercial banks in Nepal. As stated in the methodology, the sample banks are measured using several financial tools for risk management such as credit deposit ratio, Non-performing loan ratio, capital adequacy ratio and management quality ratio. Similarly, statistical tools, including descriptive statistical tools like mean, standard deviation, coefficient of variation, correlation, and regression, utilizing Excel and SPSS software. Here, the information was gathered from secondary sources such yearly bank financial reports found on the website's relevant banks. The study under consideration is deeply rooted in the existing body of literature, which extensively covers the subject matter, aligning with the research goals articulated in the preceding chapter. To attain objectivity in the study's results, the research employs statistical tools, specifically regression analysis and correlation analysis.

Regression analysis is utilized to scrutinize the impact of various determinants on the profitability of banks, employing regression lines to model the intricate relationships between the dependent variable and multiple independent variables. Simultaneously, correlation analysis is employed to delve into the relationships between measures of profitability and the identified determinants, with correlation coefficients offering insights into the strength and direction of these relationships. These statistical methods serve as the cornerstone of the chapter, providing a robust framework for the investigation. By relying on regression and correlation analyses, the study aims to ensure objectivity and precision in its findings, harnessing these tools as means to objectively interpret and quantify the intricate dynamics of the variables under examination. In essence, the chapter elucidates a comprehensive approach that integrates existing knowledge, clear research objectives, and advanced statistical methodologies to explore the nuanced determinants of bank profitability.

4.2 Results

Data analysis is a crucial process that involves inspecting, cleaning, transforming, and modeling data to derive useful information, draw conclusions, and support decision-

making. It begins with the collection of raw data, which is then organized and cleaned to ensure accuracy and reliability. Exploratory data analysis (EDA) is often employed to understand the distribution, patterns, and relationships within the data. Statistical methods and machine learning algorithms are applied to uncover insights and trends, providing a basis for informed decision-making. Visualization tools play a key role in presenting the findings, helping stakeholders comprehend complex information more easily. Ultimately, effective data analysis enables businesses and researchers to make informed decisions, identify opportunities, and address challenges in a wide range of fields, from finance and healthcare to marketing and scientific research.

Data presentation is the art of visually representing information to convey meaning effectively. It involves organizing and displaying data in a format that is easily understandable for the audience. Charts, graphs, and tables are common tools used for data presentation, allowing complex information to be conveyed in a concise and accessible manner. The choice of presentation method depends on the type of data and the message intended to be communicated. Clarity is crucial in data presentation, with the goal of making patterns, trends, and insights readily apparent to the viewer. Well-designed visuals enhance comprehension, facilitating informed decision-making. Additionally, narrative context and annotations can provide deeper insights, offering a comprehensive understanding of the data being presented. Overall, effective data presentation is integral to transforming raw information into meaningful knowledge for informed analysis and decision-making

4.2.1 Descriptive Analysis of data

Descriptive analysis of data involves the systematic examination and summarization of key features within a dataset to uncover meaningful patterns and trends. This process includes the calculation of central tendency measures, such as mean, median, and mode, to understand the typical values in the dataset. Additionally, measures of dispersion, such as range and standard deviation, provide insights into the variability of the data points. Descriptive statistics also involve the exploration of the distribution of data through graphical representations, such as histograms or box plots, enabling a visual understanding of the data's shape and characteristics. This method helps researchers and analysts gain a comprehensive overview of the dataset's central tendencies, variability, and overall structure, facilitating a preliminary understanding before more advanced analyses are conducted. Ultimately, descriptive analysis serves

as a foundational step in data exploration and aids in making informed decisions based on a clear understanding of the dataset's basic characteristics.

4.2.1.1 Credit created by the banks

Credit refers to the ability to borrow money or receive goods and services with the promise of payment later. It is a financial arrangement where a borrower is trusted to repay borrowed funds on time, often with interest. A positive credit history can enhance one's financial reputation and make it easier to secure loans or obtain favorable terms. However, mishandling credit can lead to debt and negatively impact an individual's financial standing.

Table 3

Descriptive Statistics of Credit in the form of Log

	N	Minimum	Maximum	Mean	Std. Deviation
KBL	10	17.00	19.03	18.07	0.70
MBL	10	17.22	18.78	18.07	0.60
EBL	10	17.74	20.50	18.64	0.78
HBL	10	17.83	19.41	18.52	0.48
NBL	10	17.72	19.12	18.42	0.47

(Source: Annual Report of Sample Banks)

Table 3 presents descriptive statistics for credit values, represented in log form, across five different financial institutions: KBL, MBL, EBL, HBL, and NBL. Each institution has a dataset of 10 observations. The minimum log credit value for KBL is 17.00, while the maximum is 19.03, resulting in a mean of 18.07 and a standard deviation of 0.70. MBL exhibits a slightly narrower range with a minimum of 17.22, a maximum of 18.78, a mean of 18.07, and a standard deviation of 0.60. EBL's log credit values range from 17.74 to 20.50, yielding a mean of 18.64 and a standard deviation of 0.78. HBL has a minimum log credit value of 17.83, a maximum of 19.41, a mean of 18.52, and a standard deviation of 0.48. Finally, NBL's log credit values vary from 17.72 to 19.12, resulting in a mean of 18.42 and a standard deviation of 0.47. These descriptive statistics provide insights into the distribution and central tendencies of log-transformed credit values for each financial institution, offering a comparative analysis of their credit portfolios.

4.2.1.2 Credit deposit Ratio

The Credit Deposit Ratio (CDR) is a financial metric that reflects the proportion of loans disbursed by banks in relation to their total deposits. It is calculated by dividing the total loans extended by a bank by its total deposits. A higher CDR indicates that a larger portion of the bank's funds is being utilized for lending activities, while a lower

ratio suggests a conservative approach with more funds kept in reserve or invested in safer assets. Monitoring the CDR is essential for assessing a bank's risk exposure and its ability to manage liquidity.

Table 4

Descriptive Statistics Credit Deposit Ratio (CDR)

	N	Minimum	Maximum	Mean	Std. Deviation
KBL	10	79.34	92.19	86.61	4.37
MBL	10	78.77	91.35	86.09	4.12
EBL	10	69.47	90.77	80.60	6.75
HBL	10	71.82	92.14	83.85	6.68
NBL	10	59.45	86.97	74.66	7.77

(Source: Annual Report of Sample Banks)

Table 4 presents descriptive statistics for the Credit Deposit Ratio (CDR) across five banks, namely KBL, MBL, EBL, HBL, and NBL. Each bank's CDR is characterized by the number of observations (N), the minimum and maximum values, the mean and the standard deviation, offering a comprehensive overview of the distribution of CDR within each banking institution.

Starting with KBL, it has 10 observations with a CDR range of 79.34 to 92.19, and a mean CDR of 86.61, exhibiting a moderate level of variability as indicated by the standard deviation of 4.37. MBL, with 10 observations, demonstrates a similar pattern with a CDR range of 78.77 to 91.35 and a slightly lower mean of 86.09, accompanied by a standard deviation of 4.12.

Moving on to EBL, it displays a broader range of CDR values (69.47 to 90.77) across its 10 observations, resulting in a mean CDR of 80.60 and a higher standard deviation of 6.75, indicating more variability. HBL, with 10 observations, exhibits a CDR range of 71.82 to 92.14, a mean CDR of 83.85, and a standard deviation of 6.68.

Finally, NBL has a CDR range of 59.45 to 86.97 with a mean of 74.66 and a standard deviation of 7.77 based on its 10 observations. This suggests that NBL has a wider variability in CDR compared to some other banks in the dataset. Overall, these descriptive statistics provide insights into the distribution and central tendencies of the Credit Deposit Ratios for each bank, aiding in the analysis of their financial performance and risk exposure.

4.2.1.3 Non-performing loan

A non-performing loan (NPL) refers to a loan that has stopped generating interest or principal repayments as per the agreed-upon terms. In essence, it is a loan where the borrower has failed to meet their repayment obligations for a specified period, typically 90 days or more. NPLs are considered a concern for lenders and financial institutions as they indicate potential credit risks and can negatively impact the overall financial health of the institution. Addressing and managing non-performing loans is crucial for maintaining the stability of the banking sector and ensuring a healthy lending environment.

Table 5

Descriptive Statistics of Non-performing loan ratio (NPLR)

	N	Minimum	Maximum	Mean	Std. Deviation
KBL	10	0.96	4.96	2.00	1.41
MBL	10	0.37	2.26	0.86	0.65
EBL	10	0.12	0.97	0.39	0.31
HBL	10	0.48	4.93	1.81	1.32
NBL	10	1.83	5.12	3.07	0.96

(Source: Annual Report of Sample Banks)

Table 5 presents descriptive statistics for the Non-Performing Loan Ratios (NPLR) of five distinct banks: KBL, MBL, EBL, HBL, and NBL. Each bank's NPLR is based on a sample size of 10 observations. Kangaroo Bank Ltd (KBL) has a minimum NPLR of 0.96, a maximum of 4.96, a mean of 2.00, and a standard deviation of 1.41. Monkey Bank Ltd (MBL) exhibits a range from 0.37 to 2.26, with a mean NPLR of 0.86 and a standard deviation of 0.65. Elephant Bank Ltd (EBL) has a minimum NPLR of 0.12, a maximum of 0.97, a mean of 0.39, and a standard deviation of 0.31. Horse Bank Ltd (HBL) displays a range from 0.48 to 4.93, a mean NPLR of 1.81, and a standard deviation of 1.32. Lastly, Nightingale Bank Ltd (NBL) has a minimum NPLR of 1.83, a maximum of 5.12, a mean of 3.07, and a standard deviation of 0.96. These statistics offer a comprehensive overview of the distribution and variability of NPLR for each bank, allowing for comparisons and assessments of their respective non-performing loan ratios.

4.2.1.4 Capital Adequacy ratio

The Capital Adequacy Ratio (CAR) is a financial metric that measures a bank's ability to meet its financial obligations and absorb potential losses. It is calculated by dividing a bank's capital by its risk-weighted assets. A higher CAR indicates a greater

financial cushion and resilience against unexpected losses, providing confidence to depositors and regulators. Regulatory authorities set minimum CAR requirements to ensure the stability and solvency of financial institutions.

Table 6

Descriptive Statistics of Capital Adequacy ratio (CAR)

	N	Minimum	Maximum	Mean	Std. Deviation
KBL	10	10.84	15.35	12.78	1.42
MBL	10	10.63	16.82	13.22	1.75
EBL	10	11.31	14.69	13.10	1.03
HBL	10	10.84	14.89	12.33	1.26
NBL	10	4.55	17.01	12.74	4.27

(Source: Annual Report of Sample Banks)

Table 6 provides descriptive statistics on the Capital Adequacy Ratio (CAR) for five different banks: Kumari Bank Limited (KBL), Machhapuchchre Bank Limited (MBL), Everest Bank Limited (EBL), Himalayan Bank Limited (HBL), and Nepal Bank Limited (NBL). Each bank's CAR is based on a sample of 10 observations. The minimum and maximum CAR values depict the range within which the capital adequacy ratios fluctuate for each bank. The mean CAR serves as an average indicator of capital adequacy, offering insights into the central tendency of the data. The standard deviation measures the degree of variability or dispersion in the CAR values, with higher values suggesting increased variability. KBL, MBL, EBL, and HBL exhibit relatively moderate standard deviations, indicating relatively stable CARs. In contrast, NBL stands out with a larger standard deviation and a notable range between the minimum and maximum CAR values, signaling higher variability and potential concerns. Further contextual analysis, including regulatory requirements for capital adequacy, is essential for a comprehensive assessment of the financial health of these banks.

4.2.1.5 Management Quality Ratio

The term management quality ratio refers to a financial metric that assesses the effectiveness and efficiency of a company's management in creating value for shareholders. It is often calculated by comparing key performance indicators, financial ratios, or other relevant metrics to evaluate the competence of the leadership team. A higher management quality ratio suggests that the company's management is adept at making strategic decisions and navigating the business environment.

Investors may use this ratio as part of their analysis to gauge the overall health and potential success of a company.

Table 7

Descriptive Statistics of Management Quality ratio (MQR)

	N	Minimum	Maximum	Mean	Std. Deviation
KBL	10	0.48	1.68	1.28	0.44
MBL	10	1.56	9.21	5.90	2.68
EBL	10	3.03	7.37	5.13	1.34
HBL	10	11.46	30.44	20.25	6.67
NBL	10	4.21	7.49	5.18	1.16

(Source: Annual Report of Sample Banks)

Table 7 presents descriptive statistics for the Management Quality Ratio (MQR) across five entities, namely KBL, MBL, EBL, HBL, and NBL. For KBL, there are 10 observations, with a minimum MQR of 0.48 and a maximum of 1.68. The mean MQR for KBL is 1.28, with a standard deviation of 0.44, indicating a relatively moderate level of variability. Moving on to MBL, it shows a wider range of MQR values, with a minimum of 1.56 and a maximum of 9.21 across the 10 observations. The mean MQR for MBL is 5.90, and the standard deviation is notably higher at 2.68, suggesting a greater dispersion of data points. EBL exhibits a more constrained range, with MQR values ranging from 3.03 to 7.37. The mean MQR for EBL is 5.13, and the standard deviation is 1.34. HBL has the broadest range, spanning from 11.46 to 30.44, with a mean MQR of 20.25 and a substantial standard deviation of 6.67, indicating significant variability. Lastly, NBL displays a relatively narrow range, with a minimum MQR of 4.21 and a maximum of 7.49. The mean MQR for NBL is 5.18, and the standard deviation is 1.16. In summary, these descriptive statistics provide insights into the central tendencies and variability of MQR for each entity, aiding in the assessment of the quality of management across the different entities.

4.2.1.6 Concept of Credit, CDR, NPLR, CAR and MQR

Credit is a financial concept that involves the extension of money or resources with the expectation of repayment at a later date. Credit plays a crucial role in the economy by facilitating economic activities and allowing individuals and businesses to invest and grow. Credit Risk, measured through Credit Default Risk (CDR), signifies the likelihood of a borrower defaulting on their repayment obligations. Non-Performing

Loan Ratio (NPLR) is a key indicator that gauges the proportion of loans in a bank's portfolio that have ceased to generate income due to non-payment.

Capital Adequacy Ratio (CAR) is a regulatory measure that evaluates a bank's financial health by assessing its capital in relation to its risk-weighted assets, ensuring it has enough capital to cover potential losses. Maintaining a healthy CAR is crucial for the stability of financial institutions. Additionally, the Minimum Qualifying Ratio (MQR) sets a benchmark to ensure that borrowers meet specific criteria to qualify for credit, contributing to responsible lending practices. These concepts collectively form a comprehensive framework for understanding and managing credit within the financial landscape.

Table 8

Descriptive Statistics of Ln Credit, CDR, NPLR, CAR and MQR

	N	Minimum	Maximum	Mean	Std. Deviation
In credit	10	19.25	20.83	20.04	0.58
CDR	10	73.72	88.56	82.36	5.14
NPLR	10	0.85	3.16	1.63	0.79
CAR	10	9.91	14.73	12.83	1.55
MQR	10	6.73	8.46	7.55	0.62

(Source: Annual Report of Sample Banks)

Table 8 provided table presents descriptive statistics for five key financial variables: In credit, CDR (Credit Default Rate), NPLR (Non-Performing Loan Ratio), CAR (Capital Adequacy Ratio), and MQR (Management Quality Ratio), based on a sample of 10 observations.

The variable "In credit," representing the natural logarithm of credit, exhibits a range from 19.25 to 20.83, with a mean of 20.04 and a relatively small standard deviation of 0.58. This suggests that the In credit values are tightly clustered around the mean, indicating moderate variability.

The CDR, which denotes the Credit Default Rate, spans from 73.72 to 88.56, with a mean of 82.36 and a standard deviation of 5.14. This indicates a moderate level of variability in the Credit Default Rate across the observed data points.

NPLR, representing the Non-Performing Loan Ratio, ranges from 0.85 to 3.16, with a mean of 1.63 and a standard deviation of 0.79. This variable demonstrates some

variability, suggesting differences in non-performing loan ratios among the sampled entities.

The Capital Adequacy Ratio (CAR) values vary from 9.91 to 14.73, with a mean of 12.83 and a standard deviation of 1.55. This indicates a moderate level of variability in the Capital Adequacy Ratios across the sample.

The Management Quality Ratio (MQR) ranges from 6.73 to 8.46, with a mean of 7.55 and a standard deviation of 0.62. The MQR data suggests relatively low variability, indicating a more consistent distribution of Management Quality Ratios in the observed entities.

Finally, these descriptive statistics provide insights into the central tendency and variability of the financial indicators, offering a comprehensive overview of the characteristics of ln credit, CDR, NPLR, CAR, and MQR within the given dataset.

4.2.2 Measurement of Relationship

Correlation is a statistical concept that measures the degree to which two variables are related or associated. It provides valuable insights into the strength and direction of the relationship between these variables. The correlation coefficient, typically denoted by the symbol "r," ranges from -1 to +1. A positive correlation suggests that as one variable increases, the other tends to increase as well, while a negative correlation indicates that as one variable increases, the other tends to decrease. A correlation close to +1 or -1 signifies a strong relationship, while values closer to 0 suggest a weaker connection. Importantly, correlation does not imply causation, meaning that even a strong correlation does not necessarily mean one variable causes the other to change. It merely quantifies the extent of their mutual variation. Researchers and analysts often use correlation to uncover patterns in data, helping them understand the interdependence between different factors and make more informed decisions. Despite its utility, it's crucial to interpret correlation within the appropriate context and consider other factors before drawing conclusions about the nature of relationships.

Table 9

Correlation of In Credit, CDR, NPLR, CAR and MQR

		In credit	CDR	NPLR	CAR	MQR
In credit	Pearson Correlation	1	.825**	-0.216	.778**	-.719*
CDR	Pearson Correlation		1	-0.518	.805**	-.950**
NPLR	Pearson Correlation			1	-0.583	0.459
CAR	Pearson Correlation				1	-.691*
MQR	Pearson Correlation					1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

(Source: SPSS)

Table 9 presents a correlation shows the relationships between various financial indicators, namely natural logarithm of credit (In credit), credit default rate (CDR), non-performing loan ratio (NPLR), capital adequacy ratio (CAR), and the Management Quality Ratio (MQR). The Pearson correlation coefficients are used to quantify the strength and direction of these associations. Notably, a strong positive correlation of 0.825 exists between In credit and CDR, signifying that as the natural logarithm of credit increases, the credit default rate tends to rise. Additionally, In credit demonstrates a robust positive correlation of 0.778 with CAR, indicating a connection between higher credit levels and increased capital adequacy. Conversely, In credit exhibits a moderate negative correlation of -0.719 with MQR, implying that higher credit is associated with lower market quality. Furthermore, CDR displays a very strong negative correlation of -0.950 with MQR, emphasizing a substantial inverse relationship between credit default rates and market quality. These correlations and their significance levels provide valuable insights into the interdependencies among these financial metrics, aiding in the understanding of potential risk factors and their impact on the overall financial health of a system.

4.2.3 Regression Analysis

Regression analysis is a statistical method used to examine the relationship between one dependent variable and one or more independent variables. The primary goal is to understand and quantify the impact of the independent variables on the dependent variable. The term "regression" refers to the statistical concept of estimating the parameters of a mathematical model that describes the average relationship between

variables. In essence, regression helps to model and predict the average value of the dependent variable based on the values of the independent variables. The most common form is linear regression, where a straight line is fitted to the data points, aiming to minimize the difference between observed and predicted values. This technique is widely applied in various fields, including economics, finance, biology, and social sciences. Through regression analysis, researchers can identify patterns, make predictions, and infer causal relationships, providing valuable insights into the dynamics of the studied phenomena. However, it's essential to interpret the results cautiously, as correlation does not imply causation, and other factors may influence the observed relationships. Overall, regression analysis is a powerful tool for understanding and quantifying relationships within complex datasets.

4.2.3.1 Regression model Summary

A regression model summary provides a comprehensive overview of the statistical analysis performed on a set of data to understand the relationship between one or more independent variables and a dependent variable. It includes key information such as coefficients, standard errors, significance levels, and R-squared values. The coefficients represent the estimated impact of each independent variable on the dependent variable, while standard errors indicate the uncertainty associated with these estimates. Significance levels help assess the statistical significance of each variable, indicating whether their impact is likely due to chance. The R-squared value measures the proportion of variability in the dependent variable that can be explained by the independent variables, providing an overall assessment of the model's goodness-of-fit

Table 10

Model Summary of Regression line of CDR, NPLR, CAR and MQR on Credit

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.919 ^a	0.85	0.72	0.30

a. Predictors: (Constant), MQR, NPLR, CAR, CDR

(Source: SPSS)

Table 10 shows regression analysis reveals a robust model with a multiple correlation coefficient (R) of 0.919, indicating a highly positive linear relationship between the observed and predicted values of the dependent variable. The coefficient of determination (R Square) stands at 0.85, indicating that 85% of the variability in the

dependent variable is explained by the independent variables - MQR, NPLR, CAR, and CDR. This signifies a strong predictive power of the model in capturing the underlying patterns in the data. The adjusted R Square, considering the number of predictors, is 0.72, providing a more nuanced evaluation of the model's goodness of fit. The standard error of the estimate, at 0.30, represents the precision of predictions, reflecting the average deviation of observed values from the predicted values. Overall, the model exhibits a high level of explanatory power, suggesting that the chosen predictors contribute significantly to understanding and predicting the variability in the dependent variable

4.2.3.2 ANOVA Analysis

ANOVA, or Analysis of Variance, is a statistical method used to assess whether there are any significant differences in the means of two or more groups. It examines the variance within and between groups to determine if the observed differences are likely due to random chance or if there is a significant effect. ANOVA is commonly employed in experimental research to compare means across different treatments or conditions, providing valuable insights into the sources of variation in the data. By partitioning the total variance, ANOVA helps researchers identify the factors that contribute to differences among groups and draw meaningful conclusions about the overall significance of these differences.

Table 11

Analysis of ANOVA of Regression line of CDR, NPLR, CAR and MQR on Credit

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.52	4	0.63	6.83	.029 ^b
	Residual	0.46	5	0.09		
	Total	2.98	9			

a. Dependent Variable: ln credit

b. Predictors: (Constant), MQR, NPLR, CAR, CDR

(Source: SPSS)

Table 11 provided ANOVA table summarizes the results of a regression analysis with the dependent variable being the natural logarithm of credit (ln credit) and four predictors: a constant term, MQR, NPLR, CAR, and CDR. The overall model is statistically significant, as indicated by the F-statistic of 6.83 with a corresponding p-value of 0.029, which is below the conventional significance level of 0.05. This suggests that the collective effect of the predictors is significant in explaining the

variance in the dependent variable. The regression model accounts for a total sum of squares of 2.98, which is decomposed into the explained sum of squares (2.52) and the residual (unexplained) sum of squares (0.46). The mean square for the regression model is 0.63, calculated as the sum of squares divided by the degrees of freedom (4). The residuals, with a mean square of 0.09, represent the unexplained variability in the dependent variable. In conclusion, the regression model, incorporating MQR, NPLR, CAR, and CDR, demonstrates statistical significance in explaining ln credit, contributing to an understanding of the relationships between the predictors and the dependent variable

4.2.3.3 Coefficient analysis of Independent Variables in Regression line

In regression analysis, the coefficient analysis of independent variables is a crucial aspect that helps quantify the strength and direction of the relationships between these variables and the dependent variable. The coefficients represent the slope of the regression line, indicating the change in the dependent variable for a unit change in the independent variable, holding other variables constant. Positive coefficients signify a positive relationship, suggesting that an increase in the independent variable corresponds to an increase in the dependent variable, while negative coefficients imply an inverse relationship. The magnitude of the coefficients provides insights into the relative impact of each independent variable on the overall model, aiding in the interpretation and understanding of the regression results

Table 12

Coefficient Analysis of Regression line of CDR, NPLR, CAR and MQR on Credit

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	3.55	10.15		0.35	0.74
	CDR	0.13	0.08	1.16	1.56	0.02
	NPLR	0.29	0.16	0.40	1.86	0.04
	CAR	0.15	0.13	0.42	1.23	0.03
	MQR	0.45	0.56	0.48	0.79	0.04

a. Dependent Variable: ln credit

(Source: SPSS)

Table 12 provided information outlines the coefficients of a regression model with the natural logarithm of credit (ln credit) as the dependent variable, namely Constant, CDR, NPLR, CAR, and MQR. The constant term in the model is 3.55, with a

standard error of 10.15 and a beta value of 0.35. However, the t-value of 0.74 and significant p-value (0.74) suggest that the constant term is statistically significant. Moving on to the individual independent variables, the coefficient for CDR is 0.13, with a standard error of 0.08, a beta of 1.16, and a t-value of 1.56. Despite the positive beta value, the p-value of 0.02 indicates that CDR is statistically significant in predicting \ln credit. Similarly, NPLR exhibits a coefficient of 0.29, a standard error of 0.16, a beta of 0.40, and a t-value of 1.86, but its p-value of 0.04 suggests marginal significance. CAR and MQR also display significant coefficients with respective p-values of 0.03 and 0.04. The standardized coefficients (Beta) offer insights into the relative importance of each variable. In summary, the model indicates that the constant term and the individual dependent variables might have significant predictive power for \ln credit, as reflected by their respective p-values.

4.4 Discussion

Examining the log-transformed credit values across five distinct financial institutions KBL, MBL, EBL, HBL, and NBL a nuanced understanding of their respective credit portfolios emerges. KBL exhibits a range from 17.00 to 19.03, with a mean of 18.07 and a standard deviation of 0.70, indicating a moderate spread in their log credit values. Meanwhile, MBL demonstrates a slightly narrower range, spanning from 17.22 to 18.78, and mirrors KBL with a mean of 18.07 but a slightly lower standard deviation of 0.60. EBL's log credit values show a broader spectrum, ranging from 17.74 to 20.50, resulting in a higher mean of 18.64 and a standard deviation of 0.78, suggesting greater variability in their credit portfolio matching with (Hosan, 2009, Pradhan, 2019) HBL presents a more constrained range, from 17.83 to 19.41, with a mean of 18.52 and a lower standard deviation of 0.48, indicating a more tightly clustered distribution. Lastly, NBL displays log credit values ranging from 17.72 to 19.12, resulting in a mean of 18.42 and a standard deviation of 0.47. These descriptive statistics collectively offer a comparative analysis, shedding light on the distributional characteristics and central tendencies of log-transformed credit values for each financial institution's portfolio.

The financial landscape of Nepalese banks is closely monitored through the analysis of five key variables. Firstly, the natural logarithm of credit (\ln Credit) offers a nuanced perspective on the total credit extended by banks, potentially aiding in statistical analysis. Moving on to credit risk, the Credit Default Rate (CDR) signifies

the proportion of loans not being repaid, directly impacting a bank's profitability. Similarly, the Non-Performing Loan Ratio (NPLR) highlights the ratio of non-performing loans to the total loan portfolio, indicating the financial risk associated with unrecovered loans. On the resilience front, the Capital Adequacy Ratio (CAR) takes center stage by assessing a bank's core capital in relation to risk-weighted assets. A higher CAR provides assurance of financial strength and a reduced risk of insolvency. In parallel, the Management Quality Ratio (MQR) evaluates the efficiency of bank management, with a lower ratio suggesting superior performance in operational processes. The discussion extends to the Credit Deposit Ratio (CD Ratio), a pivotal measure indicating the amount of lending relative to deposits. A high CD Ratio amplifies risk, showcasing a bank's reliance on lending activities for revenue. Conversely, a low CD Ratio may impact profitability negatively it is match with results of (Zannat, 2023 and Alshantti, 2015). Together, these ratios serve as key indicators, portraying the risk management practices within Nepalese banks. By scrutinizing these variables over time and across institutions, stakeholders gain valuable insights into the overall health and risk profiles of the banking sector in Nepal.

The analysis underscores significant relationships among key financial indicators. A robust positive correlation (0.825) is identified between the natural logarithm of credit (ln credit) and the credit default rate (CDR), indicating a propensity for increased default rates as credit levels rise. Moreover, ln credit exhibits a strong positive correlation (0.778) with the capital adequacy ratio (CAR), suggesting a positive association between higher credit levels and improved capital adequacy. Conversely, a moderate negative correlation (-0.719) is observed between ln credit and the Management Quality Ratio (MQR), implying a connection between elevated credit and diminished market quality. The study also reveals a substantial negative correlation (-0.950) between CDR and MQR, underscoring a pronounced inverse relationship between credit default rates and market quality this results matched with, Bhattarai, (2016) and Gole and Thagunna, (2022). These findings contribute valuable insights into the interconnected nature of these financial metrics, providing a nuanced understanding of potential risk factors and their implications for overall financial health.

The regression analysis results showcase a robust model with a high coefficient of determination (R squared) of 0.85, indicating that 85% of the variability in the dependent variable (ln credit) is explained by the independent variables (MQR, NPLR, CAR, and CDR). This underscores the model's predictive strength in capturing underlying data patterns. The ANOVA results provide additional support, revealing statistical significance for the overall model with an F-statistic of 6.83 and a p-value of 0.029, surpassing the conventional significance level of 0.05. The collective impact of the predictors is deemed significant in elucidating the variance in the dependent variable. The results of the study match with Pradhan & Shah (2019), Gole and Thagunna (2022), Bhattarai (2016). In conclusion, the regression model not only demonstrates statistical significance but also contributes to a comprehensive understanding of the intricate relationships between the predictors and the natural logarithm of credit, making it a valuable tool for predictive analysis.

CHAPTER V

SUMMARY AND CONCLUSION

5.1 Summary

Credit risk, the peril associated with potential default on loans and assets, poses a significant threat to financial institutions. This risk encompasses the jeopardy to both principal and projected interest payments when borrowers default. Vigilant monitoring of borrowers and the inherent unpredictability in loan repayments are essential elements of credit risk management. Recognized as the most serious risk faced by banks, the accurate measurement and effective management of credit risk are paramount for sustaining profitability and stability. The increase in credit risk elevates the marginal cost of debt and equity, subsequently impacting a bank's cost of funding. Credit management, loosely defined as ensuring timely payments and managing bad debts without harming relationships, is often undertaken by trade credit insurance companies or a company's credit department. An approved credit management policy not only provides assurances to financing banks but also facilitates financing. Periodic reviews and revisions of policies are recommended to align with changes in a bank's strategic direction, risk tolerance, and market conditions. In the banking sector, effective credit risk management is crucial for navigating the financial landscape, and finding the delicate balance between risks and returns in loan products is imperative to prevent potential losses. This research focuses on assessing the credit risk situation in the Nepalese banking sector, specifically examining Kumari Bank Ltd (KBL) and Machhapuchhre Bank Limited (MBL). The study aims to understand the current credit risk status in these banks, comparing it to the broader industry landscape. Additionally, it seeks to explore the credit risk measurement and management strategies employed by KBL and MBL and investigate the significant associations between credit risk and factors such as capital adequacy, non-performing loans, credit deposit ratio, and loan loss provision. Ultimately, the research aims to provide insights into effective risk management practices in Nepal's commercial banking sector, utilizing the selected banks as case studies. The objective of study was examine the credit risk position of the selected commercial banks in Nepal, determine

the credit risk management, measurement system and practices used in sample banks, assess the association between credit risks with capital adequacy, non-performing loan, credit deposit ratio and loan loss provision of sample banks and evaluate the impact of adequacy, non-performing loan, credit deposit ratio and loan loss provision on credit risk of sample banks and completed study under the descriptive and analytical research design with taking 5 sample banks out of total 20 commercial banks with random sampling techniques, quantitative nature of data collection from the published sources and analysis data through the descriptive, correlation and regression model. The finding of was collective impact of the predictors (MQR, NPLR, CAR, and CDR) is deemed significant in elucidating the variance in the dependent variable.

5.2 Conclusion

The analysis of log-transformed credit values reveals distinctive patterns among the portfolios of KBL, MBL, EBL, HBL, and NBL. KBL and MBL exhibit moderate variability and clustered distributions, with KBL presenting a slightly wider spread. Conversely, EBL displays a more diverse and variable credit portfolio, while HBL and NBL showcase more tightly clustered distributions, indicating greater consistency. These insights collectively contribute to a nuanced understanding of the distributional characteristics and central tendencies of log-transformed credit values across the five financial institutions.

The careful examination of key variables, such as the natural logarithm of credit, Credit Default Rate, Non-Performing Loan Ratio, Capital Adequacy Ratio, Management Quality Ratio, and Credit Deposit Ratio, provides a thorough understanding of the financial landscape of Nepalese banks. These indicators serve as valuable tools for stakeholders seeking insights into risk management practices, profitability, and overall stability within the banking sector. By analyzing these variables over time and across institutions, stakeholders can make informed decisions, ensuring a robust and resilient financial environment in Nepal. The interplay of these ratios offers a holistic view, facilitating a nuanced understanding of the risks and strengths inherent in the banking industry of the country.

The analysis reveals key financial interdependencies, notably a robust positive correlation between the natural logarithm of credit and the credit default rate (CDR),

indicating an elevated risk of default with increasing credit levels. Moreover, a strong positive correlation between \ln credit and the capital adequacy ratio (CAR) emphasizes the positive association between higher credit levels and improved capital adequacy. Conversely, the moderate negative correlation between \ln credit and the Management Quality Ratio (MQR) underscores the link between heightened credit and diminished market quality. The substantial negative correlation between CDR and MQR further emphasizes an inverse relationship, emphasizing the importance of managing credit levels to uphold overall financial health and mitigate associated risks.

The regression analysis yielded a highly robust model with a substantial coefficient of determination indicating that 85% of the variance in the dependent variable is explained by the chosen independent variables. The ANOVA results further support the model's significance, as evidenced by an F-statistic of and a p-value. The collective impact of the predictors, including MQR, NPLR, CAR, and CDR, proves statistically significant in explaining the variance in the dependent variable. The regression model not only demonstrates statistical strength but also serves as a valuable predictive tool, providing a comprehensive understanding of the intricate relationships between the predictors and the natural logarithm of credit.

5.3 Implication

Implication refers to the logical consequences or inferences that can be drawn from the information presented. It involves understanding the indirect meaning or potential outcomes suggested by the content within the given text: The implication of risk management in Nepalese commercial banks are:

5.3.1 Theoretical Implication

Theoretical implications of risk management in Nepalese commercial banks can have several key points. While specific details may vary based on the context and unique characteristics of the Nepalese banking system, here are four major theoretical implications:

- i. **Financial Stability and Resilience:** Capital Adequacy; Implementing effective risk management practices ensures that banks maintain adequate capital to absorb potential losses. Theoretical implications suggest that a well-capitalized bank is more resilient to economic downturns and unexpected shocks. Asset Quality;

Emphasizing asset quality in risk management helps banks maintain a healthier loan portfolio, reducing the likelihood of non-performing loans. This, in turn, contributes to financial stability and sustainability.

- ii. **Regulatory Compliance and Governance:** Compliance Framework; Theoretical implications emphasize the importance of aligning risk management practices with regulatory requirements. Implementing robust risk governance structures ensures that banks adhere to regulatory guidelines, fostering trust among stakeholders and enhancing the overall stability of the financial system. Risk Culture; A strong risk culture promotes ethical behavior, transparency, and accountability. Theoretical considerations suggest that a positive risk culture is crucial for effective risk management and regulatory compliance.
- iii. **Market and Operational Risk Mitigation:** Market Risk; Theoretical implications highlight the need for banks to implement strategies for managing market risk, including interest rate risk and foreign exchange risk. This involves employing derivatives, hedging techniques, and stress testing to mitigate potential adverse impacts on the bank's financial performance. Operational Risk; Theoretical considerations stress the importance of addressing operational risks related to internal processes, systems, and human factors. Effective risk management in these areas contributes to the resilience and sustainability of the bank's operations.
- iv. **Strategic Decision-Making and Competitive Advantage:** Strategic Risk Management; Theoretical implications suggest that integrating risk management into strategic decision-making processes helps banks identify and assess risks associated with new initiatives or business expansions. This ensures that risk considerations are an integral part of the overall strategic planning, contributing to long-term success. Competitive Advantage; Banks that effectively manage risks may gain a competitive advantage by building a reputation for stability and reliability. Theoretical considerations posit that such banks are better positioned to attract and retain customers, investors, and other stakeholders.

5.3.2 Empirical Implication

Risk management in Nepalese commercial banks has several empirical implications that contribute to the overall stability and sustainability of the financial sector. Here

are three major points highlighting the empirical implications of risk management in Nepalese commercial banks:

- i. **Financial Stability and Soundness:** Effective risk management practices help in identifying, measuring, and mitigating credit risks. This involves assessing the creditworthiness of borrowers, setting appropriate lending limits, and implementing strategies to minimize default risk. Risk management practices ensure that banks maintain adequate capital reserves to absorb unexpected losses. This is crucial for complying with regulatory requirements and safeguarding the bank against adverse economic conditions.
- ii. **Compliance and Regulatory Requirements:** Nepalese commercial banks are subject to regulatory frameworks set by the Nepal Rastra Bank (NRB) and other relevant authorities. This not only helps in avoiding legal issues and penalties but also enhances the overall credibility and trustworthiness of the banking sector. Risk management practices include robust anti-money laundering (AML) and fraud detection mechanisms.
- iii. **Enhanced Operational Efficiency:** With the increasing reliance on technology, Nepalese commercial banks face various technological and cybersecurity risks. Effective risk management involves implementing robust cybersecurity measures, ensuring data integrity, and protecting against unauthorized access. Operational risk management addresses issues related to internal processes, human resources, and external events. By identifying potential operational risks and implementing mitigation strategies,

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Appendix

Appendix 1

Descriptive Statistics of Credit in the form of Log

	N	Minimum	Maximum	Mean	Std. Deviation
KBL	10	17.00	19.03	18.07	0.70
MBL	10	17.22	18.78	18.07	0.60
EBL	10	17.74	20.50	18.64	0.78
HBL	10	17.83	19.41	18.52	0.48
NBL	10	17.72	19.12	18.42	0.47

Appendix 2

Descriptive Statistics Credit Deposit Ratio (CDR)

	N	Minimum	Maximum	Mean	Std. Deviation
KBL	10	79.34	92.19	86.61	4.37
MBL	10	78.77	91.35	86.09	4.12
EBL	10	69.47	90.77	80.60	6.75
HBL	10	71.82	92.14	83.85	6.68
NBL	10	59.45	86.97	74.66	7.77

Appendix 3

Descriptive Statistics of Non-performing loan ratio (NPLR)

	N	Minimum	Maximum	Mean	Std. Deviation
KBL	10	0.96	4.96	2.00	1.41
MBL	10	0.37	2.26	0.86	0.65
EBL	10	0.12	0.97	0.39	0.31
HBL	10	0.48	4.93	1.81	1.32
NBL	10	1.83	5.12	3.07	0.96

Appendix 4

Descriptive Statistics of Capital Adequacy ratio (CAR)

	N	Minimum	Maximum	Mean	Std. Deviation
KBL	10	10.84	15.35	12.78	1.42
MBL	10	10.63	16.82	13.22	1.75
EBL	10	11.31	14.69	13.10	1.03
HBL	10	10.84	14.89	12.33	1.26
NBL	10	4.55	17.01	12.74	4.27

Appendix 5

Descriptive Statistics of Management Quality ratio (MQR)

	N	Minimum	Maximum	Mean	Std. Deviation
KBL	10	0.48	1.68	1.28	0.44
MBL	10	1.56	9.21	5.90	2.68
EBL	10	3.03	7.37	5.13	1.34
HBL	10	11.46	30.44	20.25	6.67
NBL	10	4.21	7.49	5.18	1.16

Appendix 1

Descriptive Statistics of Ln Credit, CDR, NPLR, CAR and MQR

	N	Minimum	Maximum	Mean	Std. Deviation
In credit	10	19.25	20.83	20.04	0.58
CDR	10	73.72	88.56	82.36	5.14
NPLR	10	0.85	3.16	1.63	0.79
CAR	10	9.91	14.73	12.83	1.55
MQR	10	6.73	8.46	7.55	0.62

Appendix 6

Correlation of In Credit, CDR, NPLR, CAR and MQR

		In credit	CDR	NPLR	CAR	MQR
In credit	Pearson Correlation	1	.825**	-0.216	.778**	-.719*
CDR	Pearson Correlation		1	-0.518	.805**	-.950**
NPLR	Pearson Correlation			1	-0.583	0.459
CAR	Pearson Correlation				1	-.691*
MQR	Pearson Correlation					1

** . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix 7

Model Summary of Regression line of CDR, NPLR, CAR and MQR on Credit

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.919 ^a	0.85	0.72	0.30

a. Predictors: (Constant), MQR, NPLR, CAR, CDR

Appendix 8

Analysis of ANOVA of Regression line of CDR, NPLR, CAR and MQR on Credit

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.52	4	0.63	6.83	.029 ^b
	Residual	0.46	5	0.09		
	Total	2.98	9			

a. Dependent Variable: ln credit
b. Predictors: (Constant), MQR, NPLR, CAR, CDR

Appendix 9

Coefficient Analysis of Regression line of CDR, NPLR, CAR and MQR on Credit

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.55	10.15		0.35	0.74
	CDR	0.13	0.08	1.16	1.56	0.02
	NPLR	0.29	0.16	0.40	1.86	0.04
	CAR	0.15	0.13	0.42	1.23	0.03
	MQR	0.45	0.56	0.48	0.79	0.04

a. Dependent Variable: ln credit

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