

**ANALYSIS OF FINANCIAL PERFORMANCE OF LISTED
HYDROPOWER COMPANIES IN NEPAL**

A Dissertation submitted to the Office of the Dean, Faculty of Management,
Tribhuvan University, in the partial fulfillment of the requirements for the Master of
Business Studies (MBS).

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CERTIFICATION OF AUTHORITY

I hereby corroborate that I have researched and submitted the final draft of dissertation entitled "ANALYSIS OF FINANCIAL PERFORMANCE OF LISTED HYDROPOWER COMPANIES IN NEPAL". The work of this dissertation has not been submitted previously for the purpose of conferral of any degrees nor has it been proposed and presented as part of requirements for any other academic purpose.

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 the dissertation.

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**“ANALYSIS OF FINANCIAL PERFORMANCE OF LISTED HYDROPOWER
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ABBREVIATIONS

API	Api Power Company Limited
BEP	Break-even Point
CHCL	Chilime Hydropower Company Limited
CV	Coefficient of Variation
CVP	Cost-Volume Profit
CR	Current Ratio
DAR	Debt-to-Asset Ratio
DER	Debt-to-Equity Ratio
EPS	Earnings per Share
JASP	Jeffrey's Amazing Statistics Program
MW	Mega Watts
NEA	Nepal Electricity Authority
NEPSE	Nepal Stock Exchange
NPR	Net Profit Ratio
OLS	Ordinary Least Square
ROA	Return on Assets
ROE	Return on Equity
TATR	Total Asset Turnover Ratio
TWh	Terawatt Hours

CHAPTER 1: INTRODUCTION

1.1 Background of Study

Hydropower is a significant contributor to the energy sector in Nepal, offering substantial potential for economic growth and development. With approximately 6,000 rivers spanning 45,000 kilometers, Nepal has an estimated technically feasible hydropower potential of 83 gigawatts (GW). However, due to various constraints, only 42 GW is considered economically viable (Gurung et al., 2011). Hydropower is not only pivotal for meeting domestic energy needs but also holds promise for electricity export, potentially transforming Nepal into an energy surplus country and providing a major source of revenue (Dhakal, 2011).

The development of hydropower in Nepal can address persistent energy shortages, reduce electricity imports, and foster sustainable economic growth. As of mid-April 2022, Nepal's installed capacity for electricity generation was 2,191 MW. Despite these advances, the country continues to grapple with challenges such as dependency on electricity imports from India, which constituted 32% of the total electricity available in the fiscal year 2020-21 (Basnet, 2022). The intermittent nature of hydropower generation, primarily due to seasonal variations, further complicates the energy supply scenario (Shrestha & Aryal, 2011).

The financial performance of hydropower companies is crucial for attracting investments and ensuring the sector's sustainable growth. Financial performance analysis provides insights into a company's financial health, including its profitability, liquidity, and overall efficiency. It involves examining financial statements to assess assets, liabilities, equity, revenue, and expenses (Tekatel, 2019). Such analyses are essential for understanding the operational capabilities of these companies and their ability to generate returns on investments.

Analyzing the financial performance of hydropower companies helps stakeholders make informed investment decisions. It also assists in identifying areas for improvement and understanding the impact of various factors on a company's financial health. This analysis is particularly important in the context of Nepal, where the hydropower sector faces unique challenges such as high initial investment costs, regulatory issues, and environmental impacts. Financial viability and performance

directly influence the ability of these companies to secure funding and support from both national and international investors (Poudel, 2019). Hydropower projects in Nepal often involve significant financial and technical risks. High upfront capital costs, long gestation periods, and the need for substantial infrastructure development are among the primary challenges. Moreover, regulatory hurdles and bureaucratic delays can impact project timelines and costs (Manandhar, 2020). Understanding the financial dynamics of these companies is therefore essential for policymakers and investors who aim to support and expand the hydropower sector in Nepal.

This study focuses on the financial performance of listed hydropower companies in Nepal, specifically Chilime Hydropower Company Limited (CHCL) and Api Power Company Limited (API). By evaluating the financial ratios and performance indicators of these companies, the study aims to provide a comprehensive understanding of their financial health and operational efficiency. Ratios such as return on assets (ROA), return on equity (ROE), and debt to equity ratio will be analyzed to assess profitability, financial stability, and risk (Khadka & Ale, 2018).

Additionally, the study will consider the impact of external factors such as government policies, market conditions, and environmental concerns on the financial performance of these companies. For instance, government incentives for renewable energy projects, including tax benefits and subsidies, can significantly influence the financial outcomes of hydropower companies (Malla, 2013). Similarly, market demand for electricity and competitive pricing strategies are crucial determinants of revenue and profitability.

In conclusion, the financial performance analysis of hydropower companies in Nepal is a vital aspect of understanding their sustainability and growth potential. By focusing on listed companies such as CHCL and API, this study seeks to provide valuable insights into the financial health of the hydropower sector, thereby aiding investors, policymakers, and other stakeholders in making informed decisions.

1.2 Problem Statement

The economy and energy are closely related fields. Hydropower is the primary energy source utilized in Nepal to produce electricity. This study aims to determine and assess the financial stability of Nepali hydropower companies and investigate the impact of firm-specific factors on their profitability. The financial performance study

assesses the health and performance of a company's finances by looking at its financial statements and firm-specific factors. Financial performance analysis can be used to assess the profitability and long-term viability of Nepali hydropower companies, as well as to pinpoint areas in need of development, gauge how well their management is working, and make wise investment choices (Shrestha, 2023).

Nepal has an enormous hydropower potential, the prospect of becoming a prosperous country can be realized provided this energy source could be tapped prudently and efficiently at the earliest. As a leader of the country's power sector, NEA has the prime responsibility of taking necessary steps toward achieving this goal.

The private sector needs sufficient revenue to support its employees and shareholders. Income can be raised by improved performance, which raises the efficacy and efficiency of both human and non-human production elements while holding other variables constant. Each of CHCL and API has its own personnel, assets, management, and capital mix. The goal of this study is to find the overall financial performance of the organization.

In general, the majority of the literature's analysis of financial performance focuses on examining the connections between a company's profitability and various financial and non-financial variables in order to assess how those variables affect profitability and assist investors in making more informed investment choices. Nonetheless, the majority of research on financial performance is carried out in the manufacturing, banking, and financial institutions sectors. Very little has been written on the financial performance of Nepal's hydropower industry. The goal of this study is to determine and assess the financial strengths and weaknesses of Nepal's hydropower firms, CHCL and API. In addition, the research aims to provide answers regarding the financial standing and operational efficacy of these companies.

This research addresses the following key issues and questions in light of hydropower companies in Nepal:

- ❖ What is the financial position and performance of the companies?
- ❖ What is the effectiveness of the financial performance analysis of hydropower companies in Nepal?
- ❖ What is the relationship of firm-specific variables with the financial performance of hydropower companies in Nepal?

- ❖ Is there an impact of firm-specific variables on the financial performance of hydropower companies in Nepal?
- ❖ Which company is more effective and efficient in terms of financial performance?

1.3 Objectives of the Study

The general objective of this study is to evaluate the financial performance of hydropower companies (CHCL and API) in Nepal.

The specific objectives of the study are as follows:

- To analyze the financial performance of hydropower companies in Nepal.
- To analyze the relationship between the firm-specific variables such as profitability, liquidity, return on assets, return on debts, firm age and firm size.
- To assess the impact of those firm-specific variables on the financial performance of hydropower companies in Nepal.

1.4 Rationale of the Study

The financial decisions of corporate hydropower companies depend heavily on analyzing their financial positions and statements. Effective financial management is crucial because it significantly affects the company's revenue, profits, and cash flow. This study examines the financial performance of hydropower companies and uses this analysis to explore the financial challenges faced by the hydropower industry in Nepal from 2015 to 2020.

Hydropower is an important sector in Nepal, a country with abundant water resources and significant potential for hydropower generation. Despite this potential, hydropower companies in Nepal face many financial challenges, including fluctuating revenues, high initial investment costs, debt repayment pressures, and regulatory issues (Shrestha & Adhikari, 2017). Therefore, understanding the financial health of these companies is crucial for investors, policymakers, and managers.

This study is important because it provides insights into how hydropower companies in Nepal manage their finances amid these challenges. By analyzing financial statements over five years, the study highlights the strengths and weaknesses of these companies' financial practices. The period from 2015 to 2020 includes significant

economic and political changes in Nepal, such as the impact of the 2015 earthquake and policy changes promoting infrastructure development (Dhakal, 2018).

Moreover, the findings of this study are expected to offer practical advice for improving financial strategies in the hydropower sector. By identifying key financial performance indicators and trends, the study can help create policies that improve the efficiency and financial stability of hydropower companies (Bhandari et al., 2020). This, in turn, can contribute to the sustainable growth of Nepal's energy sector, ensuring a reliable electricity supply and supporting economic development (Nepal Electricity Authority, 2019).

In summary, this study not only enhances the academic understanding of financial performance in the hydropower sector but also serves as a valuable resource for industry professionals and policymakers aiming to improve financial outcomes in this critical industry.

1.5 Limitations of Study

The main purpose of this study is to analyze the financial performance of different hydropower companies in Nepal. The limitations of this study are listed as:

- ✓ The study has covered 5 years of data from the fiscal year of 2074/75 to the fiscal year 2078/79 of hydropower companies.
- ✓ No primary data collection is done for this study.
- ✓ The secondary data is the basic input of the study and thus accuracy of conclusions derived from them highly depends upon the reliability of these data.
- ✓ The two hydroelectric businesses registered on the Nepal Stock Exchange had served as the basis for the study. As a result, it may not be possible to apply the study's findings to all hydroelectric firms in Nepal.
- ✓ Only a few firm-specific variables, including the current ratio, net profit ratio, debt-to-equity ratio, debt-to-asset ratio, size, and age, are planned to be covered in the study.

1.6 Introduction to Selected Companies

1.6.1 Chilime Hydropower Company Limited (CHCL)

In 1995, Chilime Hydropower Company Limited (Chilime) was established with the goal of producing hydroelectricity by making the best use of the nation's resources. With 51% of the shares, Nepal Electricity Authority (NEA) is the primary owner. The general public owns 49% of the shares remaining, with 10% being owned by locals in equity. A 22.1 MW power plant owned and operated by Chilime was put into service on August 25, 2003, and is situated in the Rasuwa district, 133 kilometres north of Kathmandu, the capital. It provides NEA with bulk power at the long-term PPA rate. The plant generates roughly 150 GWh of energy annually.

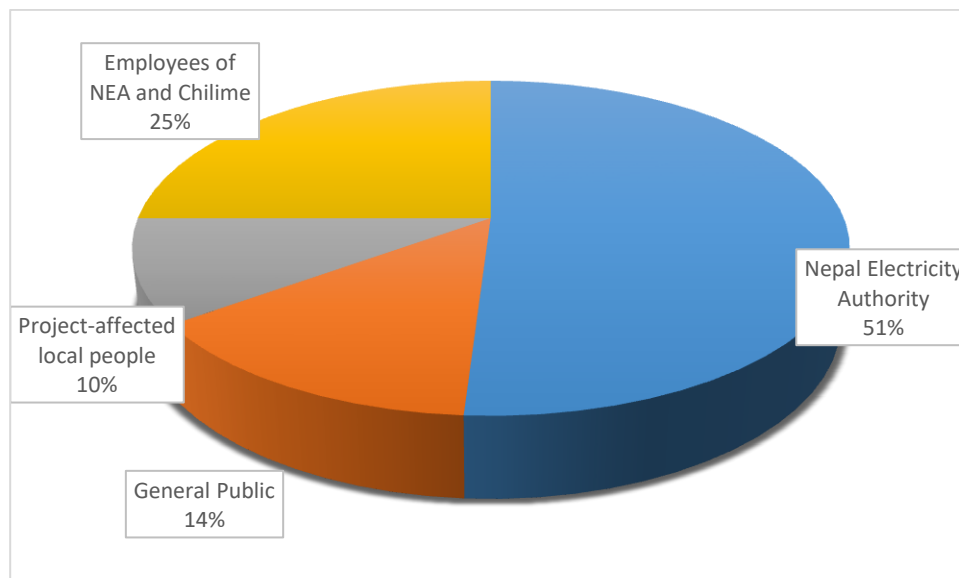


Figure 1.1: Graph showing equity structure of Chilime Hydropower Company

Source: (Chilime Hydropower Company Limited, 2024)

Chilime has three subsidiaries established namely, Rasuwagadhi Hydropower Company Limited, Madhya Bhotekoshi Jalavidhyut Company Limited and, Sanjen Jalavidhyut Company Limited. Moreover, Chilime is creating four hydroelectric projects with a combined capacity of 270.3 MW through its three subsidiaries.

1.6.2 Api Power Company Pvt. Ltd (API)

Api Power Company Ltd was established in B.S 2060 Ashad 5th (19th June 2003) as private limited company being subsidiary of South Asia Engineering Pvt. Ltd under Company Act 2053. Later on the company has been converted as public limited

company with major restructuring in the shareholding pattern on Jul-2013. The basic objective of the company is to generate electricity through utilization of water and other natural resources abundantly available in the country. The company was established by the same promoters of Arun Hydropower Group, one of the leading private sector hydropower groups.

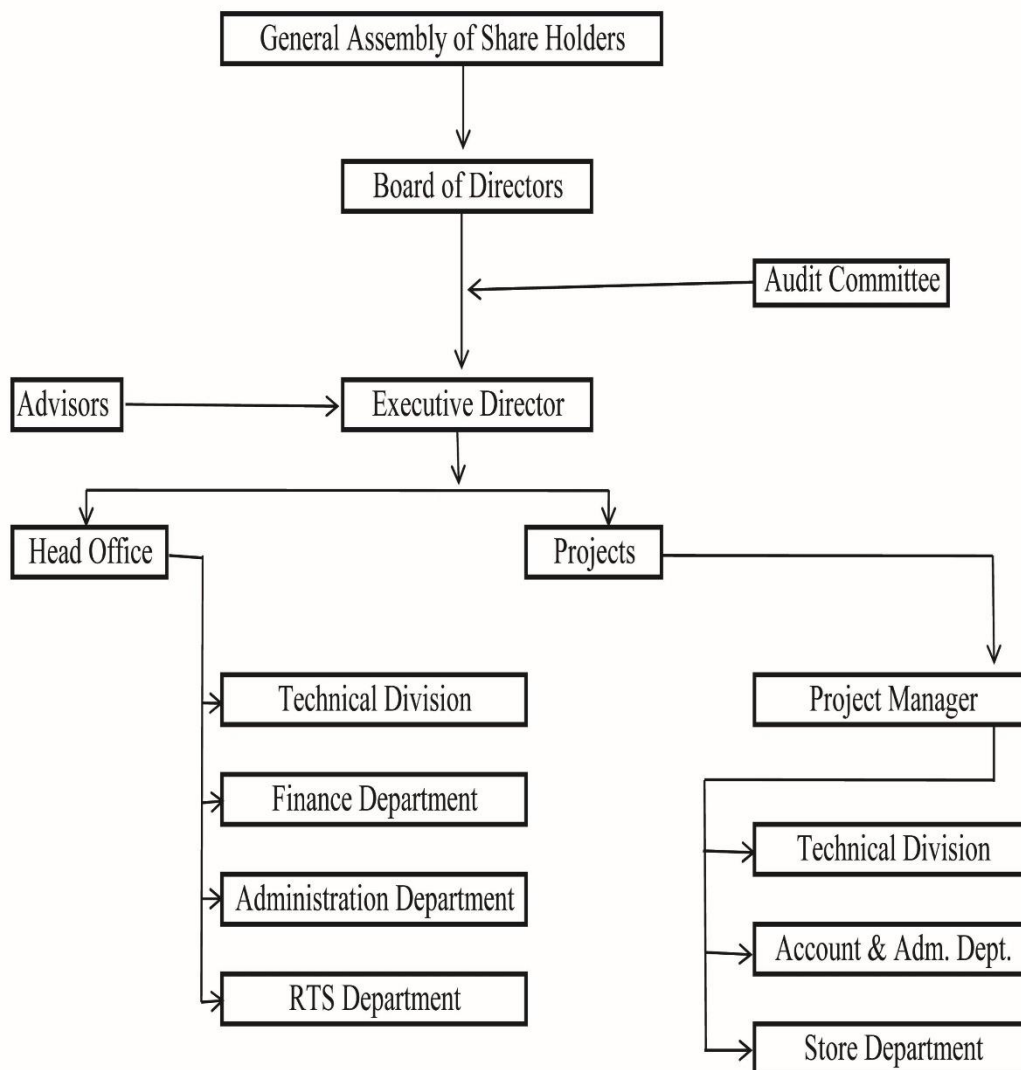


Figure 1.2: Organizational Structure of Api Power Company Ltd.

Source: (Api Power Company Pvt. Ltd)

The company is developing 8.5 MW Naugarh hydroelectric project. The company has got a generation license for 35 years which includes the period of construction. The project is being developed on Build Own Operate Transfer (BOOT) basis. The total project cost is around NPR 1400 million to be funded in debt-to-equity ratio of 70:30. Api Power Company became a stock market listed entity in 2015. It was necessary for

the company to float shares to the general public in order to match the requirement of its 70:30 debt to equity ratio (Bimali, 2014).

Api Power Company Limited is committed to operational excellence and believes in good governance, corporate citizenship and creating value for stakeholders. Company has owned and developed various Hydroelectric and Solar Projects.

Table 1.1: Table showing Api Power Company Ownership Structure

1.	Promoters	60 percent
2.	Local of Project Affected Area	10 percent
3.	Collective Investment	1.5 percent
4.	Employees of the Company	0.9 percent
5.	During Initial Allotment	27.6 percent
	Total	100 percent

Source: (Api Power Company Pvt. Ltd)

CHAPTER 2: LITERATURE REVIEW

2.1 Hydropower Development in Nepal

The abundance of water resources in Nepal is remarkable. Nepal boasts approximately 6,000 rivers totaling about 45,000 kilometers in length, producing an average annual runoff of 220 billion cubic meters. Based on this resource availability, Nepal's hydropower potential is assessed at 83 gigawatts (GW) technically, though only 42 GW is considered economically feasible due to various constraints (Gurung et al., 2011). Table 1-1 illustrates the generation capacities of major river basins, including Sapta Koshi, Karnali, Sapta Gandaki, Mahakali, and the Southern rivers (K.C. et al., 2011).

Table 2.1: Major River Systems of Nepal and Their Hydropower Potential

Major River Basin	Theoretical Potential	Technical Potential		Economic Potential	
	Megawatts	Project Sites	Megawatts	Project Sites	Megawatts
Sapta Koshi	22,350	53	11,400	40	10,860
Sapta Gandaki	20,650	18	6,660	12	5,270
Karnali and Mahakali	36,180	34	26,570	9	25,125
Southern Rivers	4,110	9	980	5	878
Total	83,290	114	45,610	66	42,133

Source: (K.C. et al., 2011)

The hydropower industry in Nepal holds significant potential to drive growth and development. Although the theoretical hydropower potential is about 83,000 MW, approximately 45,000 MW is considered economically feasible (Pokharel, 2018). By mid-April 2022, Nepal's installed capacity for electricity production was 2,191 MW. In the fiscal year 2020–21, the total available electricity was around 8.9 TWh, with about 32.5% from independent power producers and 32% imported from India. Residential use accounted for over 44% of electricity consumption, followed by industrial (37%), commercial (7%), agriculture, and other sectors. About 16% of the electricity was lost, with only 0.7% exported to India (Basnet, 2022).

A recent assessment by the Asian Development Bank (ADB) highlighted that Nepal's installed generation capacity was only 1,182 MW, compared to a peak energy demand of 1,320 MW in the fiscal year 2018–2019. Private investors controlled 560 MW of the total installed capacity, producing 29% of the total sold electricity, while the Nepal

Electricity Authority (NEA) owned 621 MW, producing 34%. The remaining demand was met by importing electricity from India (Gunatilake et al., 2020). Nepal's potential to generate electricity is rapidly increasing. Survey licenses have been granted for 302 projects totaling 15,885 MW; of these, 172 projects have acquired generation licenses, and construction is underway for projects with a total capacity of 4,642 MW. Additionally, power purchase agreements have been finalized for 244 projects totaling 4,138 MW (Gunatilake et al., 2020).

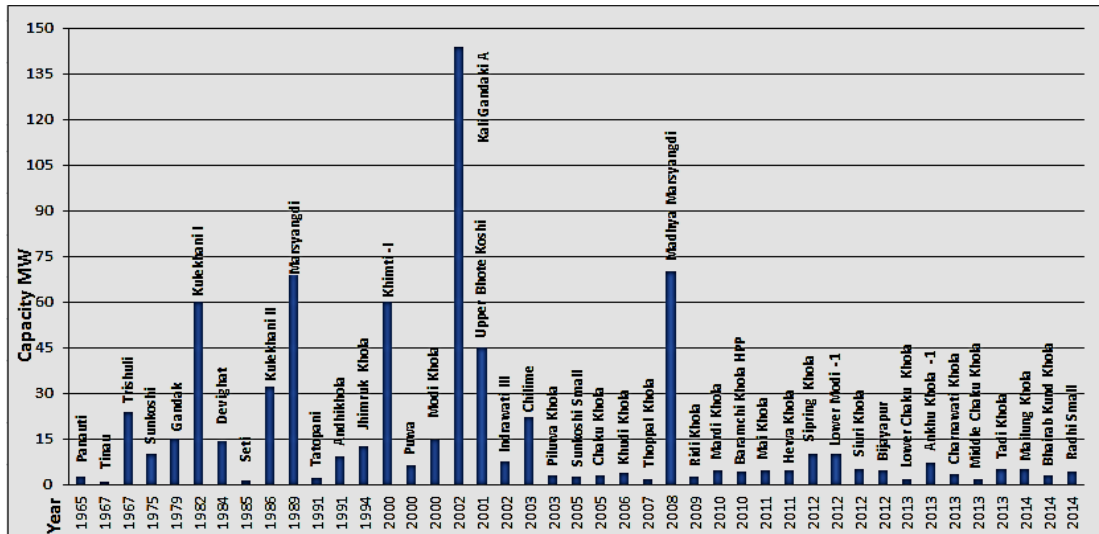


Figure 2.1: Timeline of Construction of Major Hydro powers in Nepal

Source: (Singh & Nachtnebel, 2015)

Hydropower in Nepal attracts increasing interest from both national and international stakeholders. Situated between India and China, Nepal is rich in hydropower resources, with more than 6,000 rivers offering an estimated potential of 83,000 MW (Sharma & Awal, 2013). Despite this potential, reliable and cost-effective electricity availability remains a challenge. Until recently, only 50% of the population had access to electricity (Gurung et al., 2013), with rural areas even lower at 5% (Bergner, 2013). However, by 2019, Nepal achieved over 93% population coverage in energy access (World Bank, 2019).

The contribution of Independent Power Producers (IPPs) to Nepalese hydropower has grown in recent years, with private entities increasingly investing to utilize water resources (NEA, 2022). Despite some recent successes, Nepal has yet to fully leverage its vast water resources for economic development. Challenges include seasonal water variation, sediment management, vulnerability to climate change

(Dixit, 2019), and inadequate planning and infrastructure (Kaini & George, 2019). Facilitating IPP entry by minimizing market and non-market barriers while providing appropriate incentives is essential (Nepal & Jamasb, 2012).

Investors in IPPs face significant challenges, including high initial investment costs, no return during construction, and the risk of cost overruns due to unforeseen social, political, and economic events. The financial performance of hydropower companies provides valuable insights into their economic health and managerial effectiveness, aiding in informed investment decisions (Kenton, 2022). Nepal has numerous well-researched hydropower projects open for investment. However, estimating costs and benefits remains contentious, with historical instances of cost overruns due to inadequate risk management and other factors. Despite these challenges, the government is keen to invite private and international investors to participate in these projects (Gunatilake et al., 2020).

Assessing the financial performance of hydropower companies is crucial for investors. It involves analyzing financial statements, such as balance sheets, income statements, and cash flow statements, to evaluate profitability, liquidity, and overall efficiency. Financial performance indicators help determine the company's ability to use its income, expenses, liabilities, shareholder equity, and assets effectively. Such evaluations are critical for making informed investment decisions, particularly regarding debt or equity securities (Complete Controller, 2021).

2.2 Conceptual Review

Various theories of profit have been advanced from time to time regarding the nature of profit in a competitive economy. Almost all of them differ basically from one another and are individually inadequate to explain the actual role of profit in the operation of a free economy.

Financial performance is a detailed examination of a company's standing in categories such as assets, liabilities, equity, costs, revenue, and overall profitability (Tekatel, 2019) and it mainly focuses on performance improvement, financial management, and the mitigation of finance and business-related risks of the companies (Emeritus, 2022). The prospective effectiveness of a corporation is reflected in the financial performance indicators. The company's standing among internal stakeholders is evaluated through the financial performance evaluation. The assessment helps

external stakeholders determine which companies are worth investing in and whether they are a good investment (CFI Team, 2022). The goal of the financial assessment is to summarize the firm by looking at its financial statements and determining its business model, operational profitability, and overall spending, investing, and money management practices. A well-defined and executed financial management plan can yield a favorable impact on the company's value development (Padachi, 2006).

Companies can use financial analysis to obtain a competitive edge, start transformational projects for expansion, and customize solutions for any obstacles or setbacks. Financial performance analysis can be used to achieve the owners' and shareholders' goal of profitability through the efficient use of resources (Panwala, 2009). However, no organization should use financial performance analysis as its primary means of performance improvement because it cannot guarantee development or change on its own (Emeritus, 2022).

Many studies in the banking literature and the more general industrial organization find a positive relationship between profitability and measures of market structure – either concentration or market share. Two competing hypotheses with regard to market structure and performance are the traditional structure-conduct-performance (SCP) hypothesis and the efficiency-structure (EFS) hypothesis.

2.2.1 The Structure Conduct Performance Theory

The Structure-Conduct-Performance (SCP) theory analyzes the relationship between the structure of an industry, the behavior of firms operating in that industry, and the industry's overall performance. The SCP model, developed by (Mason, 1939) in the late 1930s and early 1940s and empirically applied by (Bain, 1956), was based on the neoclassical theory of the firm and revolutionized the study of organizations. Chamberlain (1933), and Robinson (1933) also contributed to the theoretical foundations of the SCP model. The structure of an industry refers to its characteristics such as the number and size of firms, the degree of product differentiation, entry and exit barriers, and the level of concentration. The conduct of firms refers to their behavior, such as pricing strategies, advertising, and innovation. The performance of the industry refers to its economic outcomes, such as profitability, growth, and consumer welfare. According to this model, the market environment directly impacts the market structure, which in turn influences the firm's economic conduct and affects

its market performance. Additionally, external factors like legal or political interventions can affect the market framework and, consequently, the structure, conduct, and performance of the market.

The traditional SCP hypothesis suggests that banks can extract monopolistic rents in concentrated markets by offering lower deposit rates and charging higher loan rates. The relative-market-power (RMP) hypothesis further posits that only firms with large market shares and well-differentiated products can exercise market power in pricing these products and earn supernormal profits (Berger, 1995). Empirical evidence supports the SCP hypothesis in the case of Spanish banks for the period 1986-1988 (Lloyd-Williams et al., 1994). According to Yeats (1974), key finding is that a dichotomous relationship exists in the structure-performance relation in banking. Banks operating in markets above a critical level of concentration earn monopoly profits, while those in markets below the breakpoint earn competitive or near-competitive profits. Malyneoux (1999) the breakpoint earn competitive or near-competitive profits and his research on pooled country estimates indicates that collusive profits occur in the Belgian, French, Italian, Dutch, and Spanish banking markets over the period 1986-1989. However, collusive profits do not appear to accrue in non-EC banking markets. These findings suggest that market concentration and product differentiation play significant roles in the ability of firms to exercise market power and earn supernormal profits.

The SCP theory has been criticized for generalizing the complex interactions between industry structure, firm conduct, and industry performance. However, it remains a useful framework for understanding the dynamics of different industries and the role of competition in promoting economic efficiency and consumer welfare.

2.2.2 The Efficient-structure Theory

According to the Efficient Structure Theory (EST), industries and businesses will grow to obtain an ideal structure that maximizes efficiency and reduces costs. According to this hypothesis, the market will self-regulate and adapt to encourage competitiveness and reduce wasteful behaviors. Businesses and industries will create the most effective structure to boost earnings, reduce production costs, and preserve a competitive advantage. Mergers, acquisitions, and divestitures, as well as adjustments

to manufacturing processes, marketing plans, and resource allocation, may all be part of this ideal structure.

Market concentration may not accurately reflect market strength and may be biased in favor of larger companies. One solution to this problem is to directly include a metric of efficiency in the analysis. The Efficient Structure Hypothesis (EFS) requires a positive association between efficiency and either market concentration or market share. Numerous studies have looked at how efficiency affects the market structure, including those by Berger and Hannah (1992), and Goldberg and Rai (1996). To investigate the connection between market structure and business performance, Berger (1955b) has created models that incorporate the two efficiency indicators, X-efficiency, and scale-efficiency. X-efficiency refers to the ability of a firm to minimize its costs for a given level of output and depends on management or production technology. Scale-efficiency refers to the ability of a firm to exploit economies of scale by expanding its size and depends on the optimal scale of production.

This theory is also not free from critics. Many argue that the EST abbreviates the intricacy of real-world market conditions, such as imperfect information, externalities, and regulatory barriers. Additionally, there are discussions regarding the failure of the theory to account for the influence of power and politics in shaping industry structure and competition.

2.2.3 The Dynamic Theory of Profit

The dynamic theory of profit was formulated by Clark (1899). According to this theory, profit is not a static measure, but rather a dynamic and ongoing process of continuous innovation and improvement. This theory suggests that firms must constantly innovate and adapt to remain profitable in a competitive market. Since the dynamic nature of society makes the future uncertain and any act, the result of which has to come in the future involves risk. Thus, profit is the price of risk-taking and risk-bearing. In a static society where changes do not occur, the risk element disappears, and profits cease to exist. A society is dynamic when changes in population, trends, capital, and entrepreneurship occurred. Regular changes that can be anticipated do not result in profits, only unforeseen or unpredictable changes do. According to Clark (1899), certain changes are of a recurring and calculable nature. They can be

anticipated, and the output can be adjusted according to that. Profits arise from the divergence of actual conditions from those that were expected when business arrangements were made. Therefore, profits are not caused by dynamic changes or any changes as such, but rather by the unexpected or divergent conditions that arise from these changes.

2.2.4 Risk Bearing Theory of Profit

The risk-bearing theory of profit was originally developed by Frank H. Knight, and further discussed by Hawley (2019). According to this study, profit is a reward for risk-bearing. The main function of an entrepreneur is to bear risk. Production involves various kinds of risks and other emergency expenses. Nobody will bear risk unless there is an expectation of profit. Profit is the main motive for taking a risk. Thus, profit is the reward for taking a risk. Risk differs from industry to industry. Some productive activities are riskier, while others are less. The rate of profit is also different from industry to industry. Profit is the reward for taking a risk. The higher the risk, the higher the profit, and vice versa.

2.2.5 Uncertainty bearing theory of Profit

The theory of uncertainty bearing was developed by Fisher et al. (1921). According to this theory, profits are the reward for uncertainty bearing rather than risk-taking. He has divided the risk into insurable risks and non-insurable risks. Non-insurable risk is also known as uncertainty. Risks whose statistical probability can always be computed like the risk of fire, theft, and accident are known as insurable risks. These risks can be insured, and the entrepreneur can reduce such risks. No entrepreneur fears this type of risk because such risk can be transferred to an insurance agency by paying a suitable premium. A risk, which is neither definite nor foreseen, is called a non-insurable or uncertainty risk. It cannot be guarded against because no insurance company can afford insurance against such uncertainties. Its statistical probability also cannot be computed. Non-insurable risk arises due to business cycles, technological changes, unhealthy competition among business firms, changes in government policy, etc. According to this theory, the main function of the organization is to bear such non-insurable risks or uncertainties, and profit is the reward for bearing such risks.

2.2.6 Monopoly theory of profit

This theory was established by Kalecki, (1942), and he said that there is no doubt that profits arise from dynamic changes, innovations, and from making a correct estimate of future economic conditions. However, in his point of view, monopoly, and monopolistic competition in the market also give rise to profits. Firms under monopoly or monopolistic competition have greater control over the price of the product. They are the price-makers rather than the price-takers. As such, they raise prices by restricting the level of output and thus keep profit at a higher level. Monopoly power, thus, is the basic source of business profits. Nevertheless, this theory is also criticized because monopoly is no doubt an important cause and source of monopoly profits, but it does not replace other theories. Monopoly power only supplements other theories.

2.3 Review of Related Researches

1. A journal article by **Mishra (2018)** titled “*Impact of Performance on Profitability of Small Hydropower Projects in Nepal*” stated that performance of any construction project refers to attainments of its construction within specified time and cost with maintaining safety and quality. He assessed the impact of performance on profitability of small hydropower projects in Nepal. Two projects namely, *Upper Hugdi Khola Hydropower Project* and *Bijaypur Khola Hydropower Project* were considered for detail cost performance, schedule performance and profitability analysis. Time management, cost and safety in construction enhance the performance of the construction and increase the profitability of the project.

He claimed that on keeping the project functions constant, time and cost are the performance measures of hydropower construction. For ensuring the profitability, it is most to ensure performance. The research to endorse the performance evaluation of the hydropower construction and its effect on the project to set the benchmark for the performance related issues. Due to availability of very few researches in the area, the research is highly demanded.

He concluded that the performance management enhances the profitability of project; however other factor such as social issues as well as internal management plays the vital role in overall profitability of the company. Even though, Upper

Hugdi Hydropower Project had completed on time and less than estimated cost but the financial indicators of the projects has been decreasing because of other external factors. The IRR of the project had decreased from 15.18 percent to 13.42 percent. The construction organization should incorporate the identified factors in practice for enhancing the performance to increase the profitability.

Based on his study he recommended that the performance problem is costly and often result in disputes, claims and affect the development of the construction industry. The construction organizations must have a clear mission and vision to formulate, implement and evaluate performance. The environment of construction organizations should be proper to implement projects with successful performance. It is important for construction organizations to identify the weaknesses of performance in order to solve and overcome.

2. **Bhandari and Nakarmi (2016)** conducted a study financial performance analysis of commercial banks of Nepal using Analytic Hierarchy Process titled “*A Financial Performance Evaluation of Commercial Banks in Nepal Using AHP Model*”.

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

Averages of four-year ratios from 2008/09 to 2011/12 were evaluated to assess the financial performance of the commercial banks in Nepal. Thirteen commercial banks were selected for the analysis in this study. The financial ratios used to assess bank performance were taken based on the AHP framework in which hierarchical criteria were determined based on CAEL (Capital Adequacy, Asset Quality, Efficiency and Liquidity). Out of the banks selected, 3 were public banks; Agriculture Development Bank Limited, Nepal Bank Limited and Rastriya Banijya Bank Limited. The following banks were selected from the private list of banks: Citizen Bank, Everest Bank Ltd, Himalayan Bank Ltd, KIST Bank, NABIL Bank Ltd, Nepal Investment Bank Ltd, NMB Bank, Prime Bank, Standard Chartered Bank Ltd and Sunrise Bank.

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

3. Another research titled “*Profitability in Commercial Bank – A Case from Nepal*” by **Mishra et al. (2021)** conducted a study on seven commercial banks namely, Nabil Bank Limited (NABIL), Everest Bank Limited (EBL), NIC Asia Bank Limited (NICA), Nepal Investment Bank Limited (NIBL), Himalayan Bank Limited (HBL), Nepal SBI Bank Limited (NSBI) and, Siddhartha Bank Limited

(SBL) to assess the impact, contribution and relationship of size, loans and deposit, inflation and capital on the profitability of those banks. The variable used in the study such as bank size, loan ratio, deposit ratio, capital ratio and inflation, ROA, ROE and NIM are all calculated on ratio. The researchers performed analysis to explain the relationship among these variables of 7 samples of commercial banks during the period 2013 through 2019.

The research assessed that the size of banks is in increasing trend. The decreasing trend of standard deviation showed that the size of Nepalese commercial banks has lower variation in the use of total assets as the year increases. The study also found that here is a negative relation between ROA and ROE with loan ratio, deposit ratio and capital ratio, while there is positive relation with bank size and inflation. However, in case of NIM, bank size, loan ratio, deposit ratio and inflation exhibit a positive relation while the capital ratio shows the negative relationship with NIM. Majority of the respondents feel that the publication of financial reports is one of the major influencing factors of bank profitability.

The study has drawn the following conclusions:

- Bank profitability has strong positive relation with loan ratio and deposit ratio. Hence, Nepalese commercial banks have to pay special attention for the efficient and effective utilization of assets to increase profits and bank value.
- Deposit has positive and significant relation with bank profitability in terms of total deposits to total assets. So, the Nepalese banks should examine the deposit ratio and should try to increase the size of deposits of the banks to improve bank performance.
- The survey results indicated the most priority of banks for its investment/lending is hydropower sector with the overall rank of first and accordingly manufacturing and processing, trading, insurance and hotel sectors have the second, third, fourth and fifth important priority sectors for investment/lending of Nepalese banks respectively.

This study has assumed linear relationship between bank profitability and explanatory variables. In emerging markets, it is expected that there exists non-linearity. The future Studies are should be conducted to test predictive power of explanatory variables.

4. **Subedi (2008)** conducted a study titled "Fund Management of Hydropower Companies (With Special Reference to Chilime Hydropower Company Limited, Butwal Power Company Limited, and National Hydropower Company Ltd)". His focus was on the fund management of these organizations, examining different ratios over a five-year period. He made use of these companies' profit and loss statements and balance sheets as secondary data.

Subedi has drawn following recommendations:

- The hydropower companies CHCL and NHPL have extremely low liquidity positions due to their below-average quick and current ratios. When their creditors make demands, the two hydroelectric businesses are unable to satisfy their short-term obligations. It can lead to challenging circumstances later on. Therefore, in order to preserve their liquidity position, both hydropower 55 enterprises need have an adequate level of current and fast assets.
- NHPL's profitability position was worse than CHCL's and BPCL's. By allocating more of its funds to returnable assets, it should increase overall efficiency. i.e., hazardous area using appropriate risk analysis methods.
- NHPL's ability to service its debt seemed inadequate. So, it is preferable to use its capital and revolving money to look for more lucrative assets. Compared to CHCL, NHPL appears to have a less favorable capital adequacy situation. It must therefore increase net worth.
- Because of the high cost of bearing outsiders' funds, or borrowed capital, NHPL's earnings were unable to rise proportionately. Consequently, it is advised that NHPL reduce its loan capital and boost its equity funding.

5. In another study, **Dahal (2007)** conducted a comparative analysis between NEA and BPC, titled "Cost –Volume Profit Analysis of Public Enterprises and Private Company Ltd." His concerns were the Butwal Power Company Limited and NEA's cost and profit analyses. He made advantage of secondary data from their companies' annual reports. Based on above findings, Dahal has concluded that:

- The majority of businesses in Nepal don't use CVP analysis in a methodical way. Therefore, it is advised that CVP analysis be used or practiced by every business.

- CVP analysis displays the correlation between cost, revenue, and profit-related factors. Analyzing the connections between these factors aids in enhancing the state of the company. Therefore, every organization needs this instrument.
 - Despite having large pools of knowledgeable and competent personnel, BPC and NEA have disregarded CVP analysis. They haven't divided up different kinds of expenses into fixed and variable categories. Categorizing expenses is crucial for cost containment.
 - Neither company's cost strategy is kept up to date in a methodical manner. Thus, each sector's costs should be carefully planned. In these businesses, a cost control programme must be established. It will continue to enforce cost-control discipline.
 - NEA is operating in monopoly situation, strength, weakness, threats, and opportunity should properly analyze to gain future opportunities.
 - Although both businesses' sales revenue is trending upward, it is insufficient to pay expenses and turn a profit. NEA's variable costs are extremely high and must be lowered in order to turn a profit in the future. To take advantage of market opportunities, these businesses' sales plans need to be clearly maintained and improved.
 - BPC and NEA should consider BEP analysis while preparing sales plan, production plan, and setting price of its products.
6. According to the "Financial Performance Analysis of Butwal Power Company" **Khatiwada (2007)** ratio analysis, income and expenditure analysis, and least square trend analysis are used to assess the financial strengths and weaknesses of BPC. The analysis shows that all other ratios, with the exception of the capital employed and total assets turnover ratios, are satisfactory and show strong financial performance for BPC. It also shows that operating income and operating expenses are trending downward, yet the company has strong sustaining power because the income is adequately diversified. The statistical analysis shows that during the Period, the company's sales have increased but its operating income has decreased.

The study's complaint is that the business has a sizable amount of current assets that are underutilized and is unable to take advantage of lower borrowing costs. Mr. Khatiwada has suggested improving BPC's capital structure and making effective use of all of its assets.

7. In a study titled "Market Efficiency and the Investors," **Tamang (2007)** sought to determine "The efficiency or NEPSE and the effect of Nepalese investor" behavior on the level or efficiency of NEPSE. The results indicated that NEPSE is inefficient with regard to any or all so-called levels of efficiency. The low level of information processing in NEPSE may be attributed to the continued presence of a sizable number of shares that are not regularly traded.

Furthermore, NEPSE behavior demonstrates the basis for price responsiveness to information. Prices can be unjustly high at one point and unjustly low later on. It implies that information is not the only factor influencing prices; other likely causes include irrational investor behavior, unfair business tactics, or market middlemen. Speculators' manipulative actions, listed firms' delayed disclosure of information, and other factors provide proof of market inefficiencies.

Based on the NEPSE index for the whole market composite and the banking sector index for the study period, the analysis assesses market efficiency using randomness analysis or daily market return through the use of auto-correlation and run test models. The run test and autocorrelation have identified a substantial association in the market return series. It indicates that prices or stock returns are trending in a predictable way. Consequently, an active investor who has access to previous stock price data can easily outperform a sample buy and hold approach.

2.4 Research Gap

Financial performance analysis using firm-specific variables such as *profitability*, *liquidity*, *return on assets*, *return on debts*, *earning per share*, *firm age* and *firm size* has been an established area of study and the literature shows the application of financial ratios in determining the financial soundness of a company in different jurisdictions and countries. The majority of studies have been conducted in the developed market with the availability of large datasets. However, in the context of

the Nepalese hydropower sector, extensive financial performance analysis is required to assure and attract stakeholders for the investment.

The Nepalese hydropower sector is relatively immature and most of the hydropower companies are recently listed on the Nepal Stock Exchange. Most of these companies have very short operational history and many of them are still to start their operation. Therefore, this study conducts a financial performance analysis to evaluate the profitability and financial positions of a company and help investors, lenders, suppliers, and managers to make intelligent investment decisions.

Firm-specific variables highlight the factors associated with successful and unsuccessful companies. They also reveal the attractiveness and unattractiveness of the company in the industry, and also the over-valued and under-valued companies. Different firm-specific variables that have an impact on the financial performance of hydropower companies are investigated in this study. Investigation and analysis of various financial factors such as liquidity and leverage of companies and non-financial factors such as size and age of the companies helps to provide insight into the profitability of the hydropower companies in Nepal and how each of these factors impacts the financial performance of hydropower companies.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Research Design

In order to determine the effects of non-financial characteristics like size and age and financial factors like liquidity and leverage on the profitability of hydropower businesses in Nepal, this study has used a descriptive and causal comparative research approach. The nature of variables is investigated using descriptive study designs and descriptive metrics including mean, standard deviation, minimum and maximum values. In addition to providing an overview of the data variables and average values, descriptive statistics also provides light on the variables' variability. Additionally, correlation analysis is utilized to assess the degree and direction of the association between the variables under consideration.

The link between dependent and independent variables is investigated using correlation analysis. The causal relationship between the dependent and explanatory variables is evaluated and examined using regression analysis. The regression analysis estimates the value of the dependent variable based on the values of the independent variables and helps determine how much each independent variable contributes to the variance in the dependent variable. It also helps determine the strength and direction of those correlations.

Pearson correlation analysis is used to examine the relationship between the profitability of hydropower and its liquidity, leverage, size, and age. The regression line is assessed using the ordinary least square (OLS) regression model, which is also used to look at the effects of size, age, liquidity, and leverage on hydropower profitability.

3.2 Population and Sampling

Eighty-two companies that are listed on the NEPSE is taken into account as the population in this study. The majority of these listed hydropower companies lack historical data because they are primarily recent listings. Thus, a sample of two companies is chosen from the entire population. The financial accounts of five chosen companies—CHCL and API—from the fiscal years 2074/75 to 2078/79 has served as the basis for this analytical analysis of financial performance. The time frame for the five mentioned companies is 5 years for this study.

3.3 Nature and Sources of Data

The published financial accounts of CHCL, and API from the fiscal years 2074/75 to 2078/79 serve as the primary sources of data for this analysis. Thus, secondary data serve as the study's primary source. The balance sheet, profit and loss account statement, notes to account, and cash flow statement make up the majority of the annual reports. Since secondary data is easily obtainable from a trustworthy source, using it is advantageous as it lowers the expense and time needed for data collection. Additional information has been added from a number of NEA publications.

3.4 Instrument of Data Collection

For this research secondary data collection methods are used. The secondary data is gathered from the National Planning Commission report, Api Power Company Limited and Chilime Hydropower Company Limited's public accounting accounts, and the Nepal Electricity Authority.

3.5 Research Framework

The conceptual research framework developed to analyze the relationship between the defined dependent and independent variables is shown in Figure 3.1.

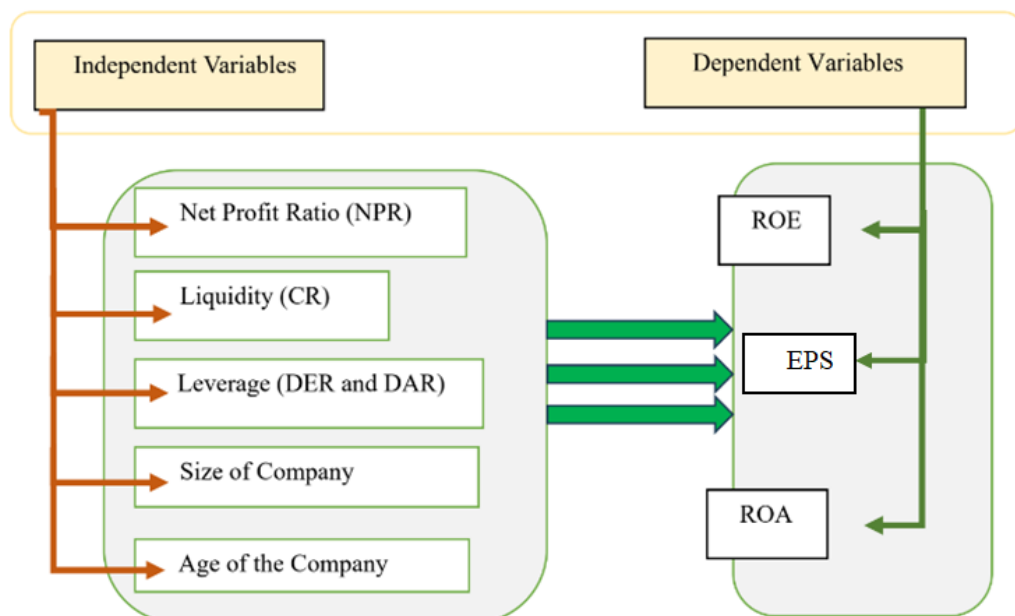


Figure 3.1: Theoretic Research Framework

Figure 3.1 shows EPS, ROE and ROA as dependent variables reflecting the financial performance of the hydropower companies in Nepal.

3.6 Definition of Variables

Financial indicators like earning per share (EPS), return on equity (ROE) and return on assets (ROA) show how profitable hydroelectric companies are. In this study, EPS, ROE and ROA are regarded as dependent variables. Independent variables include those that are specific to a given company, like net profit ratio (NPR), liquidity measures like current ratio (CR), leverage ratios like debt-to-equity ratio (DER) and debt to asset ratio (DAR), and non-financial characteristics like the size and age of the businesses. By dividing a company's net income by its net sales, this ratio is computed. It calculates the portion of each transaction that is kept after all costs, such as interest and taxes, have been paid. This ratio shows the company's overall profitability. Characteristic variables of the hydropower companies used in analysis are:

3.6.1 Size of the hydropower companies

To examine the impact of size on the financial performance of the hydropower companies, the size of the companies must be quantified. The total assets of the hydroelectric firm serve as a proxy for its size in this study. The natural logarithm of the total assets is calculated to determine the company's size for the regression analysis.

$$\text{SIZE} = \ln (\text{Total Assets})$$

3.6.2 Age of the hydropower companies

To examine the impact of age on the financial performance of the hydropower firms, the age of the companies should also be quantified. The natural logarithm of the number of years since the hydropower company was founded is used in this study to represent the age of the firm for regression analysis.

$$\text{AGE} = \ln (\text{No. of years since the establishment of the company})$$

3.7 Methods of Analysis

The analysis of secondary data is done in two procedures; one is the descriptive analysis using Financial Tools and other is the use of statistical analysis to present the relationship among variables.

3.7.1 Financial Tools

The following ratios are used for evaluating the performance of selected sample companies:

3.7.1.1 Liquidity Ratios

This ratio measures the firm's ability to satisfy its short-term commitments out of current or liquid assets. These ratios focus on current assets and liabilities and were used to ascertain the short-term solvency position of a firm. The two primary test of liquidity are current ratio and net profit ratio.

1. Current Ratio (CR)

The ability of a business to satisfy its short-term obligations and maintain overall liquidity is assessed using the current ratio. A high current ratio shows that a business is well-positioned financially and can use its liquid assets to settle its debts.

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Current assets include cash and those assets that can be converted into cash within a year. This study accumulates stock, current work in progress, debtors and receivable cash and advance and deposit to produce the current assets. Similarly, creditors and payables, provisions, advances and deposit have been pulled together to produce current liabilities.

- If Current ratio < 2.1 (The company is not good in solvency)
- If Current Ratio = 2.1 (The company is in adequate condition in solvency)
- If Current Ratio > 2.1 (The company may have an excessive investment in current assets)

2. Net Profit Ratio (NPR)

This ratio is calculated by dividing a company's net income by its net sales. It measures the percentage of each sale that is retained after all expenses, including taxes and interest, have been deducted. This ratio indicates the overall profitability of the company.

$$\text{Net Profit Ratio} = \frac{\text{Net Profit After Tax}}{\text{Revenue}} \times 100\%$$

3.7.1.2 Leverage Ratio

Leverage ratio assesses a company's capacity to pay its long-term debts. These statistics are crucial because they tell creditors and investors about the company's long-term viability and capacity to weather financial setbacks. Whereas a low leverage ratio suggests that the company might find it difficult to satisfy its long-term financial obligations, a high leverage ratio shows that the corporation has a strong ability to do so. The debt-to-equity ratio, debt-to-assets ratio, and interest coverage ratio are a few typical measures of solvency.

a. Debt to Equity Ratio (DER)

The debt-to-equity ratio is computed to determine the company's liabilities to creditors based on the money that the owners have invested. By dividing a company's total debt and liabilities by the equity held by its shareholders, this ratio is computed. It gauges how much a business depends on debt to fund its operations; a high debt-to-equity ratio suggests that the business is heavily indebted.

$$\text{Debit to Equity Ratio} = \frac{\text{Total Debts}}{\text{Shareholder's Equity}}$$

b. Debt to Assets Ratio (DAR)

The debt-to-asset ratio may be calculated by dividing a company's total debt by the value of all of its assets. It measures the proportion of debt that finances an organization's assets; a high debt-to-assets ratio indicates that the company is highly indebted.

$$\text{Debit to Asset Ratio} = \frac{\text{Total Debts}}{\text{Total Assets}}$$

3.7.1.3 Profitability Ratio

Profitability is the end of result of a number of corporate policies and decision. It measures how effectively the firm is being operated and managed. Besides owners and managers, creditors are also interested to know the financial soundness of the firm. Owners are eager to know their returns where as manager are interested in their operating efficiency. So they calculate profitability ratios because expectations of both owners and managers are evaluated in terms of profit earned by the firm. Following are the major ratios used to measure the profitability of a firm:

a. Return on Equity (ROE)

ROE shows how well a business can pay for all of its operational costs. The net income of a business is divided by the equity held by its shareholders to get this ratio. It calculates the return on investors' capital and assesses how well the management team at the business generates profits.

$$\text{Return on Equity (ROE)} = \frac{\text{Net Profit after Tax}}{\text{Shareholder's Equity}}$$

b. Return on Assets (ROA)

ROA measures the profitability of the firm in terms of assets employed in the firm.

$$\text{Return on Assets (ROA)} = \frac{\text{Net Profit after Tax} + \text{Interest}}{\text{Total Assets}}$$

3.7.1.4 Earnings Per Share (EPS)

This ratio is calculated dividing net profit after taxes (EAT) by number of equity share outstanding. The profitability of a company from the point of view of ordinary shareholders is the earning per share. EPS calculations made over years indicate whether or not the company's earnings power on per share has changed over that period. EPS shows the amount earning attributes to each equity share. If earning per share is high market price of the share may be increased in the market and vice versa. High ratio shows the sound profitability position of the components.

$$\text{Earning Per Shares} = \frac{\text{Net profit After Tax}}{\text{Number of Shares Outstanding}}$$

3.7.2 Statistical Tools

Statistical tools present the relationship among certain variables based on past trend and help predict future values of one or more variable given the change in other associated variables. These tools are useful to researcher in order to draw liable financial consumptions from data available.

The data analysis in this study is done using *F-test, and Adjusted R²*, in addition to statistical tools like *minimum value, maximum value, mean, standard deviation, correlation analysis, and regression analysis*. An understanding of the nature and variability of the dependent and independent variables can be gained from the *mean, standard deviation, minimum, and maximum values*. The link between the independent and dependent variables is provided by the correlation analysis.

The following statistical tools are used in this study for evaluating the performance of selected companies:

3.7.2.1 Arithmetic Mean

Arithmetic Mean (AM) is the most commonly used of all the average. This is due to the simplicity of its calculation and other advantage. It is used to calculate the average value of quantitative data closed end class intervals and when the distribution does not have very large and very small items. It is also used to obtained average value of distribution having closed ended class intervals and having non-extreme items.

Arithmetic Mean of given set of observation is their sum divided by the number of observations. In general, if $X_1, X_2, X_3, \dots, X_N$ are the given observations and N being number of observations, then arithmetic means usually denoted by:

$$\bar{X} = \frac{X_1 + X_2 + X_3 \dots \dots + X_N}{N} = \frac{\Sigma X}{N}$$

3.7.2.2 Coefficient of Variation

It is the method which calculates risk. It is the standardized measure of the risk per unit of return. It is the percentage variance in the mean. Standard deviation being considered as the total variation in the mean. It is one of the relative measures of dispersion that is useful in comparing the amount of variation in data group with different mean. Coefficient of variation, denoted by CV is given by:

$$CV = \frac{\sigma}{\bar{X}} \times 100\%$$

$$\text{where, } \sigma = \sqrt{\frac{\sum X^2}{n} - \left(\frac{\sum X}{n}\right)^2}$$

Comparing the variability of two distributions we compute the coefficient of variation for each distribution. A distribution with smaller CV is said to be more homogenous or uniform or less variable than other.

3.7.2.3 Correlation Analysis (r)

It is a statistical tool for measuring the intensity of the magnitude of linear relationship between two series. Karl Pearson's correlation coefficient measures the degree of linear association between two variables. Let X and Y are two variables. Karl Pearson's correlation coefficient between X and Y is generally denoted by r_{xy} or simply by r only. It is also called product moment correlation coefficient or simple coefficient or simply a correlation. It is defined 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 = Number of observations

$\sum X$ = Sum of observation in series

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

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

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

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

Values of r lies between -1 and +1, $r=1$ implies that there is a perfect correlation between the variables. The variables are said to be perfectly negatively correlated if $r=-1$ and perfectly positively correlated if $r = +1$. If $r= 0$, the variables are not correlated at all except other than in form of logarithm, quadratic or exponential.

3.7.2.4 Regression Analysis (adjusted - R^2)

Regression analysis reveals the impact of many independent variables on the dependent variable and pinpoints the variables that have a major impact on a firm's

financial performance. The goodness of fit and statistical significance of the regression model used for analysis are assessed using adjusted *R-squared* and the *F-test*. The firm-specific characteristics of the hydropower businesses are determined using pertinent data gathered from financial statements of several fiscal years of selected hydropower in Nepal. A financial tool called ratio analysis is used to determine the hydropower firms' profitability, leverage ratio, and liquidity ratio.

The multiple regression model is used to investigate how a dependent variable is predicted by a linear combination of the independent variables. The relationship between the dependent variable and the independent variables is typically represented by an equation in the form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \epsilon_r$$

where, Y is the dependent variable, X_1, X_2, \dots, X_k are the independent variables, β_0 is the intercept, $\beta_1, \beta_2, \dots, \beta_k$ are the coefficient of the independent variables, and ϵ_r is the error term.

The following multiple regression models are used to examine the impact of the independent variables on EPS, ROE and ROA of hydropower companies in Nepal.

$$ROE = \beta_0 + \beta_1 NPR + \beta_2 CR + \beta_3 DER + \beta_4 DAR + \beta_5 SIZE + \beta_6 AGE + \epsilon_r$$

$$ROA = \beta_0 + \beta_1 NPR + \beta_2 CR + \beta_3 DER + \beta_4 DAR + \beta_5 SIZE + \beta_6 AGE + \epsilon_r$$

$$EPS = \beta_0 + \beta_1 NPR + \beta_2 CR + \beta_3 DER + \beta_4 DAR + \beta_5 SIZE + \beta_6 AGE + \epsilon_r$$

where, β_0 is the coefficient of constant,

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the coefficient of the independent variables,

$NPR, CR, DER, DAR, SIZE, AGE$ are the independent variables, and

ϵ_r is the error term.

3.7.2.5 t-test

A t-test (also known as Student's t-test) is a tool for evaluating the means of one or two populations using hypothesis testing. A t-test may be used to evaluate whether a single group differs from a known value (a one-sample t-test), whether two groups

differ from each other (an independent two-sample t-test), or whether there is a significant difference in paired measurements (a paired, or dependent samples t-test).

While t-tests are relatively robust to deviations from assumptions, t-tests do assume that:

1. The data are continuous.
2. The sample data have been randomly sampled from a population.
3. There is homogeneity of variance (i.e., the variability of the data in each group is similar).
4. The distribution is approximately normal.

**The P-value is the probability that we would have found the current result if the correlation coefficient were in fact zero (null hypothesis). If this probability is lower than the conventional 5% ($P < 0.05$) the correlation coefficient is called statistically significant.

- a. For **correlation**, the hypotheses are:

H₀: There is no correlation (linear relationship) between dependent variable(y) and independent variables(x).

H₁: There is a significant correlation (linear relationship) between x and y.

If the P-value is smaller than the significance level ($\alpha = 0.05$), we REJECT the null hypothesis in favor of the alternative. We conclude that the correlation is statically significant. or in simple words “we conclude that there is a linear relationship between x and y in the population at the α level”. In other words, if the P value is 0.05, the null hypothesis has a 5% chance of being true, so we have to accept alternate hypothesis.

- b. For **regression**, the hypotheses are:

H₀: There is no predictive relationship between the $x[i]$ variables and $y[i]$ in the population or, that the regression coefficient for the independent variables $x[i]$ is zero.

H₁: The regression coefficient for the independent variables $x[i]$ is not zero.

If the p-value is more than 0.05, then the result is not significant. If the p-value is less than 0.05, then the result is significant. If $p < 0.01$, then it is highly significant, and so forth.

3.7.2.6 F-test

F-test in statistics helps to decide whether two populations' variances are equal. This is the variance ratio test because it calculates the ratio of variances. The goal of the test is to determine whether the variance in two populations is equal. It was propounded by British polymath R.A. Fisher and named to honor him. G.W. Snedecor later developed the test. Formula:

1. Sample variances: The formula for calculating sample variances is as follows (an online F-test calculator can make it easier):

$$S_1^2 = \frac{\sum (x_1 - \bar{x}_1)^2}{n_1 - 1}$$

$$S_2^2 = \frac{\sum (x_2 - \bar{x}_2)^2}{n_2 - 1}$$

2. Null hypothesis: After the formation of the test, the null hypothesis is either:
 - a. Two samples were from the same group or
 - b. The population's variances concerning both samples are equal.
3. To compute the variance ratio, use the formula $F = \text{larger estimate divided by a smaller estimate of variance}$. Regardless of whether S_1^2 or S_2^2 , the numerator will always be the larger value.
4. When calculating degrees of freedom, the larger the sample's variance is V_1 ; the smaller variance is V_2 .
5. **Table value of F:** the critical value of F is available from the "F-Table" (F-test table) at the determined significance level.
6. **Analysis:** This involves the comparison of the computed value and the tabulated value. For various levels of significance, there are several F Tables (F-test tables).
 - a. The variance ratio is insignificant if $p\text{-value} \leq 0.05$. We can assume that the values are from the same group or groups with similar variances.
 - b. The null hypothesis is rejected, and the variance ratio is considered significant if $p\text{-value} \geq 0.5$.

The *correlation, regression, t-tests and F-tests* are assessed using *Microsoft Excel and JASP version 0.18.2 software* a freeware statistics tool. The findings are then further examined and analyzed in order to draw conclusions.

CHAPTER 4: RESULTS AND DISCUSSION

This section presents and analyzes the data associated with the financial report of selected hydropower companies in Nepal. Firm-specific variables are calculated to reflect the financial standing of different hydropower companies. Furthermore, the relationship between firm-specific variables and the profitability of the hydropower companies is examined with correlation analysis. The impact of firm-specific variables on the EPS, ROE and ROA of the hydropower companies are investigated using various financial and statistical tools such as descriptive statistics, correlation analysis, and regression analysis.

4.1 Results and Major Findings

The firm-specific variables are used to conduct a comparative study between five different listed hydropower companies in Nepal. Financial ratios are calculated using data from the annual financial report and are presented in Table 4.1 to Table 4.6.

4.1.1 Liquidity Ratios

4.1.1.1 Current Ratio (CR)

The current ratio is a liquidity ratio that measures a company's ability to pay off its short-term obligations using its current assets. A higher current ratio indicates that a company has sufficient current assets to cover its current liabilities, while a lower current ratio suggests that a company may face difficulty in paying off its short-term obligations. The standard current ratio should be 2:1 and it is also defined by the nature of the company.

Table 4.1: Table showing Current Ratio calculation for API and CHCL.

Fiscal Year	Current Assets		Current Liabilities		Current Ratio	
	API	CHCL	API	CHCL	API	CHCL
2074/75	117,981,497	6,025,101,105	480,478,811	586,363,250	0.25	10.28
2075/76	93,653,195	6,035,712,004	411,373,510	1,048,871,954	0.23	5.75
2076/77	150,649,471	4,565,763,798	450,052,444	1,550,893,617	0.33	2.94
2077/78	1,577,761,402	4,140,348,885	465,696,973	2,275,626,123	3.39	1.82
2078/79	1,891,022,563	4,497,597,842	621,073,393	2,167,923,231	3.04	2.07
Mean (\bar{x})					1.45	4.57
Standard Deviation (σ)					1.62	3.55
Coefficient of Variance (CV)					111.81%	77.61%

Sources: Annual Financial Reports of API and CHCL (F.Y. 2074/75 – 2078/79)

Table 4.1 shows that API has the highest average current ratio of 1.45 times, followed by CHCL with an average current ratio of 4.57 times. CHCL has high current ratio compared to API, indicating that CHCL have more current assets to meet their short-term obligations. This suggests that CHCL may have a better liquidity position compared to API. Although this may seem like a positive indication of the company's liquidity, the high coefficient of variation (CV) of 111.81% indicates a high degree of variability in API's current ratio over the years. This suggests that API's liquidity position may not be consistent and may vary significantly from year to year.

It is important to note that the current ratio is only one aspect of a company's financial health, and other financial ratios and factors, such as profitability, debt levels, and cash flows, must be considered to gain a more comprehensive understanding of a company's financial performance. Therefore, while the current ratio provides important information about a company's liquidity position, it should be evaluated in conjunction with other financial metrics to make informed investment decisions.

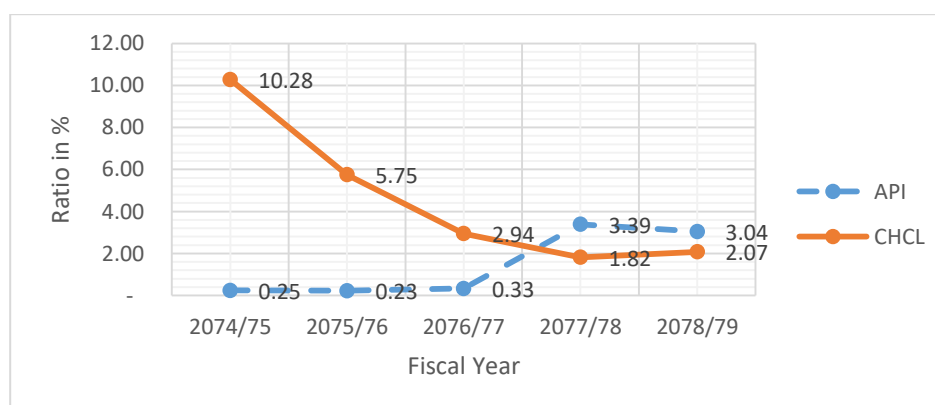


Figure 4.1: Graph showing Current Ratio of API and CHCL.

In graphical presentation of current ratio shows that the current ratios of API have more fluctuate since F/Y 2076/77 to 2078/79. It has drastically increased in F/Y 2077/78 and slightly decreases in F/Y 2078/79. In contract, the current ratio of CHCL has been in decreasing trend since 2074/75 to 2077/78 & slightly increases in F.Y.2078/79.

4.1.1.2 Net Profit Ratio

The Net Profit Ratio (NPR) establishes the relationship between net profit and sales. The ratio of net profit to sales shows the profitability of corporations indicating that only an increase in sales does not mean anything unless it commands profit.

Table 4.2: Table showing Net Profit Ratio calculation for API and CHCL.

Fiscal Year	Net Profit after Tax		Revenue		Net Profit Ratio	
	API	CHCL	API	CHCL	API	CHCL
2074/75	57,744,391	895,661,653	127,829,031	1,138,432,864	45.17%	78.67%
2075/76	71,034,764	788,747,187	178,740,059	1,170,432,144	39.74%	67.39%
2076/77	108,966,003	586,699,774	324,437,259	1,140,739,306	33.59%	51.43%
2077/78	113,227,234	585,126,043	367,288,448	1,247,027,519	30.83%	46.92%
2078/79	106,142,234	632,306,671	518,521,323	1,303,020,178	20.47%	48.53%
Mean (\bar{x})					34%	59%
Standard Deviation (σ)					9%	14%
Coefficient of Variance (CV)					27.59%	23.67%

Sources: Annual Financial Reports of API and CHCL (F.Y. 2074/75 – 2078/79)

Table 4.2 shows the net profit ratio (%) for two companies in the hydropower industry over the past five fiscal years. First, we observe that the net profit ratio for each company varies widely from year to year. API had a net profit ratio in a decreasing trend. CHCL has also net profit in a decreasing trend up to 2077/78 however it slightly increases in 2078/79. To get a better understanding of the overall performance of the companies, we can look at the mean and standard deviation of the net profit ratios. On average, the API had an average net profit ratio of 34%, with a standard deviation of 9%. However, CHCL has an average net profit ratio of 59%, with a standard deviation of 14%. This means that the net profit ratios for the API were, on average, within one standard deviation of the mean. However, the coefficient of variation is high compared to CHCL indicating high variability in their net profit ratios compared to their mean. This suggests that the company is more volatile, and its net profit ratios are more sensitive to changes in the industry or other external factors. In conclusion, while the hydropower industry has shown overall profitability over the past five years, the net profit ratios of individual companies have varied widely, and some companies have been more volatile than others. Investors and stakeholders should consider the high variability in net profit ratios when making investment decisions. The NPR of CHCL is preferable since it has the lowest CV of 23.67 percent.

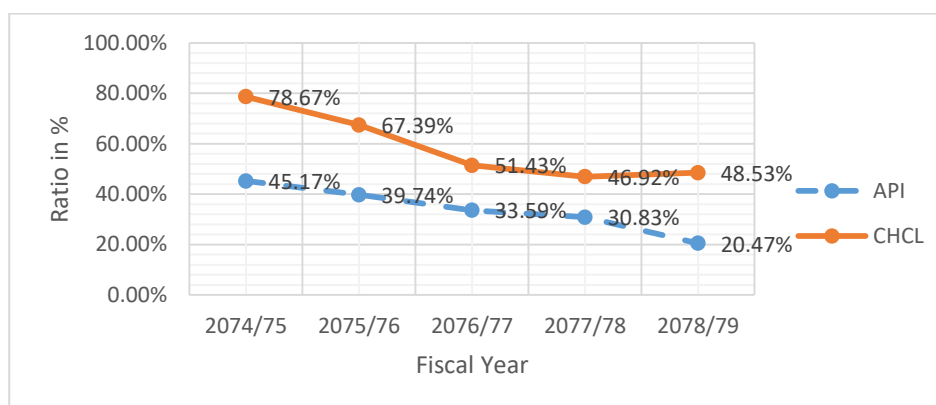


Figure 4.2: Graph showing Net Profit Ratio of API and CHCL.

In graphical presentation of net profit ratio shows that the net profit ratios of CHCL have consistently decreased since F/Y 2074/75 to 2078/79. API also follows the same trend but in 078/79 it has increased slightly to 48.53% from 46.92%. Overall net profit ratios for both the companies have decreased over time.

4.1.2 Leverage Ratio

4.1.2.1 Debt to Equity Ratio (DER)

The debt-to-equity ratio measures the proportion of debt and equity financing used by a company to finance its assets. A higher debt-to-equity ratio indicates that the company is using more debt financing as compared to equity financing, which can be risky as it can lead to financial instability in case of any adverse economic conditions.

Table 4.3: Table showing DER calculation for API and CHCL.

Fiscal Year	Total Debts		Shareholder's Equity		Debt to Equity Ratio	
	API	CHCL	API	CHCL	API	CHCL
2074/75	1,685,309,469	8,447,210,799	1,195,243,256	8,719,939,147	1.41	0.97
2075/76	1,926,100,825	9,684,222,614	1,264,931,057	9,194,314,559	1.52	1.05
2076/77	1,976,139,047	15,134,503,659	1,373,590,532	9,805,827,908	1.44	1.54
2077/78	3,051,045,788	19,291,350,284	2,809,083,584	9,866,580,098	1.09	1.96
2078/79	4,766,423,271	24,237,695,444	4,188,211,413	10,100,996,670	1.14	2.40
Mean (\bar{x})					1.32	1.58
Standard Deviation (σ)					0.19	0.61
Coefficient of Variance (CV)					14.73%	38.20%

Sources: Annual Financial Reports of API and CHCL (F.Y. 2074/75 – 2078/79)

Table 4.3 reveals that the debt-to-equity ratios of the two hydropower companies have varied widely over the past five years, with significant fluctuations in some cases. Among these companies, CHCL has had the highest debt-to-equity ratio over the past five years, with a mean of 1.58 and a CV of 38.2%. This indicates that CHCL has been relying heavily on debt financing to fund its operations. API has lesser debt-to-equity ratio over the past five years, with a mean of 1.38 and a CV of 14.73%. This is a good DER value indicating that API has been relying more on debt and equity financing equally and has a relatively lower level of debt compared to the other company. The coefficient of variation for CHCL is the highest indicating volatility over the past five years. In summary, the given data suggests that the debt-to-equity ratio varies widely among the two hydropower companies, with CHCL relying more heavily on debt financing than API. This shows that hydropower companies are capital-intensive projects where most of the funds are taken as loans from financial institutions, hence they have a high debt-to- equity ratio.

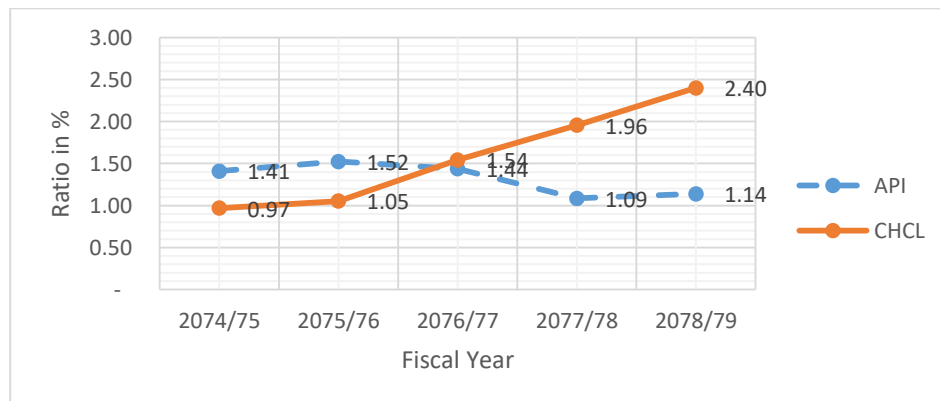


Figure 4.3: Graph showing Debt to Equity Ratio of API and CHCL.

The graph shows the trend of DER value over the year. It can be observed that the DER has been increasing for CHCL indicating more reliance on debts for operation funding. The DER for API has slightly fluctuating trend but overall, in level line. It has a balanced reliance on debt and equity to fund its operation.

4.1.2.2 Debt to Assets Ratio (DAR)

This ratio shows the relationship between debt capital and total assets. A higher ratio indicates that assets are less backed up by equity and hence higher financial leverage.

Fiscal Year	Total Debts		Total Assets		Debt to Asset Ratio	
	API	CHCL	API	CHCL	API	CHCL
2074/75	1,685,309,469	8,447,210,799	3,247,800,632	22,800,410,107	0.52	0.37
2075/76	1,926,100,825	9,684,222,614	3,412,395,950	28,022,349,305	0.56	0.35
2076/77	1,976,139,047	15,134,503,659	3,556,749,591	34,454,499,616	0.56	0.44
2077/78	3,051,045,788	19,291,350,284	5,938,538,220	39,378,905,130	0.51	0.49
2078/79	4,766,423,271	24,237,695,444	9,118,263,002	45,870,205,308	0.52	0.53
Mean (\bar{x})					0.54	0.43
Standard Deviation (σ)					0.02	0.08
Coefficient of Variance (CV)					4.33%	17.78%

Table 4.4: Table showing DAR calculation for API and CHCL.

Sources: Annual Financial Reports of API and CHCL (F.Y. 2074/75 – 2078/79)

Table 4.4 reveals that the table provides data on the fiscal performance of two entities (API and CHCL) over five fiscal years, including total debts, total assets, and the debt to asset ratio. The mean and standard deviation of the debt to asset ratio are calculated for each entity, along with their respective coefficients of variation. For API, the mean debt to asset ratio is 0.54 and CV 4.33%. The mean debt to asset ratio for CHCL is 0.43 with CV of 17.78%. The coefficient of variation measures the relative variability of the debt to asset ratio across the years. API exhibits lower relative variability (CV = 4.33%) compared to CHCL (CV = 17.78%). This suggests that API's debt to asset ratio is more consistent over time compared to CHCL.

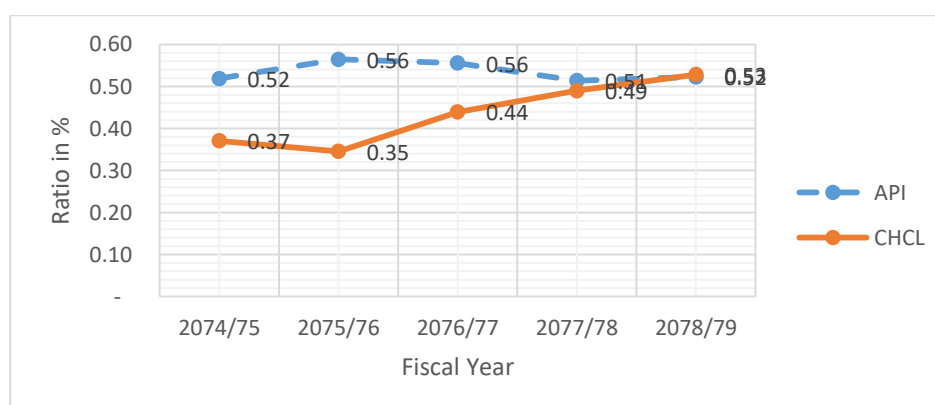


Figure 4.4: Graph showing Debt to Asset Ratio of API and CHCL.

In Figure 4.4, the DAR value of CHCL has been sharply increasing since 2075/76. This might indicate that CHCL has started to heavily rely on debts to finance its

operation ever since. The case in however opposite foe API as the DAR value has been decreasing since 2076/77. In 2078/79, both of the companies DAR values are nearly identical.

4.1.3 Profitability Ratio

4.1.3.1 Return on Equity (ROE)

Return on Equity (ROE) is a financial ratio that indicates the profitability of a company by measuring how much profit a company generates for each unit of shareholder equity.

Table 4.5: Table showing ROE calculation for API and CHCL.

Fiscal Year	Net Profit after Tax		Shareholder's Equity		Return on Equity	
	API	CHCL	API	CHCL	API	CHCL
2074/75	57,744,391	895,661,653	1,195,243,256	8,719,939,147	0.05	0.10
2075/76	71,034,764	788,747,187	1,264,931,057	9,194,314,559	0.06	0.09
2076/77	108,966,003	586,699,774	1,373,590,532	9,805,827,908	0.08	0.06
2077/78	113,227,234	585,126,043	2,809,083,584	9,866,580,098	0.04	0.06
2078/79	106,142,234	632,306,671	4,188,211,413	10,100,996,670	0.03	0.06
Mean (\bar{x})					0.05	0.07
Standard Deviation (σ)					0.02	0.02
Coefficient of Variance (CV)					40.12%	26.24%

Sources: Annual Financial Reports of API and CHCL (F.Y. 2074/75 – 2078/79)

Table 4.5 shows the mean and standard deviation for each company's return on shareholders' equity over five years. The coefficient of variation (CV %) is also provided, which is a measure of the relative variability of each company's return on shareholders' equity compared to its mean. Based on the data, ROE of CHCL shows a decreasing trend. ROE of API increases to 0.08 till 2076/77 and decreases to 0.03 till 2078/79. API had the highest coefficient of variation (40.12%), indicating that its return on shareholders' equity has been the most volatile compared to its mean. The ROE data provides insight into the profitability of the hydropower companies highlighting which companies are generating profit efficiently and which may be facing financial challenges. It shows that there is significant variation in the performance of the companies, with some companies consistently outperforming others. The information can be useful for investors, analysts, and other stakeholders in evaluating the financial health and potential of the companies.

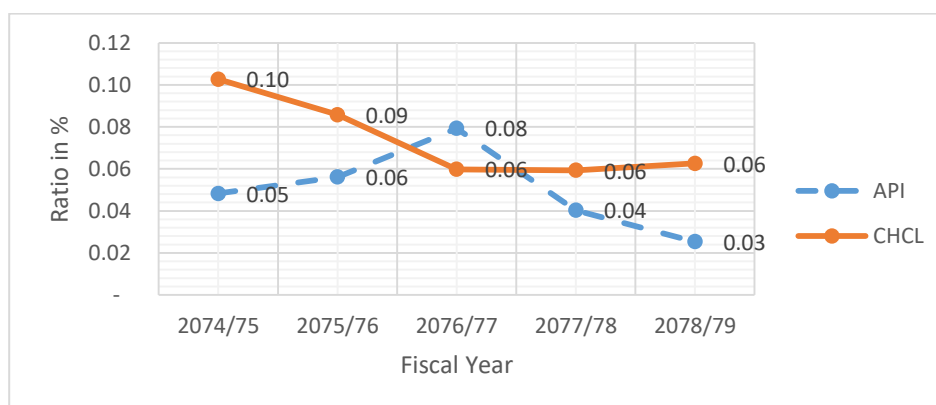


Figure 4.5: Graph showing Return on Equity Ratio of API and CHCL.

The Graphical Presentation of ROE ratios that the ROE of CHCL dropped in F/Y 2076/77. However, it recovered profusely the following year and at last year it has maintained higher ROE. In contrary, the ROE of API increased to peak in 2076/77 and has declined ever since and has not recovered.

4.1.3.2 Return on Assets (ROA)

Return on Assets (ROA) measures the profitability of the firm in terms of assets employed in the firm. A higher return on total assets ratio shows higher earnings of the company in terms of its total assets. A lower return on total assets ratio indicates an unsound financial position due to a low level of return.

Table 4.6: Table showing ROA calculation for API and CHCL.

Fiscal Year	Net Profit after Tax with Interest		Total Assets		Return on Asset	
	API	CHCL	API	CHCL	API	CHCL
2074/75	57,724,714	882,086,844	3,247,800,632	22,800,410,107	0.02	0.04
2075/76	70,922,011	760,309,660	3,412,395,950	28,022,349,305	0.02	0.03
2076/77	108,659,474	492,180,958	3,556,749,591	34,454,499,616	0.03	0.01
2077/78	113,227,234	532,019,870	5,938,538,220	39,378,905,130	0.02	0.01
2078/79	106,142,234	548,549,692	9,118,263,002	45,870,205,308	0.01	0.01
Mean (\bar{x})					0.02	0.02
Standard Deviation (σ)					0.01	0.01
Coefficient of Variance (CV)					34.31%	54.69%

Sources: Annual Financial Reports of API and CHCL (F.Y. 2074/75 – 2078/79)

Table 4.6 reveals both API and CHCL have the same average Return on Assets over the past 5 years, with a mean of 2%. However, the standard deviation is also quite

different at 34.31% for API and 54.69% for CHCL, which indicates that both their performance has been volatile over time. API had the lowest coefficient of variation at 34.31%, which suggests that its performance has been relatively stable over time in comparison to CHCL.

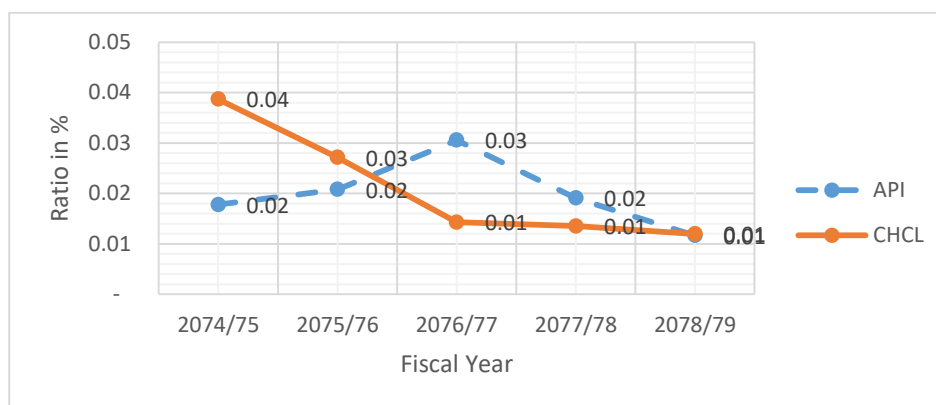


Figure 4.6: Graph showing Return on Equity Ratio of API and CHCL.

The Graphical presentation of ROA ratios shows that the ROA of CHCL dropped in F/Y 2076/77 and levelled ever since. The ROA for API however peaked in the same year and has dropped sharply to the same value as CHCL.

4.1.4 Earnings Per Share (EPS)

This ratio is calculated dividing net profit after tax by number of equities share outstanding. The profitability of a company from the point of view of ordinary shareholders is the earning per share (EPS). EPS calculations made over years indicate whether or not the companies earning power on per share has changed over that period. EPS shows the amount of earning attributes to each equity share. If earning per share is high market price of the share may be increased in the market and vice versa. High ratio shows the sound profitability of the components.

Table 4.7: Table showing EPS calculation for API and CHCL.

Fiscal Year	Net Profit after Tax		Number of Outstanding Shares		Earnings per Share	
	API	CHCL	API	CHCL	API	CHCL
2074/75	57,744,391	895,661,653	11,340,000	39,651,131	5.09	22.59
2075/76	71,034,764	788,747,187	11,907,000	47,581,357	5.97	16.58
2076/77	108,966,003	586,699,774	11,907,000	57,097,629	9.15	10.28
2077/78	113,227,234	585,126,043	24,751,963	62,807,392	4.57	9.32

2078/79	106,142,234	632,306,671	38,449,155	67,517,946	2.76	9.37
Mean (\bar{x})					5.51	13.62
Standard Deviation (σ)					2.35	5.85
Coefficient of Variance (CV)					42.65%	42.95%

Sources: Annual Financial Reports of API and CHCL (F.Y. 2074/75 – 2078/79)

We can find huge difference between the fluctuating trends of EPS of API and CHCL. For both the companies, the EPS has declined over the years. In 2074/75, CHCL had a satisfactory EPS value of 22.59 but has declined in a constant rate over the years until 2077/78 at 9.32. It recovered a mere 9.37 in fiscal year 2078/79. Meanwhile, the EPS value of API had been increasing till 2076/77 to 9.15 from 5.09. It has gradually decreased over 40% every year till 2078/79. This can be attributed to the fact that the decreasing EPS value has resulted in decreased profit and bonus distribution to the shareholders. This is the direct result of decreased income over the years.

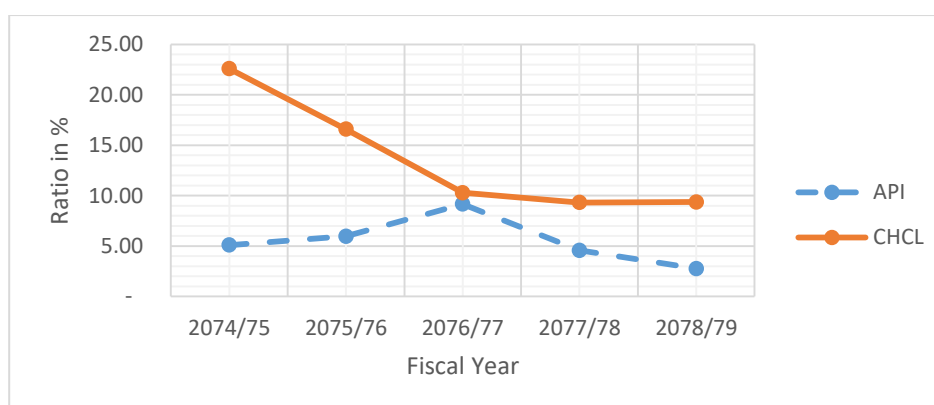


Figure 4.7: Graph showing Earnings per Share of API and CHCL.

The Graphical presentation of EPS ratios shows that the EPS of CHCL and API. The EPS of CHCL has dropped since fiscal year 2074/75 and it has not been able to recover in the following years. The EPS of API however had an increasing trend until 2075/77 and has declined ever since. Overall, both of these companies have declined EPS value for the study period.

4.1.5 Size of the hydropower companies

The total assets of the hydroelectric firm serve as a proxy for its size in this study. The natural logarithm of the total assets is calculated to determine the company's size.

Table 4.8: Table showing Size parameter calculation for API and CHCL.

Fiscal Year	Total Asset		Size of the Company (Logarithm of Total Asset)	
	API	CHCL	API	CHCL
2074/75	3,247,800,632	22,800,410,107	21.90	23.85
2075/76	3,412,395,950	28,022,349,305	21.95	24.06
2076/77	3,556,749,591	34,454,499,616	21.99	24.26
2077/78	5,938,538,220	39,378,905,130	22.50	24.40
2078/79	9,118,263,002	45,870,205,308	22.93	24.55
Mean (\bar{x})			22.26	24.22
Standard Deviation (σ)			0.45	0.28
Coefficient of Variance (CV)			2.02%	1.14%

Sources: Annual Financial Reports of API and CHCL (F.Y. 2074/75 – 2078/79)

Table 4.8 shows the measure of company's size for API and CHCL. It is evident that CHCL is a larger company with mean 24.22 and API is relatively smaller with mean value of 22.93. The CV of API is larger with 2.02% as compared to 1.14% of CHCL indicating API has increased its asset by larger portion between the five years.

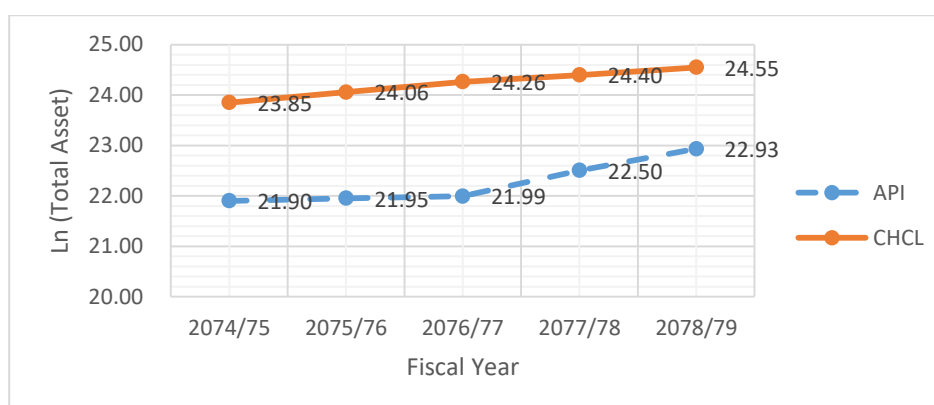


Figure 4.8: Graph showing logarithm of Total Assets of API and CHCL.

The graph in Figure 4.8 shows the trend of growth of company size. The asset of CHCL has increased uniformly over the years. However, the growth of company for API had been steady till 2076/77 and increased in greater rate from that year.

4.1.6 Age of the hydropower companies

The natural logarithm of the number of years since the hydropower company was founded is used in this study to represent the age of the firm.

Table 4.9: Table showing Age parameter calculation for API and CHCL.

Fiscal Year	Number of Years since Establishment		Age of the Company	
	API (2060 BS)	CHCL (2052 BS)	API	CHCL
2074/75	15	23	2.71	3.14
2075/76	16	24	2.77	3.18
2076/77	17	25	2.83	3.22
2077/78	18	26	2.89	3.26
2078/79	19	27	2.94	3.30
Mean (\bar{x})			2.83	3.22
Standard Deviation (σ)			0.09	0.06
Coefficient of Variance (CV)			3.30%	1.97%

Sources: Annual Financial Reports of API and CHCL (F.Y. 2074/75 – 2078/79)

Table 4.8 shows the measure of company's age for API and CHCL. It is evident that CHCL is a larger company in terms of age with mean 2.83 and API is relatively smaller with mean value of 3.22.

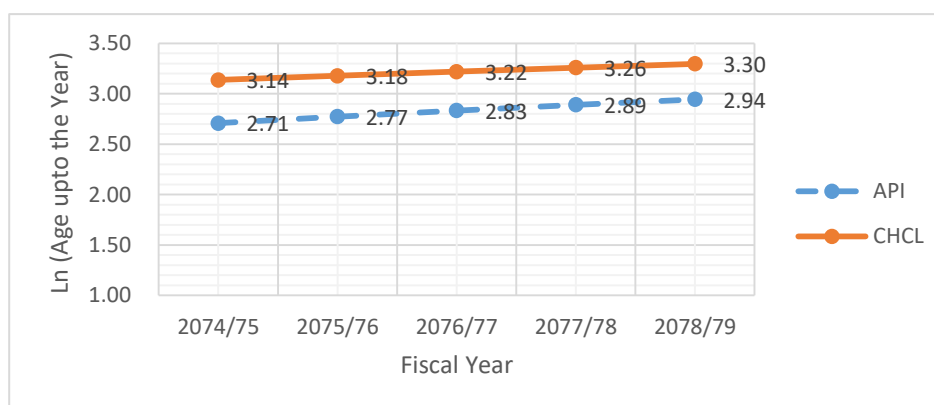


Figure 4.9: Graph showing logarithm of Age of API and CHCL.

The graph in Figure 4.9 shows uniform values for both the companies in terms of age.

4.1.7 Descriptive Analysis

Table 4.10 presents the summary statistics of variables used in this study. It shows the number of observations, mean, median, standard deviation, minimum and maximum value of ROE, ROA and EPS, and independent variables.

Table 4.10: Table showing Descriptive Statistics

Variables	N	Mean	Median	Std. Deviation	Coeff. of variation	Minimum	Maximum
CR	10	3.01	2.505	3.079	1.023	0.23	10.28

DER	10	1.452	1.425	0.446	0.37	0.97	2.4
ROE	10	0.063	0.060	0.022	0.30	0.03	0.1
NPR	10	46.27	46.045	17.116	0.153	20.47	78.67
DAR	10	0.485	0.515	0.074	0.343	0.35	0.56
ROA	10	0.02	0.02	0.011	0.527	0.01	0.04
EPS	10	9.568	9.235	5.999	0.627	2.76	22.59
AGE	10	3.024	3.040	0.218	0.072	2.708	3.296
SIZE	10	23.24	23.392	1.095	0.047	21.901	24.549

(See [Appendix B](#))

Table 4.10 shows that for the variable ROE, the median value is 0.06, which indicates that half of the companies in the sample had an ROE above this value, while the other half had an ROE below this value. The mean value is slightly higher at 0.063, indicating that the sample had a slightly higher ROE. The standard deviation of 0.022 suggests that the data is quite dispersed, with some companies having much higher or lower ROEs than others. The minimum and maximum values for ROE are 0.23 and 10.68, respectively, which indicates that no companies had negative ROEs. For the variable ROA, the median value is 0.02, and the mean value is higher at 0.02. The standard deviation is quite high at 0.011, indicating that the data is quite spreadout. The minimum and maximum values for ROA are 0.01 and 0.04, respectively, indicating that the companies have a similar value.

For the variable NPR, the median value is 46.065, and the mean value is higher at 46.27. The standard deviation is high at 17.116, indicating that the data is moderately dispersed. The minimum and maximum values for NPR are 20.47 and 78.67, respectively, indicating that all the companies have positive net profit for all the fiscal years. For the variable CR, the median value is 2.505, and the mean value is higher at 3.01. The standard deviation is 3.079, indicating that the data is extremely dispersed. The minimum and maximum values for CR are 0.23 and 10.28, respectively, indicating that some companies had very low current ratios, while others had very high current ratios.

For the variable DER, the median value is 1.425, and the mean value is slightly higher at 1.452. The standard deviation is 0.446, indicating that the data is highly dispersed. The minimum and maximum values for DER are 0.97 and 2.4, respectively, indicating

that some companies had a relatively low debt-to-equity ratio, while others had high debt-to-equity ratio. For the variable DAR, the median value is 0.515, and the mean value is slightly lower at 0.485. The standard deviation is 0.074, indicating that the data is highly dispersed. The minimum and maximum values for DAR are 0.35 and 0.56, respectively, indicating that some companies had relatively low debt-to-asset ratios, while others had high debt-to-asset ratios. For the variable SIZE, the median value is 23.392, and the mean value is slightly lower at 23.24. The standard deviation is 1.095, indicating that the data is not very dispersed. The minimum and maximum values for SIZE are 21.901 and 24.549, respectively, indicating that the companies in the sample vary somewhat in size, but not by a large amount. For the variable AGE, the median value is 3.040, and the mean value is slightly lower 3.024. The standard deviation is 0.218, indicating that the data is not very dispersed. The minimum and maximum values for AGE are 2.708 and 3.296, respectively, indicating that the companies in the sample are relatively young. Overall, the table provides useful information on the central tendency, dispersion, and range of the data for each variable. It can be used to compare the different variables and to identify outliers or unusual values.

4.1.8 Correlation Analysis

Pearson's correlation coefficient is used as a descriptive statistic to explain the strength and direction of the linear relationship between two quantitative variables. Table 4.11 presents the correlation coefficient of variables to explain the relationship between companies' profitability (ROE, ROA, EPS) and explanatory variables during the study period.

Table 4.11: Pairwise matrix of Correlation Coefficients of Variables

	CR	NPR	DER	DAR	ROE	ROA	EPS	AGE	SIZE
CR	—								
NPR	0.714*	—							
DER	-0.509	-0.113	—						
DAR	-0.847**	-0.826**	0.447	—					
ROE	0.565	0.831**	-0.168	-0.625	—				
ROA	0.574	0.560	-0.616	-0.467	0.780**	—			

EPS	0.816**	0.930***	-0.227	-0.823**	0.918***	0.688*	—		
AGE	0.450	0.512	0.400	-0.544	0.319	-0.211	0.525	—	
SIZE	0.472	0.540	0.373	-0.584	0.287	-0.231	0.521	0.992***	—

(* $p < .05$, ** $p < .01$, *** $p < .001$: See [Appendix C](#))

Table 4.11 CR has fairly strong positive correlation with NPR at 0.714 and EPS at 0.816. It has very strong negative correlation with DAR at -0.847 indicating as CR increases DAR decreases in that rate. NPR has almost perfect positive association with EPS (0.930) and very strong linear relationship with ROE (0.831). However, NPR has strong negative relation with DAR (-0.826). DER does not have such strong associations with any of the variables. It has however, moderately good negative correlation with ROA at -0.616.

There is strong negative association, -0.823 between DAR and EPS. Among the dependent variables, ROA and ROE have fairly strong correlation, 0.78. The association is almost perfect between EPS and ROE at 0.918 and fairly strong positive association between EPS and ROA with 0.688. Among the characteristic variables, the association between AGE and SIZE are almost perfect and these variables can be said that they are in almost positive unison having value 0.992. AGE has moderate correlation with DAR (-0.544) and EPS (0.525). The case is similar for SIZE parameter; DAR (-0.584) and EPS (0.521).

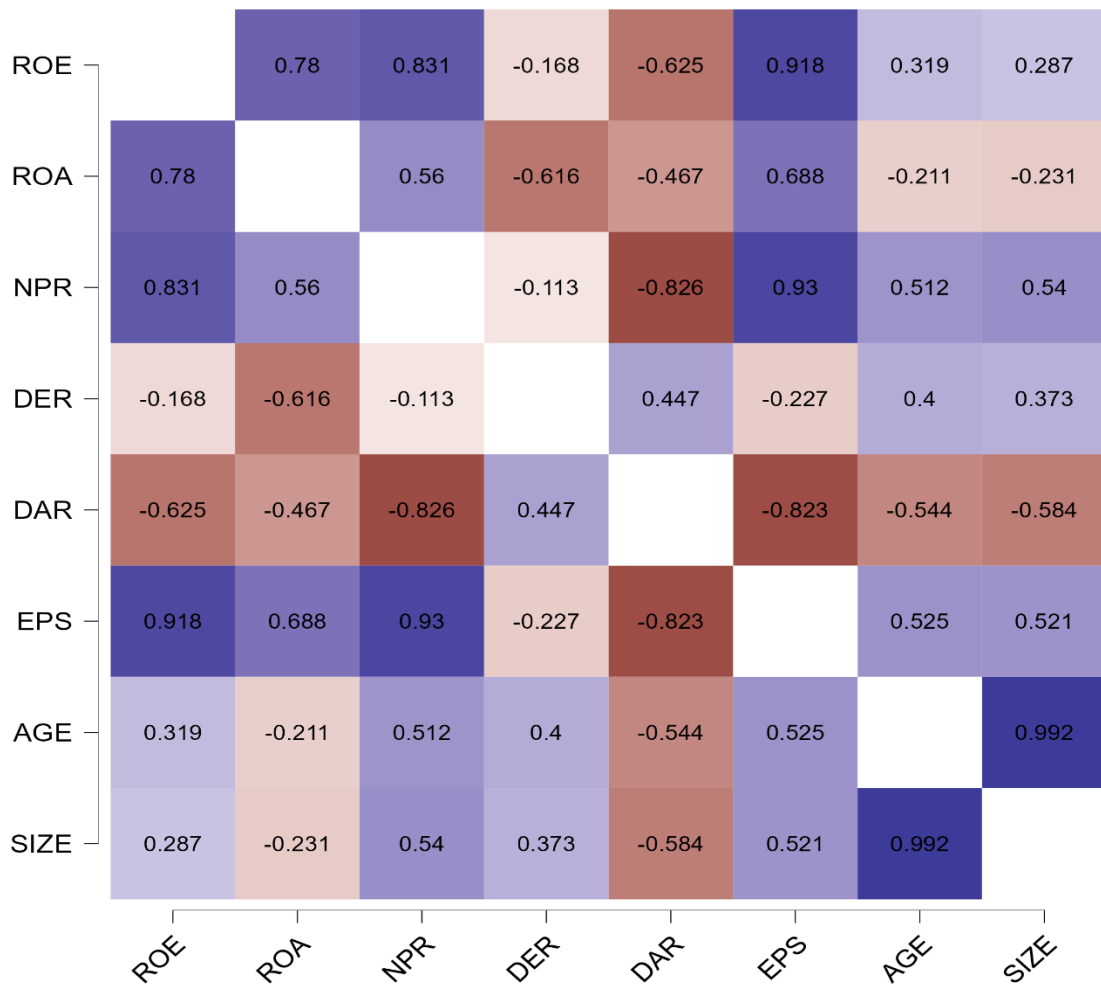


Figure 4.10: Pearson's r Correlation Heatmap of Variables

Figure 4.10 shows a heat map of correlation between all the variables. The blue tan shows positive correlation and the red ones show negative correlation. The high correlation is expressed in darker tan while the lower correlation values are highlighted in faint tan.

4.1.9 Regression Analysis

In this thesis, the multivariate regression model is used for the estimation of relationships between a dependent variable and independent variables. The regression model can be used to quantify the strength of different explanatory variables affecting the profitability of the companies. Regression models have been used to explain the relationship between dependent variables ROE, ROA and EPS, and independent variables NPR, CR, DER, DAR, SIZE, and AGE. The first regression model examines the effect of various explanatory variables related to liquidity, leverage, profit, size, and age of the hydropower companies on ROE.

4.1.9.1 Model 1: ROE

This regression model examines the effect of various explanatory variables related to liquidity, leverage, profit, size, and age of the hydropower companies on ROE expressed as:

$$ROE = \beta_0 + \beta_1 * NPR + \beta_2 * CR + \beta_3 * DER + \beta_4 * DAR + \beta_5 * SIZE + \beta_6 * AGE + \epsilon_r$$

where, β_0 is the coefficient of constant,

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the coefficient of the independent variables,

$NPR, CR, DER, DAR, SIZE, AGE$ are the independent variables, and

ϵ_r is the error term.

Table 4.12: **ROE Regression: Initial Model using all Independent Variables**

Model		Unstandardized	Standard Error	Standardized	t	p
H ₀	(Intercept)	0.063	0.007		9.211	< .001
H ₁	(Intercept)	0.765	0.872		0.877	0.445
	NPR	0.001	0.001	1.049	1.049	0.371
	DER	-0.004	0.070	-0.090	-0.062	0.954
	AGE	0.398	0.121	4.002	3.287	0.046*
	SIZE	-0.083	0.041	-4.221	-2.056	0.132
	CR	-9.966×10^{-4}	0.005	-0.142	-0.217	0.842
	DAR	-0.036	0.508	-0.125	-0.071	0.948

($R^2 = .946$, $F(6, 3)=8.837$, $p=.051$: See [Appendix D-1](#))

Table 4.12 shows the regression model reflecting the effects of NPR, DER, AGE, SIZE, CR and DAR on the dependent variable ROE. The summary of this analysis indicates that the regression value indicated by R^2 is 0.945 which means that the model explains 94.6% of the relationship between the variables. The significance value i.e. p-value is 0.51, this means that the model is statistically insignificant and so we cannot conclude that the explanatory variable affects the dependent variable. Moreover, the p-value of all variables except the AGE variable are non-significant.

Thus, we cannot conclude that all these explanatory variables affect the dependent variables in this model and since the p-value is also above 5%, we eliminate variables until we get a model that explains the relationship within 95% confidence interval.

Table 4.13: *ROE Regression: Truncated Model using selective Independent Variables*

Model		Unstandardized	Standard Error	Standardized	t	p
H ₀	(Intercept)	0.063	0.007		9.211	< .001
H ₁	(Intercept)	0.720	0.144		4.991	0.002
	NPR	0.001	1.562×10 ⁻⁴	1.079	8.724	< .001*
	AGE	0.374	0.083	3.768	4.521	0.004*
	SIZE	-0.080	0.017	-4.033	-4.742	0.003*

(R² = .938, F(3, 6)=30.364, p<.001: See [Appendix D-2](#))

Table 4.13 shows the redefined multivariate regression model reflecting the effects of NPR, SIZE, and AGE on ROE. The summary of the model indicates that the p-value is highly significant. The individual p-values of the explanatory variables NPR, AGE and SIZE are also well within the limits to reject the null hypothesis. Thus, we accept this model. The model is thus defined as:

$$R O E = 0.720 + 0.001 * N P R + 0.374 * S I Z E - 0.080 * A G E$$

The positive relationship between the NPR and ROE indicates that companies with higher net profit ratios tend to have higher ROE. This makes intuitive sense since net profit is a key component of ROE, which measures a company's profitability relative to its shareholders' equity. The coefficient of 0.001 indicates that a one-unit increase in the net profit ratio is associated with a 0.001-unit increase in ROE. Conversely, the negative relationship between the SIZE ratio and ROE indicates that companies with higher size in terms of assets tend to have lower ROE. AGE has a significant positive relationship with ROE, as indicated by its positive coefficient of 0.379 and significant p-value (0.004). The adjusted R² value of 0.938 suggests that the model explains a large proportion of the variance in the dependent variable (ROE), indicating a good fit of the model to the data. This means that the independent variables included in the model can explain about 93.8% of the variability observed in the dependent variable (ROE). The F- value of 30.364 is statistically significant, indicating that the model as a whole is a good fit for the data.

4.1.9.2 Model 2: ROA

This regression model examines the effect of various explanatory variables related to liquidity, leverage, profit, size, and age of the hydropower companies on ROA expressed as:

$$R O A = \beta_0 + \beta_1 * N P R + \beta_2 * C R + \beta_3 * D E R + \beta_4 * D A R + \beta_5 * S I Z E + \beta_6 * A G E + \epsilon r$$

where, β_0 is the coefficient of constant,

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the coefficient of the independent variables,

$NPR, CR, DER, DAR, SIZE, AGE$ are the independent variables, and

ϵ_r is the error term.

Table 4.14 shows the multivariate regression model reflecting the effects of NPR, CR, DER, DAR, SIZE, and AGE on ROA. Looking at the results, we can see that the independent variables of SIZE, and AGE are the only statistically significant variables with p-values less than 0.05. Other variables in the analysis, including the current ratio, net profit, debt to asset ratio and debt to equity ratio, do not appear to have a statistically significant relationship with ROA in this model. The non-significant p-values suggest that these variables do not contribute significantly to explaining the variation in ROA after accounting for the other variables in the model.

Table 4.14: ROA Regression: Initial Model using all Independent Variables

Model		Unstandardized	Standard Error	Standardized	t	p
H ₀	(Intercept)	0.020	0.003		6.000	< .001
H ₁	(Intercept)	0.817	0.270		3.022	0.057
	NPR	-1.396×10 ⁻⁴	3.914×10 ⁻⁴	-0.227	-0.357	0.745
	AGE	0.167	0.038	3.453	4.459	0.021
	SIZE	-0.053	0.013	-5.491	-4.205	0.025
	DER	0.031	0.022	1.295	1.403	0.255
	DAR	-0.249	0.157	-1.760	-1.584	0.211
	CR	0.003	0.001	0.944	2.270	0.108

(R² = .978, F(6, 3)=22.578, p<.014: See [Appendix D-1](#))

The high adjusted R-squared value of 0.978 indicates that the model explains a large proportion of the variance in ROA. This means that the independent variables included in the analysis are able to account for much of the variation in ROA among the companies in the sample. The significant F-value of 22.578 indicates that the model as a whole is statistically significant, which means that the independent variables included in the model are jointly useful in predicting ROA.

Table 4.15: ROA Regression: Truncated Model using selective Independent Variables

Model		Unstandardized	Standard Error	Standardized	t	p
H ₀	(Intercept)	0.020	0.003		6.000	< .001
H ₁	(Intercept)	0.726	0.078		9.245	< .001
	SIZE	-0.049	0.007	-5.122	-7.261	0.002*

Model	Unstandardized	Standard Error	Standardized	t	p
DAR	-0.194	0.030	-1.373	-6.489	0.003*
AGE	0.163	0.032	3.370	5.162	0.007*
DER	0.023	0.005	0.975	4.982	0.008*
CR	0.003	5.555×10 ⁻⁴	0.811	4.999	0.007*

(R² = .949, F(5, 4)=34.623, p<.002: See [Appendix D-2](#))

In Table 4.15, looking at the coefficients of the truncated model, we can see that the independent variables of SIZE, DAR, AGE, DER and CR are the only statistically significant variables with p-values less than 0.05. These variables have coefficients of -0.049, -0.194, 0.163, 0.023 and 0.003 respectively, indicating a positive or negative relationship with ROA. The coefficient for DAR is -0.194, which means that a one-unit increase in net profit is associated with a 0.194-unit decrease in ROA. This suggests that companies with higher debts are likely to have lower ROA.

The coefficient for Debt to equity is 0.023, which means that a one-unit increase in the debt-to-equity ratio is associated with a 0.023-unit increase in ROA. This suggests that companies with higher debt-to-equity ratios are likely to have high ROA. This result is somewhat counterintuitive, as higher levels of debt are generally associated with lower profitability. However, this may be due to other factors that are not captured in the model. The coefficient for SIZE is -0.049, which means that a one-unit increase in company size is associated with a 0.049- unit decrease in ROA. This suggests that larger companies may be less efficient at generating profits. The coefficient for AGE is 0.163, which means that a one-unit increase in company age is associated with an 0.163-unit increase in ROA. This suggests that more established companies may be more efficient at generating profits. Finally, the independent variable of the Current ratio is not has the least coefficient value indicating that it has the least influence on this model. The adjusted R² value of 0.949 suggests that the model explains a large proportion of the variance in the dependent variable (ROA), indicating a good fit of the model to the data. This means that the independent variables included in the model can explain about 94.9% of the variability observed in the dependent variable (ROA). The F- value of 34.623 is statistically significant, indicating that the model as a whole is a good fit for the data. The model is thus defined as:

$$R O A = 0.726 + 0.003 * C R + 0.023 * D E R - 0.194 * D A R - 0.049 * S I Z E + 0.163 * A G E$$

4.1.9.3 Model 3: EPS

This regression model examines the effect of various explanatory variables related to liquidity, leverage, profit, size, and age of the hydropower companies on EPS expressed as:

$$EPS = \beta_0 + \beta_1 * NPR + \beta_2 * CR + \beta_3 * DER + \beta_4 * DAR + \beta_5 * SIZE + \beta_6 * AGE + \epsilon_r$$

where, β_0 is the coefficient of constant,

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the coefficient of the independent variables,

$NPR, CR, DER, DAR, SIZE, AGE$ are the independent variables, and

ϵ_r is the error term.

Table 4.16 shows the multivariate regression model reflecting the effects of NPR, CR, DER, DAR, SIZE, and AGE on EPS. Looking at the variables, it can be seen that none of the variables are statistically significant. It can be said that these variables in individuality are statistically insignificant and there is no sufficient evidence that these variables in totality justifies the model.

Table 4.16: *EPS Regression: Initial Model using all Independent Variables*

Model		Unstandardized	Standard Error	Standardized	t	p
Ho	(Intercept)	9.568	1.897		5.044	< .001
H1	(Intercept)	38.555	152.103		0.253	0.816
	NPR	0.351	0.220	1.000	1.592	0.210
	DER	-5.059	12.264	-0.376	-0.412	0.708
	DAR	30.559	88.628	0.379	0.345	0.753
	CR	0.271	0.801	0.139	0.339	0.757
	AGE	56.834	21.109	2.062	2.692	0.074
	SIZE	-9.696	7.079	-1.769	-1.370	0.264

($R^2 = .979$, $F(6, 3) = 23.088$, $p < .013$: See [Appendix D-1](#))

The adjusted R^2 mean is 0.979 and the F-value of 23.088 is statistically significant. This might indicate that the model as a whole is a good fit for the data but as we saw earlier that in individual these data does not provide sufficient evidence that the model is statistically significant. We the redefine the models by removing the most insignificant variables and running the model again until all the variables and the model as a whole is justifiable.

Table 4.17: **EPS Regression: Truncated Model using selective Independent Variables**

Model		Unstandardized	Standard Error	Standardized	t	p
H ₀	(Intercept)	9.568	1.897		5.044	< .001
H ₁	(Intercept)	91.363	26.946		3.391	0.019
	NPR	0.271	0.036	0.773	7.440	< .001*
	CR	0.638	0.191	0.328	3.339	0.021*
	AGE	57.454	15.383	2.085	3.735	0.014*
	SIZE	-11.616	3.125	-2.120	-3.717	0.014*

(R² = .977, F(4, 5)=52.964, p<.001: See [Appendix D-2](#))

In Table 4.17, we can see that the independent variables of NPR, CR, AGE and SIZE are the only statistically significant variables with p-values less than 0.05. These variables have coefficients of 0.271, 0.638, 57.454 and -11.616 respectively, indicating a positive or negative relationship with EPS. The coefficient for NPR is 0.271, which means that a one-unit increase in net profit is associated with a 0.271-unit increase in ROA. This suggests that companies with higher debts are likely to have lower ROA.

The coefficient for current ratio is 0.638, which means that a one-unit increase in the debt-to-equity ratio is associated with a 0.638-unit increase in EPS. This suggests that companies with higher debt-to-equity ratios are likely to have high EPS. The coefficient for SIZE is -11.616, which means that a one-unit increase in company size is associated with a 11.616 unit decrease in EPS. This suggests that larger companies may be less efficient at generating profits. The coefficient for AGE is 57.454, which means that a one-unit increase in company age is associated with a 57.454-unit increase in EPS. This suggests that more established companies may be more efficient at generating profits. The adjusted R² value of 0.977 suggests that the model explains a large proportion of the variance in the dependent variable (EPS), indicating a good fit of the model to the data. This means that the independent variables included in the model can explain about 97.7% of the variability observed in the dependent variable (ROA). The F- value of 52.964 is statistically significant, indicating that the model as a whole is a good fit for the data. The model is thus defined as:

$$EPS = 91.363 + 0.271 * NPR + 0.638 * CR - 11.616 * SIZE + 57.454 * AGE$$

4.2 Discussion

The results of the regression analysis provide insights into the relationship of ROE, ROA and EPS to the independent variables included in the model. The statistically significant variables can be used to make predictions about a company's ROE, ROA and EPS, based on their coefficients related to these independent variables.

The impact of firm-specific variables is used for evaluating a company's financial performance. Various financial ratios such as ROE, ROA, EPS, NPR, CR, DER, and DAR are calculated for the two listed hydropower companies in Nepal. These financial ratios are utilized for a comparative study of the financial performance of the selected hydropower companies, API and CHCL.

The result of DER having negative significant relationship with ROA is consistent with (Dewi et al., 2015), (Mahardika & Marbun, 2016), and (Rahmah et al., 2016) prove that debt to equity ratio (DER) has a significant negative effect on return on assets (ROA) which mean that the debt to equity ratio, the lower the return on assets and vice versa.

Earlier studies conducted by (Addae et al., 2013), (Zeitun & Tian, 2007), and (Al-Taani, 2013) found the negative relation between performance and long term debt. There is significant positive relationship between STD/E and ROA The ratio analysis provided insight in terms of liabilities, assets, profitability, debts and equities of the two listed hydropower companies. The CR for CHCL showed that this company more capable of paying its obligations because it has a larger proportion of short-term asset value relative to the value of its short-term liabilities. On the other hand, API can be attributable to the fact that there is an increase in short-term debt with respect to the decrease in current assets. This also suggests that CHCL may have a better liquidity position compared to API. API has a much higher variability over the years than CHCL. Therefore, API's liquidity position may not be as consistent as that of CHCL and may vary significantly from year to year. On the other hand capital structure (LTD and TD) has negative significant impact on firm's performance measured by ROA and these findings are consistent with (Zeitun & Tian, 2007) and (Abor, 2007) who indicated that firm's performance is negatively related to capital structure. These finding are in contrast with (Champion, 1999), (Gosh et al., 2000), and (Berger & Bonaccora di Patti, 2006) who revealed that there is a positive relation between firm

performance and capital structure.

In terms net profit and sales, as presented by NPR, both of these companies are in a decline. The profit of CHCL has declined by over 30% in contrast to API, whose net profit has increased by 85% and revenue nearly quadrupled over the five years. This can be attributed to the fact that CHCL has reinvested large sum of earnings in the new hydropower projects as comparison to API company. But the mean of NPR shows that CHCL has better value over API which means that CHCL has better shown efficiency in controlling costs and this can be a result from low operational costs, efficient management and strong pricing strategies.

The leverage of the hydropower companies was indicated with DER and DAR. The debt-to-equity ratio (DER) and debt-to-asset ratio (DAR) reflects a company's debt status. A good debt to equity ratio is around 1 to 1.5. However, the ideal debt to equity ratio will vary depending on the industry because some industries use more debt financing than others. Capital-intensive companies like hydropower companies often have higher ratios that can be greater than 2. A high DAR is considered risky for lenders and investors because it suggests that the company is financing a significant amount of its potential growth through borrowing. The mean DER and DAR value of both of the companies is well within the risk margin. CHCL has had the highest debt-to-equity ratio over the past five years. This indicated that CHCL has been relying heavily on debt financing to fund its operations. API had the lowest debt-to-equity ratio showing better standing in terms of debt. Both API and CHCL are similar in terms of DAR but CHCL has shown more volatility compared to API.

The ROE data provided insight into the profitability of the hydropower companies highlighting which companies are generating profit efficiently and which may be facing financial challenges. It shows that there is significant variation in the performance of the selected hydropower companies. The results from ROA also suggested that both API and CHCL have consistently performed well. The results from EPS showed the how well company has been making profit for each share of its stock. The profitability of the hydropower companies measured in terms of ROE, ROA and EPS showed that the companies with large sizes and long history of operation such as CHCL have more consistent returns while smaller and more recent hydropower companies such as API showed great volatility in the return. This result is in line with the results of research conducted by (Lee & Poku, 2022) which presented

that older firms listed on Ghana Stock showed better financial performance compared to newly established firms. The coefficient of variation for each company was used as a measure of how much their performance deviated from their respective means, which could be important information for investors and stakeholders who want to understand the risks and volatility associated with each company's financial performance.

The net profit ratio of the hydropower companies also shows a consistent result as that of ROE and ROA in terms of volatility of the companies. Their net profit ratios are more sensitive to changes in the industry or other external factors. While the hydropower industry has shown overall profitability over the past five years, the net profit ratios of individual companies have varied widely, and some companies have been more volatile than others. The company such as CHCL with larger size and long operation years showed better NPR than other hydropower companies with minimum variation in profit over the years. Further, the more recent company such as API showed large variations in profit with significant decreasing trend.

ROE and ROA were selected as dependent variables to represent the financial performance of the hydropower companies. The financial ratios such as NPR, CR, DER, and DAR were selected as dependent variables along with SIZE and AGE as non-financial factors. The descriptive statistics of dependent and independent variables explored the nature and variability of these selected variables. The results provided useful information on the central tendency, dispersion, and range of the data for each variable. The correlation analysis explored the strength and direction of the relationship between dependent and independent variables. The correlation results indicated that there were significant relationships between the independent and dependent variables, implying that these variables are likely to be important predictors of a company's return on equity and return on assets. However, it's worth noting that correlation does not imply causation and further analysis would be needed to understand the nature of these relationships and their underlying causes. Hence, regression analysis was used to analyze the factors affecting the ROE and ROA of the hydropower companies.

The results from the regression analysis showed that ROE had a statistically significant relationship with NPR, DER, DAR, and AGE. The positive relationship

between the net profit ratio and ROE indicated that companies with higher net profit ratios had higher ROE. The negative relationship between the DER and ROE indicated that companies with higher DER had lower ROE. This result is also intuitive as the decrease in debt results in an increased ROE. This result shows consistent with the findings of (Lee & Poku, 2022), showing a negative relationship between ROE and DER. AGE had a significant positive relationship with ROE. The positive association between AGE and ROE contradicts the findings of (Mansikkamäki, 2023) which shows that very small young firms have the greatest likelihood to succeed because they face the fewest risks from non-profitable growth. Similarly, the DAR also showed a negative relationship with ROE. This is due to the fact that, as higher levels of debt are generally associated with lower profitability.

This regression model had a high adjusted R-squared value indicating that the model explains a large proportion of the variance in ROE. The significant F-value also indicated that the model as a whole is statistically significant. The regression model suggests that NPR, SIZE, and AGE are significant predictors of ROE, while the other independent variables (DER, DAR and CR) are not significant predictors. The study is in line in case of size with the research by (Javaid & Alalawi, 2018). Size, the natural logarithm of the total assets though positive, but proved to be insignificant in all of the relevant regressions. In the case of the current ratio, the result shows a positive and statistically significant effect on profitability however our study shows a positive but not significant relationship with profitability.

The regression model for ROA showed a statistically significant relationship of ROA with CR, DAR, DER, SIZE, and AGE. CR, DER, and AGE showed a positive relationship with ROA. This indicated that hydropower companies with higher CR had higher ROA. DAR and SIZE showed a negative relationship with ROA. This suggested that larger companies might be less efficient at generating profits. The adjusted R² value suggested that the model explained a large proportion of the variance in the dependent variable (ROA), indicating a good fit of the model to the data. The statistically significant F-value also indicated that the model as a whole was a good fit for the data.

The adjusted R² value for EPS suggested that the model explained a large proportion of the variance also indicating a good fit of the model to the data. The statistically

significant F-value also indicated that the model as a whole was a good fit for the data for EPS model. The truncated regression model for EPS showed a statistically significant relationship of EPS with CR, NPR, SIZE, and AGE. NPR and CR showed a positive relationship with ROA. This indicated that hydropower companies with higher CR and profits had higher EPS. SIZE showed a negative relationship with EPS. This suggested that larger companies might be less efficient at generating profits.

CHAPTER 5: SUMMARY AND CONCLUSION

5.1 Summary

Financial performance analysis is the process of determining the operating and financial characteristics of a firm from accounting and financial statements. Accomplishing the required trade-off between liquidity, solvency, and profitability is a dilemma in financial management. Because it directly affects the company's profitability and liquidity which is crucial for solid financial planning. The financial performance analysis can be used as a financial tool to determine the efficiency and performance of hydropower companies. This study analyzes the financial performance and firm-specific variables affecting the financial performance of five hydropower companies in Nepal. This study was conducted using descriptive and causal comparative research design to investigate the impact of financial factors such as liquidity and leverage, and non-financial factors such as size and age on the profitability of hydropower companies in Nepal. The influence of liquidity ratio, leverage ratio, and other factors on hydropower's profitability was examined using correlation and regression analysis.

The key findings of this thesis reflect the financial status of the hydropower companies in Nepal and firm-specific variables affecting the profitability of those companies. The profitability of hydropower companies measured in terms of ROE, ROA and EPS showed that the companies with large sizes and long history of operation such as CHCL have more consistent returns while smaller and more recent hydropower companies such as API showed great volatility in the return. The NPR of the hydropower companies also shows a consistent result as that of ROE and ROE in terms of volatility of the companies. Their NPR is more sensitive to changes in the industry or other external factors. CHCL had a relatively higher mean CR, indicating that they have more current assets to meet their short-term obligations. It was because these companies have a better liquidity position compared to the other hydropower companies. API had high volatility in the CR. This indicates that API are experiencing difficulties in managing their short-term assets and liabilities and is struggling to meet its short-term obligations. CHCL have had the highest DER over the past five years indicating their heavy reliance on debt financing to fund operations. API had the

lowest debt-to-equity ratio showing better standing in terms of debt, which indicates that API is less leveraged and more financed by equity.

The correlation analysis implied that the dependent and independent variables are likely to be important predictors of a company's return on equity and return on assets as their results indicated that there were significant relationships between these variables. The positive relationship between the net profit ratio and ROE indicated that companies with higher net profit ratios had higher ROE. The negative relationship between the DER and ROE indicated that companies with higher DER had lower ROE. This result is also indicative as higher levels of debt are generally associated with lower profitability. The regression model suggests that NPR, DER, DAR, and AGE are significant predictors of ROE, while the other independent variables (CR and SIZE) are not significant predictors. The statistically significant relationship of ROA with NPR, SIZE, and AGE indicated that they are significant predictors for ROA. NPR and AGE showed a positive relationship with ROA. This indicated that hydropower companies with higher NPR have higher ROA. SIZE showed a negative relationship with ROA. This suggested that larger companies might be less efficient at generating a return on assets.

5.2 Conclusion

A well-designed and implemented financial management strategy contributes positively to enhancing the financial performance of hydropower companies in Nepal. This study aimed to achieve three main objectives: to analyze the financial performance of these companies, to examine the relationship between firm-specific variables and financial performance, and to assess the impact of these variables on financial performance.

First, the analysis of the sampled hydropower companies revealed that financial performance is significantly influenced by profitability metrics such as return on equity, return on assets, and net profit ratio. Higher values in these profitability metrics indicate stronger financial performance. This finding aligns with the objective of analyzing the financial performance of hydropower companies in Nepal, demonstrating that profitability is a key driver of financial health in this sector.

Second, the study explored the relationship between various firm-specific variables—profitability, liquidity, return on assets, return on debts, firm age, and firm size—and

the financial performance of hydropower companies. The results showed that companies with higher profitability metrics tend to perform better financially. Additionally, a higher debt-to-equity ratio, indicative of aggressive financing through debt, was found to correlate with lower profitability. This suggests that while debt can fuel growth, it may also hinder profitability if not managed effectively. The relationship between firm age and size also emerged as significant, with older and larger companies exhibiting more stable financial returns compared to their smaller and newer counterparts.

Lastly, the assessment of the impact of these firm-specific variables on financial performance provided deeper insights. The continued operation over a longer period contributes to better financial standing, as evidenced by more consistent returns in older and larger companies. In contrast, smaller and newer companies showed greater volatility in returns, highlighting the challenges they face in achieving financial stability. The correlation and regression analyses further supported these findings, showing clear links between the firm-specific variables and the overall financial performance of the companies.

In conclusion, this study underscores the importance of profitability, effective debt management, and the benefits of sustained operations in enhancing the financial performance of hydropower companies in Nepal. Firm-specific variables provide valuable insights into a company's financial health, but these insights must be interpreted within the broader context of industry benchmarks, historical trends, and competitive dynamics. The comparative analysis of different hydropower companies, along with the detailed examination of firm-specific variables, offers a comprehensive understanding of the factors driving financial performance in this capital-intensive industry.

5.3 Implications

This study is significant in diverse ways. Firstly, it unveils the key determinants of the financial performance of hydropower companies listed on the Nepal Stock Exchange which was not scientifically known to the best of our knowledge. This in turn will serve as a great source of information for investors and asset managers alike with regard to investment decisions. This research study provides important information for investors and stakeholders who want to understand the risks and volatility

associated with each company's financial performance. Secondly, it will inform corporate directors on the best corporate finance policies for their organizations; that's either to use equity financing or debt financing. In order to improve the financial performance of hydropower companies, management can sell off obsolete or unnecessary assets, improve cash inflows by speeding debt recovery, gradually reduce debt to enhance debt-to-equity ratios, enhance profitability by eliminating unnecessary expenses, ensure proper inventory management to reduce wastage, maintain sufficient working capital for timely fulfillment of obligations.

The following recommendations could be beneficial for the policymakers, practitioners, and academic community:

- Policymakers need to make an independent regulator to implement the electricity reforms, strong governance, and proper institutional arrangements that can control corruption, and theft and install resistivity towards political shocks in the sector. IPPs entry should also be facilitated and encouraged by minimizing unnecessary market and non-market barriers while providing appropriate entrepreneurial incentives.
- Practitioners and the academic community can use financial performance for modeling purposes. The firm involves many interested parties, like the owners, management, personnel, customers, suppliers, competitors, and regulatory agencies, each having their views on applying financial statement analysis in their evaluations. Practitioners use financial performance, for instance, to forecast the future success of companies, while the academics' main interest has been to develop models exploiting the firm-specific variables, ratios, etc.

Areas for Future Research: This study covers only a limited number of hydropower companies as a sample and a limited study period. Further, there are limitations on capturing the more independent variables. Additional variables total assets turnover ratio, dividend payout ratio, interest coverage ratio, etc. can be considered in future studies. This study has considered only return on equity and return on assets to analyze the financial performance of hydropower companies. Hence, further research is necessary using more samples and longer periods to analyze the financial performance of hydropower companies in Nepal.

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APPENDICES

APPENDIX A: Secondary Data from Financial Reports

Table A-1: Secondary Data of API from Annual financial reports (figures in NRs.).

Fiscal Year	2074/75	2075/76	2076/77	2077/78	2078/79
Current Assets	117,981,497	93,653,195	150,649,471	1,577,761,402	1,891,022,563
Total Assets	3,247,800,632	3,412,395,950	3,556,749,591	5,938,538,220	9,118,263,002
Current Liabilities	480,478,811	411,373,510	450,052,444	465,696,973	621,073,393
Net Profit after Tax	57,744,391	71,034,764	108,966,003	113,227,234	106,142,234
Interest	-19,677	-112,753	-306,529	0	0
Revenue	127,829,031	178,740,059	324,437,259	367,288,448	518,521,323
Short term Debts	113,230,904	189,199,442	243,032,432	387,288,125	547,502,649
Long term Debts	1,572,078,565	1,736,901,383	1,733,106,615	2,663,757,663	4,218,920,622
Total Debts	1,685,309,469	1,926,100,825	1,976,139,047	3,051,045,788	4,766,423,271
Shareholder's Equity	1,195,243,256	1,264,931,057	1,373,590,532	2,809,083,584	4,188,211,413
Number of Outstanding Shares	11,340,000	11,907,000	11,907,000	24,751,963	38,449,155

Table A-2: Secondary Data of CHCL from Annual financial reports (figures in NRs.).

Fiscal Year	2074/75	2075/76	2076/77	2077/78	2078/79
Current Assets	6,025,101,105	6,035,712,004	4,565,763,798	4,140,348,885	4,497,597,842
Total Assets	22,800,410,107	28,022,349,305	34,454,499,616	39,378,905,130	45,870,205,308
Current Liabilities	586,363,250	1,048,871,954	1,550,893,617	2,275,626,123	2,167,923,231
Net Profit after Tax without Interest	895,661,653	788,747,187	586,699,774	585,126,043	632,306,671
Interest	-13,574,809	-28,437,527	-94,518,816	-53,106,173	-83,756,979
Revenue	1,138,432,864	1,170,432,144	1,140,739,306	1,247,027,519	1,303,020,178
Total Debts	8,447,210,799	9,684,222,614	15,134,503,659	19,291,350,284	24,237,695,444
Shareholder's Equity	8,719,939,147	9,194,314,559	9,805,827,908	9,866,580,098	10,100,996,670
Number of Outstanding Shares	39,651,131	47,581,357	57,097,629	62,807,392	67,517,946

Table A-3: Data for Correlation and Regression

S. No.	CR	NPR	DER	DAR	ROE	ROA	EPS	AGE	SIZE
1	0.25	45.17	1.41	0.52	0.05	0.02	5.09	2.70805	21.90124
2	0.23	39.74	1.52	0.56	0.06	0.02	5.97	2.772589	21.95068
3	0.33	33.59	1.44	0.56	0.08	0.03	9.15	2.833213	21.99211
4	3.39	30.83	1.09	0.51	0.04	0.02	4.57	2.890372	22.50473
5	3.04	20.47	1.14	0.52	0.03	0.01	2.76	2.944439	22.93355
6	10.28	78.67	0.97	0.37	0.1	0.04	22.59	3.135494	23.85004
7	5.75	67.39	1.05	0.35	0.09	0.03	16.58	3.178054	24.05627
8	2.94	51.43	1.54	0.44	0.06	0.01	10.28	3.218876	24.26291
9	1.82	46.92	1.96	0.49	0.06	0.01	9.32	3.258097	24.3965
10	2.07	48.53	2.4	0.53	0.06	0.01	9.37	3.295837	24.54908

APPENDIX B: JASP Descriptive Reports

Descriptives

	CR	NPR	DER	DAR	ROE	ROA	EPS	AGE	SIZE
Valid	10	10	10	10	10	10	10	10	10
Missing	0	0	0	0	0	0	0	0	0
Mean	3.010	46.274	1.452	0.485	0.063	0.020	9.568	3.024	23.240
Std. Deviation	3.079	17.116	0.446	0.074	0.022	0.011	5.999	0.218	1.095
Coefficient of variation	1.023	0.370	0.307	0.153	0.343	0.527	0.627	0.072	0.047
Minimum	0.230	20.470	0.970	0.350	0.030	0.010	2.760	2.708	21.901
Maximum	10.280	78.670	2.400	0.560	0.100	0.040	22.590	3.296	24.549

APPENDIX C: JASP Correlation Reports

Pearson's Correlations

Variable		CR	NPR	DER	DAR	ROE	ROA	EPS	AGE	SIZE
1. CR	Pearson's r	—								
	p-value	—								
2. NPR	Pearson's r	0.714*	—							
	p-value	0.020	—							
3. DER	Pearson's r	-0.509	-0.113	—						
	p-value	0.133	0.755	—						
4. DAR	Pearson's r	-0.847**	-0.826**	0.447	—					
	p-value	0.002	0.003	0.195	—					
5. ROE	Pearson's r	0.565	0.831**	-0.168	-0.625	—				
	p-value	0.089	0.003	0.644	0.053	—				
6. ROA	Pearson's r	0.574	0.560	-0.616	-0.467	0.780**	—			
	p-value	0.083	0.092	0.058	0.173	0.008	—			
7. EPS	Pearson's r	0.816**	0.930***	-0.227	-0.823**	0.918***	0.688*	—		
	p-value	0.004	< .001	0.529	0.003	< .001	0.028	—		
8. AGE	Pearson's r	0.450	0.512	0.400	-0.544	0.319	-0.211	0.525	—	
	p-value	0.192	0.130	0.252	0.104	0.370	0.559	0.119	—	
9. SIZE	Pearson's r	0.472	0.540	0.373	-0.584	0.287	-0.231	0.521	0.992***	—
	p-value	0.168	0.107	0.288	0.076	0.421	0.522	0.123	< .001	—

* p < .05, ** p < .01, *** p < .001

APPENDIX D: JASP Regression Reports

D-1. Initial Models

Model Summary - ROE

Model	R	R ²	Adjusted R ²	RMSE	R ² Change	F Change	df1	df2	p
H ₀	0.000	0.000	0.000	0.022	0.000		0	9	
H ₁	0.973	0.946	0.839	0.009	0.946	8.837	6	3	0.051

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H ₁	Regression	0.004	6	6.641×10 ⁻⁴	8.837	0.051
	Residual	2.255×10 ⁻⁴	3	7.515×10 ⁻⁵		
	Total	0.004	9			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	95% CI	
							Lower	Upper
H ₀	(Intercept)	0.063	0.007		9.211	< .001	0.048	0.078
H ₁	(Intercept)	0.765	0.872		0.877	0.445	-2.009	3.539
	CR	-9.966×10 ⁻⁴	0.005	-0.142	-0.217	0.842	-0.016	0.014
	NPR	0.001	0.001	1.049	1.049	0.371	-0.003	0.005
	DER	-0.004	0.070	-0.090	-0.062	0.954	-0.228	0.219
	DAR	-0.036	0.508	-0.125	-0.071	0.948	-1.653	1.580
	AGE	0.398	0.121	4.002	3.287	0.046	0.013	0.783

Coefficients

Model	Unstandardized	Standard Error	Standardized	t	p	95% CI	
						Lower	Upper
SIZE	-0.083	0.041	-4.221	-2.056	0.132	-0.213	0.046

Model Summary - ROA

Model	R	R ²	Adjusted R ²	RMSE	R ² Change	F Change	df1	df2	p
H ₀	0.000	0.000	0.000	0.011	0.000	0	9		
H ₁	0.989	0.978	0.935	0.003	0.978	22.578	6	3	0.014

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H ₁	Regression	9.783×10 ⁻⁴	6	1.631×10 ⁻⁴	22.578	0.014
	Residual	2.167×10 ⁻⁵	3	7.222×10 ⁻⁶		
	Total	0.001	9			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	95% CI	
							Lower	Upper
H ₀	(Intercept)	0.020	0.003		6.000	< .001	0.012	0.028
H ₁	(Intercept)	0.817	0.270		3.022	0.057	-0.043	1.677
	CR	0.003	0.001	0.944	2.270	0.108	-0.001	0.008

Coefficients

Model	Unstandardized	Standard Error	Standardized	t	p	95% CI	
						Lower	Upper
NPR	-1.396×10 ⁻⁴	3.914×10 ⁻⁴	-0.227	-0.357	0.745	-0.001	0.001
DER	0.031	0.022	1.295	1.403	0.255	-0.039	0.100
DAR	-0.249	0.157	-1.760	-1.584	0.211	-0.750	0.252
AGE	0.167	0.038	3.453	4.459	0.021	0.048	0.287
SIZE	-0.053	0.013	-5.491	-4.205	0.025	-0.093	-0.013

Model Summary - EPS

Model	R	R ²	Adjusted R ²	RMSE	R ² Change	F Change	df1	df2	p
H ₀	0.000	0.000	0.000	5.999	0.000		0	9	
H ₁	0.989	0.979	0.936	1.513	0.979	23.088	6	3	0.013

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H ₁	Regression	316.985	6	52.831	23.088	0.013
	Residual	6.865	3	2.288		
	Total	323.850	9			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

95% CI

Model		Unstandardized	Standard Error	Standardized	t	p	Lower	Upper
H ₀	(Intercept)	9.568	1.897		5.044	< .001	5.277	13.859
H ₁	(Intercept)	38.555	152.103		0.253	0.816	-445.504	522.613
	CR	0.271	0.801	0.139	0.339	0.757	-2.279	2.822
	NPR	0.351	0.220	1.000	1.592	0.210	-0.350	1.052
	DER	-5.059	12.264	-0.376	-0.412	0.708	-44.089	33.971
	DAR	30.559	88.628	0.379	0.345	0.753	-251.495	312.613
	AGE	56.834	21.109	2.062	2.692	0.074	-10.343	124.011
	SIZE	-9.696	7.079	-1.769	-1.370	0.264	-32.225	12.832

D-2. Redefined Models

Model Summary - ROE

Model	R	R ²	Adjusted R ²	RMSE	R ² Change	F Change	df1	df2	p
H ₀	0.000	0.000	0.000	0.022	0.000		0	9	
H ₁	0.969	0.938	0.907	0.007	0.938	30.364	3	6	< .001

ANOVA

Model		Sum of Squares	df	Mean Square	F	p	
H ₁	Regression		0.004	3	0.001	30.364	< .001
	Residual		2.602×10 ⁻⁴	6	4.336×10 ⁻⁵		
	Total		0.004	9			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	95% CI	
							Lower	Upper
H ₀	(Intercept)	0.063	0.007		9.211	< .001	0.048	0.078
H ₁	(Intercept)	0.720	0.144		4.991	0.002	0.367	1.073
	AGE	0.374	0.083	3.768	4.521	0.004	0.172	0.577
	SIZE	-0.080	0.017	-4.033	-4.742	0.003	-0.121	-0.039
	NPR	0.001	1.562×10 ⁻⁴	1.079	8.724	< .001	9.807×10 ⁻⁴	0.002

Model Summary - ROA

Model	R	R ²	Adjusted R ²	RMSE	R ² Change	F Change	df1	df2	p
H ₀	0.000	0.000	0.000	0.011	0.000		0	9	
H ₁	0.989	0.977	0.949	0.002	0.977	34.623	5	4	0.002

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H ₁	Regression	9.774×10 ⁻⁴	5	1.955×10 ⁻⁴	34.623	0.002
	Residual	2.258×10 ⁻⁵	4	5.646×10 ⁻⁶		
	Total	1.000×10 ⁻³	9			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	95% CI	
							Lower	Upper
H ₀	(Intercept)	0.020	0.003		6.000	< .001	0.012	0.028
H ₁	(Intercept)	0.726	0.078		9.245	< .001	0.508	0.944
	AGE	0.163	0.032	3.370	5.162	0.007	0.075	0.251
	SIZE	-0.049	0.007	-5.122	-7.261	0.002	-0.068	-0.030
	DAR	-0.194	0.030	-1.373	-6.489	0.003	-0.278	-0.111
	DER	0.023	0.005	0.975	4.982	0.008	0.010	0.036
	CR	0.003	5.555×10 ⁻⁴	0.811	4.999	0.007	0.001	0.004

Model Summary - EPS

Model	R	R ²	Adjusted R ²	RMSE	R ² Change	F Change	df1	df2	p
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Model Summary - EPS

Model	R	R ²	Adjusted R ²	RMSE	R ² Change	F Change	df1	df2	p
H ₀	0.000	0.000	0.000	5.999	0.000		0	9	
H ₁	0.988	0.977	0.958	1.222	0.977	52.964	4	5	< .001

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H ₁	Regression	316.383	4	79.096	52.964	< .001
	Residual	7.467	5	1.493		
	Total	323.850	9			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	95% CI	
							Lower	Upper
H ₀	(Intercept)	9.568	1.897		5.044	< .001	5.277	13.859
H ₁	(Intercept)	91.363	26.946		3.391	0.019	22.097	160.629
	AGE	57.454	15.383	2.085	3.735	0.014	17.909	96.998
	SIZE	-11.616	3.125	-2.120	-3.717	0.014	-19.649	-3.583
	CR	0.638	0.191	0.328	3.339	0.021	0.147	1.130
	NPR	0.271	0.036	0.773	7.440	< .001	0.177	0.364