COST VOLUME PROFIT ANALYSIS OF NEPAL TELECOM LIMITED, NEPAL ELECTRICITY AUTHORITY AND NEPAL OIL CORPORATION

A Thesis

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RECOMMENDATION

This is to certify that the thesis:

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has been prepared and approved by this department in the prescribed format of Faculty of Management. This thesis is forwarded for examination.

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VIVA-VOCE SHEET

We have conducted the Viva-Voce examination of the thesis presented

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and found the thesis to be original work of the student and written in accordance to the prescribed format. We recommend the thesis to be accepted as partial fulfillment of the requirements for

Master Degree of Business Studies (M.B.S)

Viva-Voce Committee:

Head, Research Department :……

Member (Thesis Supervisor) :……

Member (External Expert) :…….

DECLARATION

I hereby declare that the work reported in this thesis entitled, **Cost Volume Profit Analysis of Nepal Telecom Limited, Nepal Electricity Authority and Nepal Oil Corporation submitted** to Shanker Dev Campus, Faculty of Management, Tribhuvan University, is my original work done in the form of partial fulfillment of requirement for the Master's Degree in Business Studies (M.B.S) under the supervision, Romakant Bhattarai of Shanker Dev Campus.

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ABBREVIATIONS

ACP	Average Collection Period
AR	Account Receivable
ASV	Actual Sales Volume
COS	Cost of Sales
CSP	Constant Selling Price
CVPA	Cost-Volume-Profit Analysis
DOL	Degree of Operating Leverage
MOS	Margin of Safety
NEA	Nepal Electricity Authority
NOC	Nepal Oil Corporation
NOIAE	Non-Operating Incomes and Expenses
NTC	Nepal Telecom Company
OCF	Operating Cash Flow
OMC	Operating and Maintenance Cost
PT	Profit
SPPU	Selling Price per Unit
SR	Sales Revenue
SVC	Semi Variable Cost
TC	Total Cost
UTL	Operator United Telecom Limited
VCPU	Variable Cost per Unit

CHAPTER-I

INTRODUCTION

1.1 Background of the Study

Cost-volume-profit (CVP) analysis is a critical process in evaluating the financial aspects of an enterprise, essential for effective decision-making and control. It originated from the necessity of business managers to understand the reasons behind fluctuations in costs, volumes, and profits. Variations in demand, selling prices, production levels, costs, productivity, competitive pressures, and government regulations can all impact actual earnings compared to budgeted expectations. This analytical tool helps determine the viability of specific projects, choose between alternative projects, and guide the timing of projects. It requires thoughtful judgment in decision-making. CVP analysis operates under several assumptions, including constant sales prices, fixed costs, and variable costs per unit. The process involves using mathematical equations to calculate prices, costs, and other variables, which are then plotted on an economic graph to visualize their impact.CVP analysis provides insights into how changes in variable and fixed costs influence a firm's profitability (Bhattarai, 2014).

The contribution margin plays a crucial role in determining the break-even point of sales. It is calculated by subtracting variable costs from sales revenue. By dividing the total fixed costs by the contribution margin ratio, one can determine the break-even point in terms of total sales rupees. Cost-volume-profit (CVP) analysis relies on the assumption that costs remain fixed within a specified production level. It also assumes that all units produced are sold and that fixed costs remain stable. Moreover, any changes in expenses are assumed to occur solely due to changes in the level of activity. For semi-variable expenses, which have both fixed and variable components, proper classification is crucial. This can be achieved using methods like the high-low method, scatter plot analysis, or statistical regression techniques (Horngren et al., 2008). These tools help in accurately determining how much of the expense should be categorized as fixed versus variable. In essence, CVP analysis provides valuable insights into profitability and helps

businesses make informed decisions based on these assumptions and methodologies (Horngren et al., 2008).

Organizational management relies on forecasting future incomes, expenses, and revenues to design and monitor operations effectively. Cost-Volume-Profit (CVP) analysis is a vital tool used in this process to determine the necessary levels of operational activity to avoid losses, achieve targeted profits, plan future operations, and evaluate organizational performance. In service management, particularly in accounting, CVP analysis focuses primarily on the contribution margin, which is crucial for determining profitability. The contribution margin represents the amount remaining from sales revenue after deducting variable costs. For an organization to succeed, the total contribution margin must cover all fixed costs incurred by the business. The contribution margin concept simply subtracts variable costs from total sales revenue to determine how much revenue is left to contribute towards covering fixed costs (Horngren et al., 2008). This approach helps organizations understand their cost structure and make strategic decisions to enhance profitability.

Cost-Volume-Profit (CVP) analysis plays a crucial role in managerial decision-making, especially in cost control and profit planning. It provides valuable insights into how costs behave in relation to changes in sales volume, aiding businesses in determining their break-even point and projecting profits based on different sales scenarios. This analysis is essential as it helps businesses understand when they would operate at zero profit due to variations in output or sales projections.

In the context of Nepal Telecom (NTC), Nepal Oil Corporation (NOC), and Nepal Electricity Authority (NEA), the application of CVP analysis as a tool for profit analysis is particularly relevant. These sectors have faced significant challenges, including declining revenues and profits in recent years. Despite efforts to improve financial health, managing surplus power has become a primary concern in the power sector, especially with the elimination of power cuts (load-shedding).The surplus power generated during the rainy season poses a unique challenge as it cannot be fully utilized, leading to inefficiencies and potential waste. Additionally, banks are grappling with issues related to project financing in the hydropower sector, where projects lacking Power Purchase

Agreements (PPAs) struggle to secure loans to meet lending targets.CVP analysis aids in profit planning by examining cost and sales price dynamics, sectors like telecommunications and power in Nepal face multifaceted challenges beyond revenue declines, including surplus power management and project financing uncertainties in the hydropower sector. These challenges underscore the complexity of strategic decision-making in these vital sectors of the economy.

The Nepal Oil Corporation (NOC) has proposed several measures to address the depletion of foreign currency reserves and reduce its own financial losses. These include implementing an odd-even system for private and government vehicles, setting quotas on maximum fuel purchases for small vehicles, and restricting vehicle movement on Saturdays. However, these recommendations have sparked controversy due to concerns about their impact on the general public and economic activities in the country. Critics argue that these measures display a lack of consideration for the lives of common people and demonstrate a misunderstanding of their implications for government functions. There is a perception that NOC is attempting to shift responsibility away from its own obligations by proposing such stringent measures. While the reported financial losses of NOC are acknowledged, it is important to differentiate between the losses of a state-owned enterprise, which is part of the public sector, and those of a private enterprise. The implications of NOC's decisions extend beyond mere financial figures, affecting broader economic stability and public trust.

NOC's proposals aim to address pressing economic challenges, they have sparked debate and concern regarding their feasibility and impact on the public and the government itself. The situation underscores the complexities involved in managing state-owned enterprises and their role in the broader economy.

1.1.1 Introduction of Sample Organization

Nepal Telecom (NTC)

Nepal Doorsanchar Company Ltd., widely recognized as Nepal Telecom (NTC), is a state-owned telecommunications service provider in Nepal, with the government holding a majority 91.49% stake. Initially enjoying a monopoly in the telecommunications sector until 2003, Nepal Telecom faced competition with the entry of the first private operator,

United Telecom Limited (UTL). The company's headquarters are located at Bhadrakali Plaza in Kathmandu, overseeing operations across 184 locations nationwide, including branches and offices.

Nepal Telecom offers a range of services such as fixed-line, ISDN, and leased-line services. While it was the exclusive provider of GSM mobile services in the past, competition intensified after the entry of NCELL (formerly Mero Mobile) in 2005. With a workforce exceeding 5,400 employees, Nepal Telecom stands as one of Nepal's largest corporations. It operates 262 telephone exchanges, serving over 603,291 PSTN lines, more than 5 million GSM cellular phones, and over a million CDMA phone lines as of July 2011. Recent figures indicate approximately 20 million users of Nepal Telecom's services, including fixed landline, GSM mobile, CDMA, and internet services.

The company achieved a milestone by launching 4G LTE service on January 1, 2017, becoming Nepal's first operator to offer 4G LTE coverage across all seven provinces. In July 2019, Nepal Telecom successfully tested Voice over LTE (VoLTE) service, which was made available to users from May 17, 2021. According to the Nepal Telecommunication Authority's April 2019 report, Nepal Telecom led in cable internet subscriptions with over 211,513 subscribers, covering 84% of the cable internet market. Furthermore, as the sole provider of WiMAX, Nepal Telecom had 87,977 subscribers by April 2019.

On October 2, 2019, Nepal Telecom expanded its 4G service to 60 cities in 37 districts, with the inauguration ceremony led by Prime Minister KP Sharma Oli.

Nepal Electricity Authority (NEA)

Established on August 16, 1985 (Bhadra 1, 2042) under the Nepal Electricity Authority Act of 1984, the Nepal Electricity Authority (NEA) emerged from the amalgamation of the Department of Electricity of the Ministry of Water Resources, Nepal Electricity Corporation, and associated Development Boards. This consolidation aimed to address the inherent weaknesses of fragmented electricity organizations marked by overlapping functions and duplicative efforts. By merging these entities, the goal was to enhance efficiency and ensure reliable service delivery. NEA's primary objective is to plan, construct, operate, and maintain all generation, transmission, and distribution facilities

within Nepal's power system, encompassing both interconnected and isolated systems. It advises the Government of Nepal on long and short-term plans and policies in the power sector and collaborates with the government to determine and implement tariff structures for electricity consumption. NEA also facilitates training and educational programs to cultivate skilled manpower in generation, transmission, distribution, and related sectors.

Nepal Oil Corporation (NOC)

Nepal Oil Corporation Limited (NOC) is the sole state-owned trading enterprise in Nepal entrusted with the importation, storage, and distribution of various petroleum products throughout the country. It holds a monopoly over the importation of petrol and diesel, with no private entities permitted to engage in this activity. Established in 1970 under the "Company Act, 2021 (1964)" by the Government of Nepal, NOC is predominantly government-owned, with the government holding a 99.46% share. The remaining shares are contributed by four other state-owned enterprises: Rastriya Beema Sansthan, National Trading Ltd., Nepal Bank Ltd., and Rastriya Banijya Bank.

1.2 Statement of the Problems

Cost-volume-profit (CVP) analysis is an essential technique that offers valuable insights for profit planning. In Nepal, industries and agriculture play a critical role in the country's development. The banking sector in Nepal is currently experiencing a phase of impactful growth, yet there remains considerable room for further development, particularly in implementing and utilizing break-even analysis effectively.

Understanding and correctly classifying costs as fixed and variable components are fundamental for successful application of cost-volume-profit analysis. Without this distinction, conducting effective CVP analysis becomes nearly impossible. The focus of this study is to analyze and assess profitability, break-even points, liquidity, and debt management within the banking sector.

Profitability is the primary goal of any business organization. Alongside other objectives, maximizing profit is crucial. However, challenges arise, such as high production costs per unit due to low production volumes, leading to higher selling prices that may not align with public expectations or technological advancements.

Optimizing asset utilization is another significant challenge faced by production facilities in Nepal. Underutilization of capacity contributes significantly to increased costs. Therefore, leveraging cost-volume-profit analysis provides supplementary information necessary for strategic profit planning.

In addressing these issues, this research aims to explore and resolve pertinent questions within the context of Nepal's banking and industrial sectors, ensuring the effective application of CVP analysis to enhance operational efficiency and profitability.

- What is the current status of cost volume and profit of NTC, NOC and NEA?
- Is there any relationship between cost, revenue, volume and profit of NTC, NOC and NEA?
- What is the impact of cost and volume on profit of NTC, NOC and NEA?

1.3 Objectives of the study

The main objectives of the present study are to emphasize the effectiveness of cost-volume-profit (CVP) analysis in the context of Nepal Telecom (NTC), Nepal Oil Corporation (NOC), and Nepal Electricity Authority (NEA). The research aims to achieve the following objectives:

- To analyze the current status of cost volume and profit of NTC, NOC and NEA.
- To measure the relationship between cost, revenue, volume and profit of NTC, NOC and NEA.
- To analyze the impact of cost and volume on profit of NTC, NOC and NEA.

1.4 Significance of the Study

Cost-volume-profit (CVP) analysis is essential for the sustainable operation of any enterprise, as it provides crucial insights into managing costs and profitability on a day-to-day basis. Businesses that neglect CVP analysis risk financial instability and even bankruptcy. The primary goal of CVP analysis is to effectively manage costs and optimize profitability.

Research in the field of CVP analysis has predominantly focused on accounting sectors, with limited attention given to the specific challenges faced by service sector public

enterprises like NTC, NOC, and NEA. This study aims to fill this research gap by conducting a comprehensive investigation into the application and effectiveness of CVP analysis in these organizations.

This research is a pioneering effort that seeks to provide valuable insights into the financial performance and operational dynamics of NTC, NOC, and NEA. The findings of this study are expected to benefit the sampled companies by offering insights into working capital management, liquidity, and profitability positions. Policy makers can also utilize these findings to formulate informed policies. Additionally, stakeholders such as customers, financing agencies, exchanges, traders, and experts can derive valuable insights from this study.

Furthermore, this research aims to serve as a foundation for future studies in the field, providing a basis for further exploration and development of knowledge related to working capital management in trading companies.

1.5 Limitations of the Study

The study is specifically limited to examining NTC, NOC, and NEA in Nepal. The main limitations of this research are outlined as follows:

This study focuses exclusively on NTC, NOC, and NEA, without considering other companies or sectors.

The analysis is based on data spanning a period of 10 years, from FY 2013/014 to FY 2022/023.

The study is primarily centered on cost-volume-profit analysis and its implications for accounting performance, which may limit its applicability to other types of companies or broader economic contexts.

These limitations highlight the scope and focus of the research, emphasizing its relevance primarily to the specified companies and the specific period under review.

1.6 Organization of the Study

The study is structured into five chapters, with each chapter addressing the following topics:

Chapter –I: Introduction

This chapter serves as an introduction to the study. As mentioned earlier, it outlines several key aspects to be explored, including the general context, brief profiles of selected companies, statement of the problem, objectives, significance of the study, literature review, research methodology, limitations, and structure of the study.

Chapter II: Review of Literature

This chapter consolidates reviews of pertinent literature and studies to identify existing gaps. It encompasses a conceptual framework concerning banks and the analysis of financial institution performance, along with a review of related studies from journals, books, theses, and newspapers.

Chapter III: Research Methodology

This chapter details the methodology employed in the study, covering aspects such as the population, sample size, sampling methods, and data sources. It also includes an explanation of the research design utilized, along with the various financial and statistical tools applied in the research.

Chapter- IV: Presentation and Analysis of Data

This chapter centers on presenting and analyzing the data gathered from diverse sources, as well as discussing the key findings of the study.

Chapter- V: Summary, Conclusions and Recommendations

This chapter summarizes the study's findings, draws conclusions based on the analysis, and presents recommendations derived from those conclusions. It also compares the findings with existing empirical evidence when relevant and suggests avenues for future research. Additionally, the chapter includes a bibliography and an appendix with pertinent supplementary materials.

CHAPTER-II

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

This chapter focuses on reviewing existing literature related to the topic of Cost-Volume-Profit (CVP) Analysis. The aim of this literature review is to gain a deeper understanding of the subject area, identify any new insights or contributions, and gather ideas for shaping the research design. Previous studies are essential as they form the basis for the current study. This chapter presents a synthesis of available literature, drawing from research papers, articles, and theses relevant to the topic, as well as personal knowledge and experiences in the field.

2.1 Conceptual Review

2.1.1 Concept of CVP Analysis

Every business establishment is established with the aim of offering services to customers and generating profits. However, achieving these objectives in today's competitive business environment is no easy feat. With the advent of globalization, the market has become increasingly challenging to navigate. As a result, businesses must not only rely on trial and error but also exert considerable effort and provide various amenities to safeguard against losses. Consequently, they must strategize for the future in a manner that ensures the realization of their business goals. To attain profitability, it is imperative to assess the organization's capabilities, operations, and resource utilization. Moreover, identifying areas for cost reduction is crucial, as even minor expense reductions can lead to increased profitability.

2.1.2 Objectives of Cost-Volume-Profit Analysis

Cost-volume-profit analysis aims to assist in profit planning, cost management, and decision-making purposes. It facilitates the establishment of flexible budgets, which outline costs and profits across different levels of activity. This analysis assists in identifying the minimum sales volume necessary to avoid losses and determines the sales volume required to meet the firm's profit objectives. Additionally, it assists management

in identifying the most profitable combination of costs and volume. By evaluating the impact of changes in selling price on profitability, it enables management to make informed pricing decisions. Furthermore, it offers a method for evaluating the profitability of individual products, allowing for the determination of the optimal product mix.

2.1.3 Assumptions of CVP Analysis

Constant sales price Constant variable cost per unit Constant total fixed cost. Constant sales mix Units sold equal units produced.

2.1.4 Problems of CVP Analysis

Three challenges arise when implementing CVP analysis. They include:

1. **The Activity Based**

Product units are preferable if the analysis is applied to one product. For multiple products the activity base must be in additive units using a common denominator of volume or output. The net sales amounts are usually the only satisfactory common denominator.

Inventory Changes

If the budgeted changes in inventories are immaterial, they may be disregarded in CVP Analysis. In case the changes are significant, they must be included in the analysis. Hence the two approaches often used are:

- disregarded the inventory change
- include the inventory change

Non-operating Incomes and Expenses

Non-operating or extra ordinary expenses and incomes, if amounts are significant, it can cause another problem in CVP Analysis. The basic issue is whether to include or exclude from the analysis. However, if they are included, it is preferable to include the net of other income and other expenses. If the excess is expenses, it would be added to fixed expenses whereas if the excess is income, it should be deducted from the fixed expenses.

2.1.5 Limitation of CVP Analysis

CVP Analysis aids in profit planning, although firms may not be able to produce outputs as desired due to certain constraints inherent in the analysis. These constraints include the following:

- CVP analysis relies on simplistic assumptions regarding cost behavior, which can limit the model's effectiveness.

2.1.6 Terms use in CVP Analysis

1. Fixed Cost

Fixed costs remain unchanged in total regardless of fluctuations in output levels within the capacity limit.

2. Variable Cost

Variable cost is also considered as Prime cost that means direct cost. They include the cost of raw materials used in making a commodity, wages of labor, wear and tear etc. these cost values with the quantity produced. If production is stopped the prime cost disappears. It is the cost which changes in direct proportion to and in the same direction as the change activity levels or output. When the output doubles, the variable cost will also double but the cost per unit remains the same in each activity.

3. Semi Variable Cost

The costs which have characteristics of fixed cost and variable cost is called semi variable cost. It is a cost which changes as output or activity but not in proportion to change in the activity base, for example lighting indirect material, indirect labor, repair and maintenance etc.

4. Step-Fixed Cost

Step fixed costs are those which remain constant over a wide range of activity but jump to a different amount for activity level outside the range. All fixed costs are step fixed costs because none of them remain the same for an infinite level of output.

5. Contribution Margin

Contribution margin is defined as the surplus of the selling price per unit of output over its variable cost. It allows covering the fixed costs and contributes to the profit.

6. Margin of Safety

The margin of safety serves as a safeguard for a business against potential future uncertainties. A larger margin of safety indicates a higher likelihood for the firm to generate profits, whereas a smaller margin suggests a greater risk of incurring losses. It is calculated as the surplus of actual or projected sales over the break-even point (BEP) sales. In essence, it represents the variance between actual or projected sales and the break-even point, (Bajracharya, et al, 2008).

Symbolically,

MOS = Actual Sales Volume – BE Sales Volume

$$\text{MOS Ratio} = \frac{\text{Margin of safety}}{\text{Actual Sales}}$$

MOS (%) = {(Actual Sales- BE Sales) × 100} / Actual Sales

2.1.7 Definition of BEP

BE analysis is widely used technique for the study of CVP relationship. It is the plot used under BE analysis. BEP is the volume of activity where the origin's revenue and express are equal. At this point the amount of sales and the organizations has no profit or loss. BEA is a method of determining the point at which the firm will break even but it also shows the management tune of the firm's profit or loss, if sales exceed or fall below that point BEA is important, (Bajracharya, et al., 2008).

2.1.8 Assumptions of BEP

BEP analysis and contribution of analysis is based on a specific set of assumption that should be clearly understood. These underlying assumptions are as follows.

2.1.9 Limitations of BEP

BE Analysis in many business situations can be used for effective decision-making but there are many shortcomings in its analysis and interpretation. Some of these can be listed the assumption of producer's market phenomenon may not hold good for all types of commodities.

2.1.10Applications of BEP

The break-even concept holds various applications within a business enterprise. These include determining profits at different sales levels and assessing the margin of safety. It aids in identifying the necessary output level to achieve desired profit targets, as well as understanding the impact of price adjustments on sales volume and alterations in sales mix. Additionally, it facilitates analyzing the effects of changes in both fixed and variable costs on sales volume. Break-even analysis supports decision-making processes such as selecting the most profitable alternatives, deciding whether to make or buy, and evaluating whether to discontinue or introduce specific products or services (Pandey, 1999).

2.1.11 Methods of Computation BEP

1. Algebraic Method

The break-even point (BEP) can be determined using the algebraic method, also known as the formula method. According to its definition, the break-even point represents the level of sales or activity where there is neither profit nor loss. At this point, total costs equal total revenue. This relationship can be expressed in equation form as follows:

Sales Revenue = Total Cost, Or,

For Total Cost = FC + (VCPU × Q) ---------- equation (i)

We have,

SR = TC

Or, Q = FC/ (SPPU – VCPU) ---------- equation (ii)

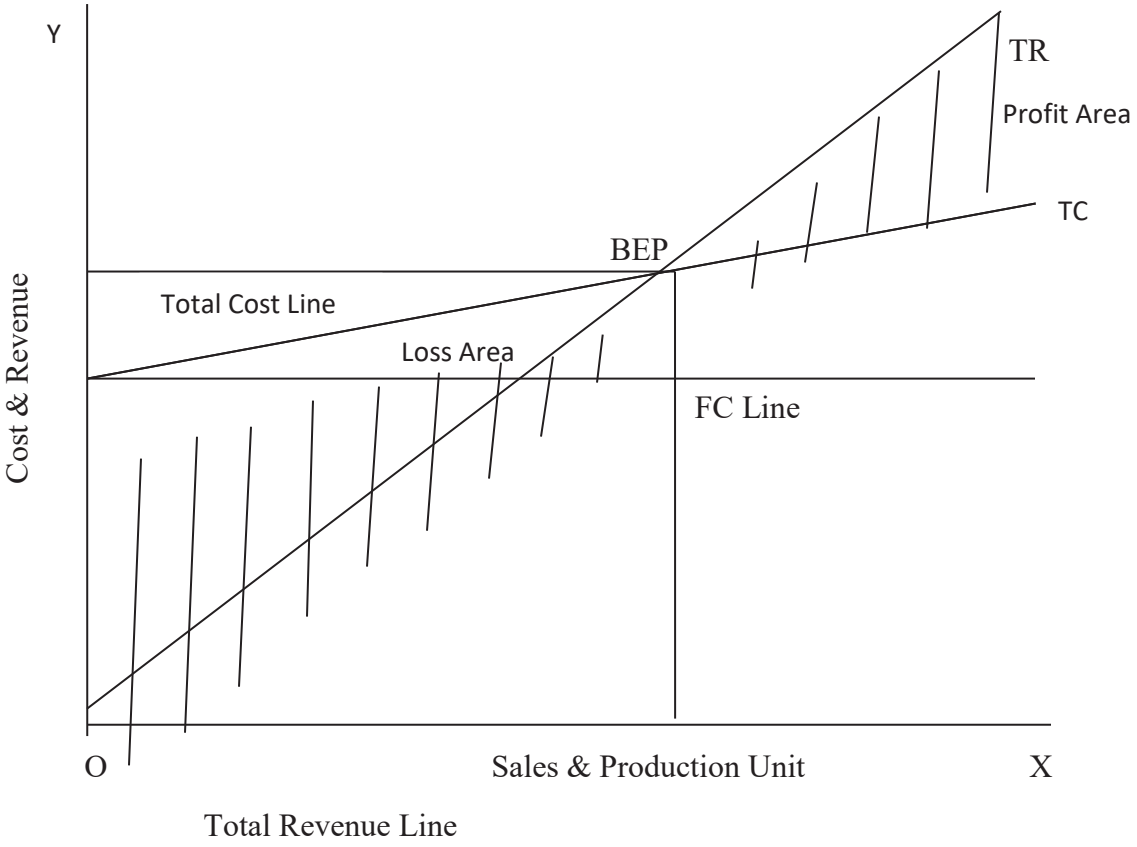
Where,

Q = BEP in Units FC = Fixed Cost SPPU = Selling Price per Unit VCPU = Variable Cost per Unit

TC = Total Cost (Bhattarai, 2014)

2. Graphic Method

BEP can be obtained by using graph too. A break-even chart visually represents the interplay between revenues, variable costs, fixed costs, and the resulting profits or losses. The break-even point (BEP), where the total cost and total revenue lines intersect, signifies the point where neither profit nor loss is incurred. Below this threshold, the firm experiences losses, while above it, the firm generates profits.



Source: (Bajracharya, et al, 2008)

*Figure: 2.1:*The Approach to Break-Even Point (BEP) Analysis

Figure 2.1 illustrates the relationship between sales and production units on the horizontal (x-axis), while costs and revenues are represented on the vertical (y-axis). In the graph, fixed costs are depicted as a horizontal line parallel to the x-axis, indicating their constant nature within the relevant range. Variable costs rise from the origin towards the right, influenced by the variable cost ratio. The total cost curve follows a similar path to the

variable cost curve. The Break-Even Point (BEP) is identified at the intersection of the total cost and sales revenue lines. This signifies the point at which total revenues match total costs. This graphical representation highlights that achieving the BEP enables the company to generate adequate revenues to cover its operating expenses.

3. Contribution Margin Method

BEP also can be determined by using the Contribution margin method. It can be defined as the excess of sales of amount over its VC. It is the difference between the portions or rupees that are left after variable expenses are deducted FC. It is particularly useful in determining BEP and target profit. It can be expressed as:

CM = Total Sales – TVC

CMPU = SPPU – VCPU

Where,

Q = BEP in Units

FC = Fixed Cost

SPPU = Selling Price per Unit

VCPU = Variable Cost per Unit

2.1.12 PV Ratio

PV Ratio establishes a relationship between the CM and the sales volume. The two factors profit and volume are interconnected as well as dependent with each other. Profit depends upon sales, sales price to a great extend depends upon the volume of production.

2.1.13 Steps (Jumping) Fixed Cost and Multiple BEP

The Break-Even Point (BEP) is calculated by dividing the fixed costs by the contribution margin per unit, when fixed costs exhibit a step change (i.e., step fixed costs), a distinct fixed cost amount must be accounted for at each step. Therefore, the break-even point (BEP) must be calculated for each level of fixed cost. However, some of these computed BEPs may not be feasible if they exceed the limits defined by the relevant range corresponding to the fixed cost level being analyzed. Hence, the actual break-even point is determined using a trial-and-error approach (Munakarmi, 2003).

2.1.14 Assumptions Underlying CVP Analysis

Break-even analysis is a valuable tool for profit planning and management, providing insights into the relationships among costs, volume, and profitability. The discussion on Cost-Volume-Profit (CVP) analysis, or break-even analysis, is based on the following assumptions (Pandey, 1994).

a. Cost Segregation

Total costs consist of fixed and variable components. Fixed costs remain constant regardless of changes in sales volume. Unit variable costs remain constant per unit of output, while total variable costs fluctuate directly with changes in sales volume.

b. Constant Selling Price

The selling price per unit remains consistent and does not vary with changes in volume or other factors.

c. Constant Sales Mix

The company either produces a single product, or in cases where there are multiple products, the sales mix remains stable and does not change.

d. Coordinated Production and Sales

Production and sales are synchronized, ensuring that inventory levels remain constant.

2.1.15 Limitations of CVP Analysis

The usefulness and broad applicability of CVP analysis are constrained by certain assumptions. Thus, it is crucial for the analysis to acknowledge these limitations and make necessary adjustments to the data to ensure the attainment of meaningful results. Some of the limitations associated with CVP analysis include (Pandey,1999).

- Separating costs into fixed and variable components can be challenging.
- Total fixed costs may not remain constant across all volume ranges.
- The assumption of a constant selling price and unit variable cost may not hold true.
- Applying break-even analysis to multi-product firms can be complex.

Break-even analysis is primarily applicable in the short term and has restricted utility in long-term planning. It's considered a static tool for analysis.

2.1.16 Special Problems in CVP Analysis

Three unique challenges arise within CVP analysis, namely non-linear cost behavior, step-fixed costs, and the presence of multiple product lines or services, necessitating careful consideration and adaptation of traditional analysis techniques,(Fago, 2003).

a. The Activity Base

When performing break-even analysis for multiple production activities, the unit of measurement often transitions to a monetary amount rather than a physical product unit, with the activity base expressed in terms of volume or output. In scenarios involving multiple products, the activity base must be cumulative, using a common measure such as net sales revenue to encompass manufacturing, selling, and administrative activities collectively.

b. The Change in Inventory

Normally, minor fluctuations in budgeted inventories, including finished goods and work in process, are considered insignificant in CVP analysis and can be disregarded. However, if there is a significant anticipated change in inventory, it should be included in the analysis. Management's handling of inventory adjustments may differ, with some choosing to ignore these changes while others decide to incorporate them.

d. The Non-Operating Incomes and Expenses

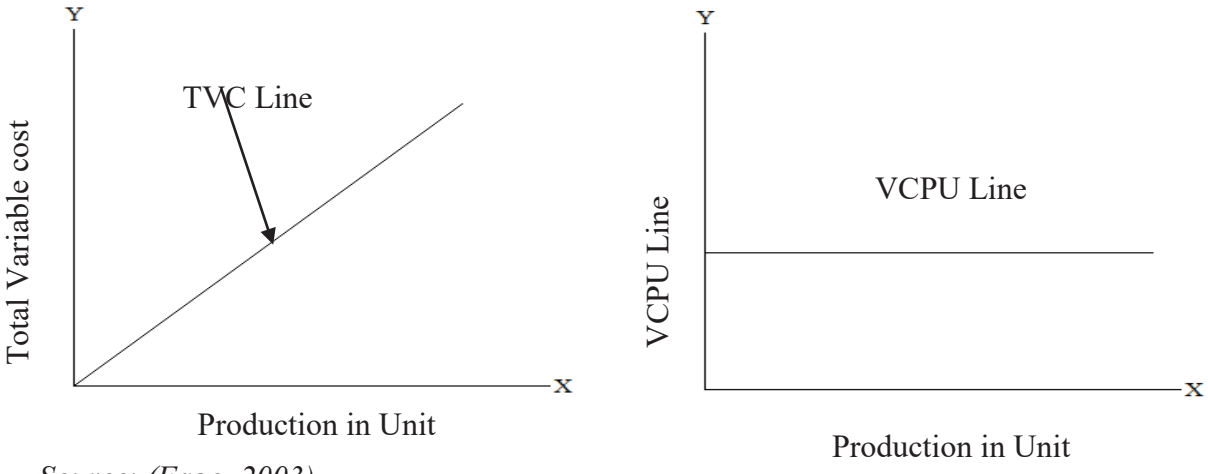
Non-operating income and expenses, such as extraordinary gains and losses, pose a challenge in CVP analysis. The key decision revolves around whether to include or exclude them from the analysis. Management may adopt different policies in this regard, choosing either to incorporate or disregard non-operating income and expenses.

2.1.17 Cost Structure

There are three categories of costs based on their variability. They are as follows:

a. Variable Costs

Variable costs change in direct proportion to changes in the level of activity. For instance, if the activity level increases by 50%, the variable costs also increase by 50%. While the total variable costs fluctuate with changes in activity levels, they remain constant on a per unit basis. Any alteration in variable costs impacts the profit-volume ratio (P/V ratio), break-even point (BEP), and net income. An increase in variable costs results in a decrease in net income, contribution margin ratio (P/V ratio), and margin of safety, but it contributes to raising the break-even point. This concept of variable costs is illustrated in the diagram below:

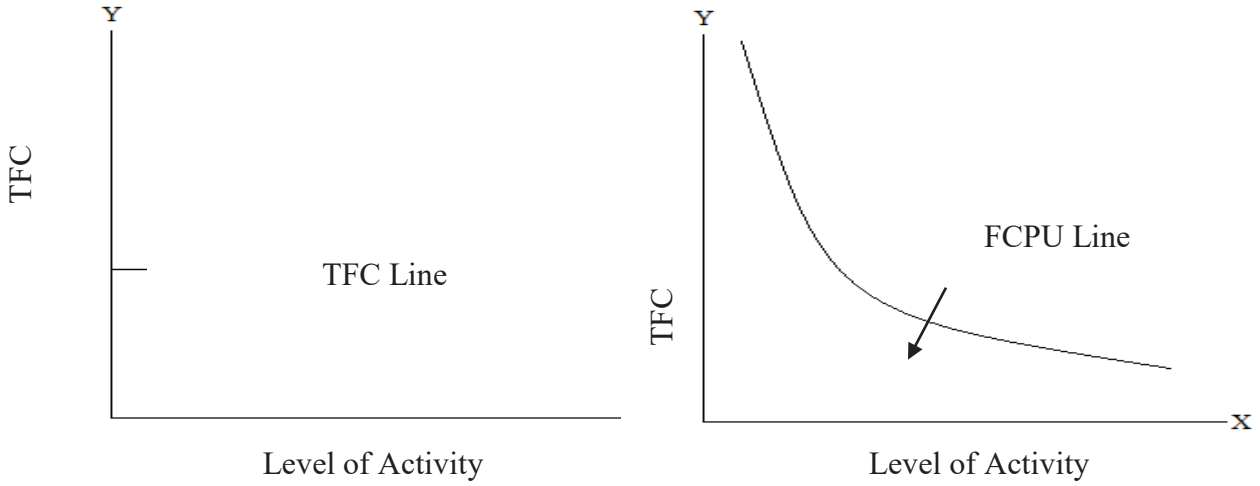


Source: (Fago, 2003)

Figure: 2.2: Variable Cost

b. Fixed Cost

Fixed costs remain unchanged in total amount regardless of fluctuations in the level of activity. This means the total fixed cost remains constant even as activity levels vary. However, the fixed cost per unit fluctuates with changes in activity levels. As activity increases, the fixed cost per unit decreases, and conversely, it increases as activity decreases. When other variables remain consistent, variations in fixed costs impact both the break-even point (BEP) and net income. An increase in fixed costs results in an expansion of the break-even point but a reduction in net income, and vice versa. Fixed costs are also referred to as capacity costs. The concept of fixed costs is illustrated in the diagram below.

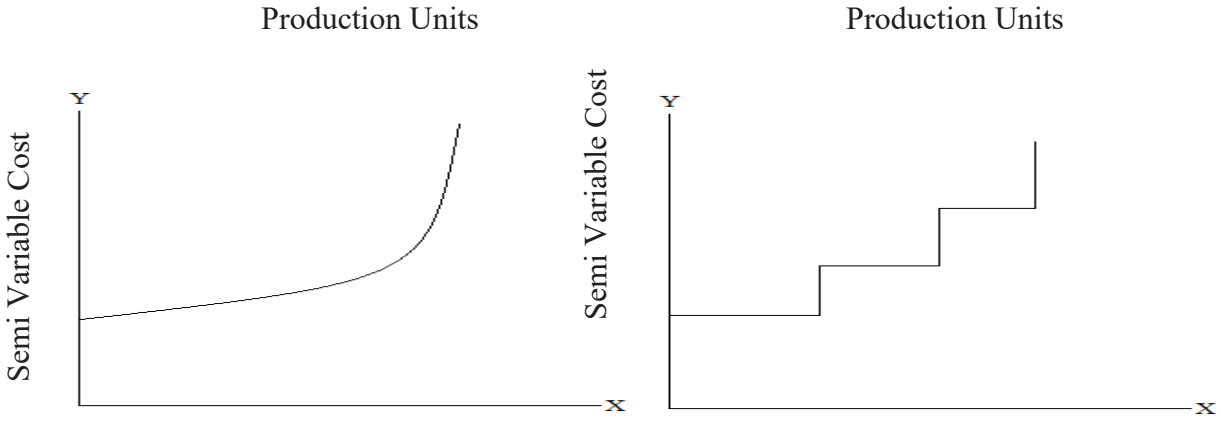


Source: (Fago, 2003)

Figure: 2.3: Fixed cost

c. Semi Variable Cost

Expenses that cannot be distinctly classified as purely fixed or variable are referred to as mixed costs or semi-variable costs. Mixed costs consist of both variable and fixed cost components. Examples of mixed costs include repair and maintenance, supervision, telephone expenses, and electricity charges. For effective profit planning, cost control, and decision-making, it is essential to separate mixed costs into their variable and fixed elements. In mixed costs, the variable cost component is added to the fixed cost component, resulting in an upward-sloping mixed cost line on graphs.



Source: (Fago, 2003)

Figure: 2.4: Semi Variable Cost

2.1.18 Risk Measurement: Operating Leverage and Break Even Point

Operating leverage is a measure of the degree to which fixed costs are utilized in an organization. It reflects the relationship between a company's variable and fixed costs. Typically, organizations with high labor-intensive operations have high variable costs and low fixed costs, resulting in low operating leverage and a relatively low break-even point. Conversely, companies that are highly capital-intensive have cost structures characterized by low variable costs and high fixed costs, leading to high operating leverage and a high break-even point. This indicates a direct relationship between fixed costs and operating leverage. The higher the fixed costs, the higher the operating leverage and break-even point, and vice versa. In simpler terms, firms with relatively high operating leverage have proportionally higher fixed expenses, resulting in a relatively high break-even point (Munakarmi, 2003).

Operating leverage indicates how profit changes in response to changes in sales. Profit tends to change more rapidly than sales due to certain costs that remain constant. When sales decline, variable costs also decrease proportionately, leading to a decline in contribution margin. However, fixed costs remain unchanged, causing net operating income to decline more rapidly. This phenomenon applies similarly when sales increase. As sales revenues fluctuate, fixed costs remain constant, resulting in more significant changes in net income. This phenomenon is known as operating leverage.

Operating leverage is quantified using the "Degree of Operating Leverage" (DOL), which expresses the ratio of the percentage change in net operating income to the percentage change in sales. DOL serves to measure the sensitivity of net operating income to changes in sales volume. It signifies the percentage alteration in net operating income or EBIT resulting from a specific percentage change in sales (Pandey, 2004).

$$\text{DOL} = \frac{Percentage\ Change\ in\ Net\ Operating\ income}{Percentage\ change\ in\ sales}$$

Alternatively,

$$\text{DOL} = \frac{Contribution\ Margin}{Net\ Operating\ income}$$

$$\text{DOL} = \frac{Q(SPPU - VCPU)}{Q(SPPU - VCPU) - Fixed\ cost}$$

Where,

Q = Total Sales in unit

SPPU = Selling Price in unit

VCPU = Variable Cost in Unit

As We Know,

BEP (in Units) $= \frac{fixed\ cost}{SPPU - VCPU}$

Leverage decisions involve shifting from variable costs to fixed costs. Increasing the degree of operating leverage (DOL) entails utilizing a greater amount of fixed costs, which consequently raises the break-even point. When the DOL reaches "1," indicating no leverage, the break-even point is at "0."

Higher fixed costs lead to an increase in both the DOL and the break-even point, highlighting the close connection between the degree of operating leverage and the break-even point. Both a high DOL and a high break-even point serve as indicators of increased risk(Bajracharya, Ojha, Goet, and Poudel, 2008).

2.1.19 Segregation of Semi-Variable (Mixed) Costs

Cost-volume-profit analysis necessitates the classification of all costs into two categories: fixed and variable. Consequently, semi-variable costs must be divided into their fixed and variable components. This can be achieved through any of the following methods: (Maheshwori,2000).

a. Levels of Output Compared to Levels of Expenses Method

In this approach, the expenses incurred at two different output levels are compared against the corresponding levels of output. Given that fixed expenses remain constant, the variable overhead costs are determined by calculating the ratio of the change in expenses to the change in output:

Variable Element $= \frac{Change\ in\ amount\ of\ expenses}{Change\ in\ activity\ level}$

b. Range Method

This approach involves comparing output levels with expense levels, focusing particularly on the highest and lowest points of output across different levels. Known as the "High and Low" method, it is detailed step by step as follows:

Step I – The highest pair and the lowest pair are selected.

Step II – The variable rate "b" computed by using the following formula

$$\text{Variable Rate} = \frac{Difference\ in\ cost}{Difference\ in\ activity\ level}$$

Step III–The fixed cost portion is determined by subtracting the variable cost from the total cost.

Fixed cost = total cost – total variable cost

c. Degree of Variability Method

In this method, the variability degree is assessed individually for each semi-variable expense item. Some semi-variable items may demonstrate a variability of 30%, while others could indicate 70%. While the approach is relatively easy to apply, accurately determining the exact degree of variability can pose challenges.

d. Scatter – Graph Method

This method involves plotting data points on a graph, with semi-variable expenses on the vertical axis (Y-axis) and the level of activity on the horizontal axis (X-axis). Each data point represents a specific production volume and its corresponding costs. Drawing a line of best fit through these points establishes the total cost line. The point where this line intersects the vertical axis indicates the fixed cost component. From this intersection point, another line is drawn parallel to the horizontal axis to represent the fixed cost line. The variable cost at any given level of activity can then be determined by subtracting the fixed cost line from the total cost line.

Although the scatter graph method is relatively straightforward, caution should be exercised because it lacks an objective test to confirm the accuracy of the regression line in fitting the underlying data points.

e. Least square Method

The least squares method, a statistical approach, effectively separates fixed and variable costs from mixed costs. It begins by calculating the variable cost per unit and then determines fixed costs. This method involves plotting production volume against costs on a graph to generate multiple data points. A line of best fit is drawn through these points to depict the total cost line. The intersection of this line with the vertical axis indicates the fixed cost component. Next, a line parallel to the horizontal axis is drawn from this intersection to represent the fixed cost line. Variable costs at any production level are computed by subtracting the fixed cost from the total cost line. While the scatter graph method is straightforward, caution is needed due to its lack of an objective test to validate the accuracy of the regression line fitting the data points.

2.2 Review of Previous Research Work

2.2.1 Review of International Context

Chrysafis and Papadopoulos (2014) introduced a method using fuzzy estimators to handle uncertainty in cost-volume-profit (CVP) analysis, particularly in decision-making scenarios involving multiple products. Their approach involved constructing fuzzy estimators for cost parameters to express uncertainty and assess profitability under various conditions.

Ihemeje, Okereafor, and Ogungbangbe (2015) focused on the manufacturing industries in Nigeria, examining how CVP analysis influences decision-making. They found that higher sales value and product quantity positively impact profits. The study emphasized the importance of integrating CVP analysis into decision-making processes for manufacturing industries.

Kim (2015) explored CVP analysis for multi-product companies, proposing a micro approach to handle complexities such as sales mix ratios. This study aimed to provide more accurate break-even and target profit calculations for companies with diverse product lines.

Calegari, Rhoden, and Cortimiglia (2016) applied CVP analysis to evaluate the feasibility of establishing a new distribution center for a company manufacturing

radiopharmaceutical products. Their study highlighted the use of financial data analysis to compare scenarios with and without the new distribution center.

Lulaj and Iseni (2018) investigated the role of CVP analysis in planning and decision-making across manufacturing and service sectors. Their research indicated that CVP analysis contributes significantly to profitability, break-even analysis, and decision-making processes in businesses.

Enyi (2019) conducted research on Joint Products CVP Analysis, comparing the effectiveness of Weighted-Contribution-Margin (WCM) and Reversed-Contribution-Margin-Ratio (RCMR) in multi-product CVP analysis. The study used operational data and regression analysis to evaluate six joint-products over 42 weeks. It found that WCM lacks analytical efficiency and can lead to suboptimal product mixes due to its oversight of the inverse relationship between a product's contribution-margin-ratio (CMR) and its breakeven point (BEP). The paper recommends using RCMR, which considers the tradeoff effects of CMR/BEP in its measurement, thereby improving resource allocation during low-capacity utilization periods.

Oanh, Phong, Thuan, and Cong (2020) researched the application of cost-volume-profit (CVP) analysis in decision-making by public universities in Vietnam. The study aimed to assess how Vietnamese public universities apply CVP analysis amidst financial autonomy transitions. Data collected from surveys conducted in 2018 and 2019 were analyzed using Excel and SPSS software. The findings indicated that while universities used CVP analysis for decision-making, the information utilized by administrators was simplistic and lacked detailed cost-control specifics. The study highlighted the need for enhanced governance in public universities to reduce costs, increase income, improve student services, and enhance training quality. Flexible application of CVP analysis was recommended to provide comprehensive decision-making support.

Beykaei, Abekah, and Rahim (2020) explored the integration of cost-volume-profit (CVP) analysis under uncertainty in profit planning. The study demonstrated the use of MAPLE software to incorporate uncertainty into CVP analysis and planning practices. By examining scenarios with expected selling price and variable cost changes, the study showed that variations in these factors significantly impact the breakeven quantity.

Specifically, decreases in expected selling prices were found to sharply reduce the breakeven quantity, highlighting the sensitivity of CVP analysis to changes in key variables. The findings underscored the importance of considering uncertainty in CVP analysis for effective profit planning.

Malarkodi and Ranjitha (2021) conducted research on the determinant analysis of cost volume profit of E.I.D-Parry (India) Limited. Cost Volume Profit Analysis (CVPA) is highlighted as a crucial tool in today's competitive market, enabling companies to make strategic decisions to increase sales and profitability. The study utilized five years of financial data (2016-2020) as secondary data to assess profitability. The findings emphasize that CVP analysis helps in understanding changes in output levels, selling prices, variable costs, and fixed costs. This understanding aids in maximizing production capacity, reducing manufacturing costs through technological advancements, and making informed decisions to enhance profitability.

Guo (2022) explained enterprise management decision-making and financial management based on a dynamic cost volume profit model. In the current complex business environment, enterprises face internal and external uncertainties, necessitating scientific decision-making methods to mitigate risks and improve economic benefits. Guo proposes a dynamic CVP model that enhances traditional CVP analysis by incorporating multiple cost drivers to interpret cost behavior. This model is applied to enterprise decision-making and financial management, offering tailored improvement strategies to optimize profitability and ensure stable development amid market competition.

Ikeda, Battuvshin, Shirasawa, Chultem, Ishiguri, and Aruga (2022) explored the effects of site conditions on costs and profitability in the extraction and use of dead trees in Mongolia. The study analyzes the costs and profits associated with extracting dead trees for lumber and firewood sales across various site conditions. Using forest registration data and geographical information, the study identifies a positive correlation between off-road transportation distance and harvesting costs, as well as profitability linked to the lumber yield ratio. It concludes that maximizing lumber yield from different tree species significantly impacts profitability, despite higher costs associated with lumber compared to firewood.

Isah and Udoekanem (2022) conducted a study on the cost-benefit analysis of commercial complexes in Minna, Nigeria. The research focuses on assessing the environmental and social costs and benefits associated with recent commercial property developments in Minna. Data were collected through structured questionnaires administered to commercial property developers, occupiers, and real estate professionals. The study identifies location, economic conditions, and infrastructure as key factors influencing the demand for commercial complexes. It highlights return on investment as a primary motivation for private estate developers involved in commercial complex development, while high construction costs emerge as a significant constraint in the region.

These studies contribute valuable insights into diverse areas such as real estate investment decision-making, banking sector efficiency, monetary policy impacts on income distribution, and the economic effects of global pandemics on financial markets.

2.2.2 Review of Literature in Nepalese Context

Bhushal (2014) focused on the application of Cost Volume Profit (CVP) analysis in Bottlers Nepal Limited. The research aimed to assess profitability and financial position using a causal research design with regression analysis, correlation analysis, and t-tests. Major findings indicated a lack of broad and long-range objectives, with limited goals communicated primarily to top officials. Sales and promotion targets were frequently missed due to ineffective forecasting methods. The study highlighted deficiencies in cost reduction and control plans, contributing to an overall unsatisfactory profit trend.

Adhikari (2015) examined Cost, Volume, and Profit analysis within Nepal Telecom, employing a descriptive research design along with regression analysis, correlation analysis, and t-tests. The study revealed that Nepal Telecom struggled with the segregation of fixed and variable costs. Financial planning was limited, primarily focusing on achieving sales and production targets. Ineffective strategies for cost reduction and control were noted, alongside the absence of proper criteria for evaluating financial performance.

Dahal (2016) conducted a case study on Himal Cement Company to explore Cost Volume Analysis in Nepalese manufacturing. The research aimed to analyze profitability

and financial position, uncovering significant gaps. These included a lack of budgeting expertise, skilled planners, and entrepreneurial spirit within the company. Communication and coordination issues between management levels and workers were evident. The study highlighted the absence of effective programs to achieve goals and overcome challenges, coupled with deficiencies in systematic financial planning and the segregation of costs into fixed, variable, and semi-variable categories.

Shrestha (2016) study focused on Cost Volume and Profit Analysis at Soaltee Hotel Limited. The objectives included studying direct and indirect costs, evaluating profitability, financial position, and activity sensitivity. Findings indicated that while the hotel prioritized revenue maximization, there was a notable lack of emphasis on cost planning and control. Reducing the variable cost ratio was not a priority, and there was a notable absence of market studies regarding demand and pricing.

Shrestha (2016) investigated Cost Volume and Profit Analysis in NEA (Nepal Electricity Authority) and NTC (Nepal Telecom Corporation). The research utilized mean, standard deviation, coefficient of correlation, regression analysis, and t-tests. Similar to findings at Soaltee Hotel Limited, the study identified deficiencies in cost planning, control measures, and the reduction of variable cost ratios within NEA and NTC. Financial planning and performance evaluation criteria were also highlighted as areas needing improvement.

Poudel (2017) focused on Cost, Volume, and Profit analysis as a managerial tool at Bottlers Nepal Limited. Objectives included studying the relationship of CVP analysis with profit planning, evaluating profitability sensitivity, and providing recommendations. Major findings revealed that Bottlers Nepal Limited neglected the segregation of fixed and variable costs. The company's financial planning was limited to sales and production targets, with ineffective strategies for cost reduction and control. Moreover, there were no proper criteria for evaluating financial performance.

Yadav (2017) focused on Cost Volume and Profit Analysis in Nepal Aushadhi Limited (NAL). The objectives included studying the application of CVP analysis, evaluating profitability sensitivity, and analyzing financial position. The study utilized a causal research design with regression analysis, correlation analysis, and t-tests. Major findings

revealed that NAL had not implemented a suitable scientific method for cost classification. The company struggled with effective utilization of fixed costs, resulting in higher unfavorable capacity variances. Additionally, NAL did not consider the cost-volume-profit relationship when pricing its products.

Bhusal (2018) conducted a study on Profit Planning in Dairy Development Corporation (DDC), focusing on the practice of profit planning from FY 2012 to FY 2016. Data were gathered from secondary sources. The study highlighted the Margin of Safety (MOS) as a critical factor influencing profitability, where a larger MOS increases the likelihood of profit. However, the research found that DDC lacked effective plans for cost reduction and control. Moreover, there were no proper criteria for evaluating financial performance tools identified.

Poudel (2018) investigated Cost, Volume, and Profit analysis as a managerial tool in HBL (Himalayan Bank Limited) and EBL (Everest Bank Limited). The study aimed to explore the relationship of CVP analysis with profit planning, assess its impact on profitability, and evaluate financial tools. Both casual and descriptive research designs were employed, with regression analysis, correlation analysis, and t-tests used for analysis. Major findings indicated a lack of segregation between fixed and variable costs in the banks' operations. Financial planning was limited to sales and production targets, with ineffective strategies for cost reduction and control identified. Moreover, there was a notable absence of proper criteria for evaluating financial performance.

Adhikari (2019) conducted a Cost-Volume-Profit (CVP) Analysis of Nepal Lube Oil Limited (NLO), aiming to identify operational areas and improve competitiveness through CVP metrics such as Contribution Margin (CM), Break-Even Point (BEP), and Margin of Safety (MOS). The study utilized a causal research design with regression and correlation analyses. Major findings revealed that NLO did not apply CVP analysis effectively due to the absence of cost segregation into fixed and variable components. The classification of costs lacked scientific rigor and systematic approach, hindering the application of CVP principles in financial decision-making.

Bhattarai (2019) explored CVP analysis as a supplementary tool for profit planning, emphasizing the relationships between business variables such as sales volume, total

variable costs, and fixed costs within a relevant range of output levels. The study highlighted that while CVP analysis provides insights into profit forecasts and required sales volumes, it is not mandatory but rather enhances understanding of the interrelationships among sales, costs, and net income. The analysis relies on linear cost and revenue assumptions to examine how changes in volume affect profitability.

Gautam (2020) focused on Cost Volume and Profit Analysis of Commercial Banks EBL, SCBNL, and PBL. The objectives included studying the nature of direct and indirect costs, evaluating profitability, financial position, and sensitivity of these commercial banks. The study employed descriptive and casual research designs, utilizing regression and correlation analyses. Major findings indicated that despite focusing on revenue maximization, these banks had not emphasized Cost Volume Analysis. They also lacked efforts to reduce variable cost ratios and had not conducted market studies on demand and pricing.

Shakya (2020) conducted research on Profit Planning in Lumbini Sugar Mill Limited, examining the application of budgeting tools for profit planning in sugar mills. The study covered a seven-year period from FY 2007 to 2013, gathering data from primary and secondary sources. Findings highlighted a lack of budgeting expertise, skilled planners, and effective communication and coordination between management levels and workers within the sugar mill.

Gyawali (2021) investigated Cost, Volume, and Profit analysis as a managerial tool for profit planning in Bottlers Nepal Limited. Objectives included studying the relationship between cost, volume, and profit, analyzing their impact on profit planning. The study employed a casual research design with regression and correlation analyses. Major findings revealed that Bottlers Nepal Limited ignored the segregation of fixed and variable costs, lacked a financial plan beyond sales and production targets, and did not effectively plan for cost reduction and control. Moreover, the company lacked proper criteria for evaluating financial performance.

Jha (2021) focused on profit planning in Nepalese manufacturing companies, specifically Himal Cement Company, from FY 2001 to 2011. The study assessed the application and effectiveness of profit planning systems, including Cost Volume Analysis (CVP). Data

were collected from primary and secondary sources. Findings indicated that Himal Cement Company did not effectively apply CVP analysis due to the absence of cost segregation into fixed and variable components. The classification of costs lacked scientific rigor, hindering the company's ability to use CVP analysis for realistic and strategic budgeting.

2.3 Research Gap

They not only experiment but also dedicate substantial effort and resources to minimize risks and ensure profitability. Therefore, they must strategize carefully to achieve their business goals. Profitability hinges on evaluating business capacity, activities, resource utilization, and identifying areas for cost reduction. Effective planning and implementation are essential for organizations to succeed, as significant investments are made with the expectation of returns. However, the uncertainty of the future poses risks that require robust management. Various management tools, including Cost-Volume-Profit (CVP) analysis, are crucial for analyzing relationships between activity changes, sales revenue, expenses, and net profit, facilitating informed decision-making, cost control, and profit planning. Profit serves as a fundamental measure of business success, reflecting its performance. CVP analysis plays a pivotal role in assessing profitability, providing quick insights into manufacturing or service operations. The primary objective of this study is to evaluate the application and effectiveness of CVP analysis in NTC, NOC, and NEA, prominent manufacturing companies in the country. This research primarily utilizes secondary data and informal discussions for supplementary information, which is tabulated as needed. Previous studies on profit planning and CVP analysis have predominantly focused on manufacturing companies and industries, rather than the manufacturing sector itself. This study aims to illuminate the financial positions of NTC, NOC, and NEA.

CHAPTER-III
RESEARCH METHODOLOGY

3.1 Research Design

This study employs both descriptive and causal research designs to investigate the cost volume profit of NTC, NEA, and NOC in Nepal, as well as various financial ratios affecting their profit planning. Descriptive designs are utilized in preliminary and exploratory studies to enable researchers to collect, summarize, present, and interpret information for classification purposes. These designs primarily serve to describe the data gathered through numerical means. Additionally, causal-comparative design is employed to analyze the relationships among different variables that reflect the overall cost volume profit.

3.2 Population and Sample

The study exclusively relies on secondary data. Revenue planning is intricately linked with various functional budgets, with information and data presented in an analytical format. The study encompasses 18 public enterprises in Nepal as its population. From this pool, three companies were selected for analysis: Nepal Telecom Company Limited, Nepal Oil Corporation, and Nepal Electricity Authority Company Limited. The research spans a decade, covering fiscal years from 2013/014 to 2022/023.Convenience and judgmental sampling methods were employed in this study. Convenience sampling involves researchers collecting market research data from an easily accessible pool of sources. Judgmental sampling, also known as purposive or authoritative sampling, is a non-probability technique where sample companies are chosen based solely on the researcher's knowledge and judgment.

3.3 Sources of Data

Data plays a crucial role in conducting effective research. In this study, quantitative data were directly collected from NTC, NOC, and NEA, while qualitative data were gathered from officials of these organizations. Additionally, descriptive data were obtained from

staff members of NTC, NOC, and NEA, as well as from their annual reports. This mixed-methods approach ensures comprehensive coverage and depth in the research findings.

3.4 Data Collection Technique

Various data collection procedures were implemented for this research study to ensure the acquisition of necessary and reliable information. Given the focus on budgeting practices, a significant portion of the data was sourced from published functional budgets and financial statements. These documents were directly obtained from the accounting, planning, and functional departments of NTC, NOC, and NEA. This approach ensures the authenticity and relevance of the data used in the study.

3.5 Data Analysis Tools

The data collected from diverse sources were organized, analyzed, and presented in appropriate tables and formats (Joshi, 2001). These tables and formats were interpreted and explained as needed throughout the study.

3.6 Statistical and Mathematical Tools

To analyze the collected data, the following financial and statistical tools were utilized: percentile, increment, arithmetic mean, standard deviation, correlation coefficient, regression coefficient, and graphical representations such as graphs and diagrams.

3.6.1 Percentile Increment

This statistical tool calculates the percentage change from the previous year to the current year. It aids in determining the increment in the study variables. Essentially, the term "percentage" denotes per hundred. In simpler terms, a percentage is a fraction where 100 serves as the denominator, and the numerator of this fraction represents the rate of percent.

3.6.2 Arithmetic Mean Average

The central values that describe the overall distribution or the values towards which all items in the distribution tend to cluster are referred to as averages. The arithmetic mean, or arithmetic average, is a fundamental statistical measure of averages. It is calculated by dividing the sum of a given set of observations by the number of observations. An

average serves as a representative value for a group of values, reflecting the collective characteristics of the entire group. Typically, the average value falls between the highest and lowest items in the dataset. The arithmetic mean is also known as a simple average.

Where,

$$\text{Mean or Average } (\overline{X}) = \frac{\sum X}{N}$$

3.6.3 Standard Deviation (σ)

Standard deviation is defined as the positive square root of the average sum of squares of deviations of observations from the arithmetic mean of the distribution. Widely recognized and valuable in statistics, it provides consistent, accurate, and stable results. Denoted by the small Greek letter sigma (σ), standard deviation quantifies the absolute dispersion or variability within a distribution. Greater dispersion or variability results in larger standard deviations, indicating greater deviation of values from their mean. Conversely, a small standard deviation suggests high uniformity and homogeneity within a series, whereas a large standard deviation indicates the opposite. In this study, standard deviation is calculated for selected dependent and independent variables specified in the model presented earlier.

$$\text{Standard deviation } (\sigma) = \sqrt{\frac{\sum(X-\overline{X})}{n-1}}$$

3.6.4 Coefficient of Correlation

Correlation analysis is a statistical tool used to determine the relationship between variables. When two quantities vary in a manner where changes in one are accompanied by changes in the other, these quantities are said to be correlated. It indicates how one variable affects another when changes occur. The degree of relationship between the variables is quantified through correlation analysis, which helps analyze the co-variation of two or more variables.

The Pearson correlation coefficient, denoted by the symbol "r," is widely employed in practical applications. It measures the strength and direction of the linear relationship between two variables. The formula for calculating Pearson's "r" is:

$$r = \frac{\sum Xy}{\sqrt{\sum x^2}\ \sqrt{\sum y^2}}$$

Where,

r = the correlation coefficient

$x = X - \bar{X}$

$y = Y - \bar{Y}$

X = Independent variables

Y = Dependent variables

The following general rules apply to interpret the coefficient of correlation when when r = +1, It means there is a perfect positive relationship between the variables. When r = - 1, It means there is a perfect negative relationship between the variables. When r = 0,it indicates no relationship between the variables, meaning the variables are uncorrelated.

3.6.5 Financial Tools

Ratio analysis and Cost-Volume-Profit (CVP) analysis are utilized as financial analytical tools in this study. Ratio analysis is particularly emphasized as a key financial tool throughout the research. According to Kothari (1990:187), Ratio analysis is such a powerful tool of financial analysis that through its help, the economic and financial position of a business unit can be fully examined.

3.6.6 Regression Analysis

Regression is a statistical tool used to ascertain the statistical relationship between two or more variables and to estimate one variable based on known values of other variables. In essence, regression enables the estimation of an unknown value of one variable using the known values of another variable.

The model is $(\ddot{Y}) = \beta 0 + \beta 1 * X1 + \beta 2 * X2 + \beta 3 * X3 + \beta 4 * X4 + \beta 5 * X5 + Tn$

Assume that,

Ŷ= Sales revenue (Constant)

AR(X1)= Account Receivable

ACP(X2)= Average Collection period

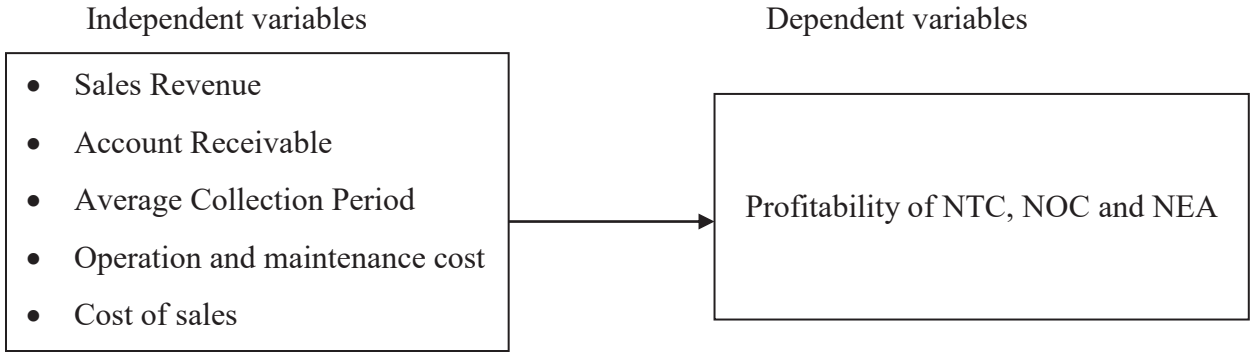
OME(X3)=Operation and Maintenance Expenditure

PT(X4)= Profit

COS(X5)= Cost of Sales

3.7 Conceptual Framework

A conceptual framework is a structured representation, either written or visual, of anticipated relationships between variables. Variables refer to the characteristics or properties under investigation in a study. This framework typically evolves from a thorough literature review of existing studies and theories relevant to the topic.



3.8 Definition of the Variables

Sales Revenue:

Sales revenue represents the income generated by a company from selling goods or providing services. In accounting, the terms "sales" and "revenue" are often used interchangeably to refer to this income.

Accounts Receivable:

Accounts receivable refers to the money owed by a company's customers for goods or services they have received but not yet paid for. For instance, when customers purchase products on credit, the amount owed is recorded as accounts receivable.

Average Collection Period:

The average collection period is the average numbers of days it takes for a business to collect accounts receivable and convert them into cash. It is an essential metric for assessing short-term liquidity, indicating how quickly a company can collect payments from its customers.

Operation and Maintenance Cost:

Operation and maintenance expenses encompass the necessary costs associated with running, maintaining, administering, and repairing a system. This includes expenditures such as salaries, wages, materials, supplies, insurance, audits, depreciation, debt service, taxes, and capital expenditures.

Cost of Sales:

The cost of sales is the cumulative total of all expenses incurred in producing a product or service that has been sold. It is a critical metric for evaluating a company's efficiency in designing, sourcing, and manufacturing goods at a reasonable cost.

Profit and Loss:

The profit and loss statement, also known as the income statement, summarizes the financial performance of an organization over a specific period. It serves as a key indicator of operational success in profit-oriented enterprises, showing either a profit or loss for the fiscal year. In non-profit organizations, a similar statement known as the income and expenditure account reveals net surplus or deficit for the period.

These definitions provide a clear understanding of key financial terms and metrics commonly used in business and accounting contexts.

CHAPTER-IV
DATA PRESENTATION AND ANALYSIS

This chapter focuses on data presentation and analysis based on information collected from annual publications of sample institutions. The collected data undergo analysis using various tools and techniques. The results derived from this analysis are systematically presented and carefully interpreted in subsequent sections.

The analytical process begins with identifying key issues, assessing the availability of suitable data, selecting appropriate methods to address the research questions, applying these methods, and finally, evaluating, summarizing, and communicating the findings. Chapter three describes various statistical tools used for these purposes.

The chapter is structured into five sections. The first section examines the structure and pattern of the data. The second section covers descriptive statistics, providing a detailed overview of the data characteristics. The third section delves into correlation analysis to explore relationships between variables. The fourth section utilizes regression analysis to make estimations based on the data. The final section concludes the chapter, offering insights and implications drawn from the secondary data analysis.

4.1 Data Analysis

4.1.1 Analysis of Revenue Trend

Revenue planning is fundamental to effective profit planning and control, serving as the cornerstone for other aspects of the profit plan. It involves several interconnected steps:

Sales Forecast: Predicting future sales levels, which is crucial for estimating revenue.

Marketing Plan: Developing strategies to attract and retain customers, thereby achieving sales targets.

Promotional Expenses Budget: Allocating funds for promotional activities that support the marketing strategy. Selling Expenses Budget: Budgeting resources for sales-related operations and activities.

The sales manager primarily oversees the preparation of the sales budget, with input from senior executives playing a crucial role. Sales forecasts are particularly critical as they directly impact the profitability of the organization by influencing revenue generation.

Organizations like NTC, NOC, and NEA undertake long-term sales forecasting to anticipate demand. They segment consumers into categories such as domestic, commercial, non-commercial, and communication centers. Similarly, customers are categorized by usage types such as Local, STD, ISD, and mobile services. Analyzing past sales performance and associated budgets helps these organizations understand historical trends and make informed projections for the future.

In summary, revenue planning is essential for aligning business objectives with financial goals, ensuring sustainable profitability through effective management of sales forecasts, marketing strategies, and budget allocations.

Table 4.1: *Analysis of Sales Revenue*

(In Millions)

Fiscal Year	NTC(NRs.)	NOC(NRs.)	NEA(NRs.)
2013/014	39,695	134,614	28,206
2014/015	42,638	139,320	30,159
2015/016	44,209	97,307	31,824
2016/017	44,426	152,578	46,796
2017/018	45,269	196,489	55,358
2018/019	43,839	247,455	66,613
2019/020	42,987	205,745	71,293
2020/021	35,935	232,445	70,473
2021/022	44,374	342,621	87,154
2022/023	44,423	382,492	100,345
Total	**427,795**	**2,131,066**	**588,221**
Mean	**42,780**	**213,107**	**58,822**
SD	**2,716**	**87,194**	**23,502**

(Sources: Annual Report of NTC, NOC and NEA)

Table 4.1 shows that the NTC's revenue has shown a relatively stable trend over the years, fluctuating within a narrow range. The highest revenue was NRs. 45,269 million in the fiscal year 2017/018, and the lowest was NRs. 35,935 million in 2020/021. The total revenue over the ten years is NRs. 427,795 million, with average annual revenue of NRs. 42,780 million. The standard deviation of NRs. 2,716 million indicates that NTC's revenue has been fairly consistent, with minor variations year to year.

NOC has experienced significant growth in revenue over the decade. Starting at NRs. 134,614 million in 2013/014, NOC's revenue saw a peak of NRs. 382,492 million in 2022/023. This substantial increase demonstrates the corporation's expanding market presence and operations. The total revenue for NOC is NRs. 2,131,066 million, with average annual revenue of NRs. 213,107 million. The standard deviation here is NRs. 87,194 million, reflecting the substantial year-to-year fluctuations and growth spurts in revenue.

NEA's revenue has also shown an upward trend, starting from NRs. 28,206 million in 2013/014 to NRs. 100,345 million in 2022/023. The increase is gradual but steady, indicating consistent growth in the electricity sector. NEA's total revenue over the ten years is NRs. 588,221 million, with an average of NRs. 58,822 million per year. The standard deviation of NRs. 23,502 million suggests moderate fluctuations, showing a mix of steady growth with occasional variations.

Over the ten-year period, NTC has shown consistent revenue figures with minor fluctuations, NOC has experienced dramatic growth and significant yearly changes, and NEA has demonstrated steady and gradual revenue increases. The total revenues and averages for each corporation highlight their scale and growth trajectories, while the standard deviations provide insights into the volatility and consistency of their yearly revenues. This statistical analysis paints a picture of three vital sectors in Nepal's economy, each with unique growth patterns and financial stability.

4.1.2 Analysis of Account Receivable

Managing receivables poses a significant challenge for Nepal Telecom, Nepal Oil Corporation, and Nepal Electricity Authority. Accounts receivable represents the amount customers owe for goods or services already provided by a business. It's listed as an asset

on the balance sheet because the business expects to receive payment in the future. However, not all of this money is usually collected promptly. The duration of collection periods reflects the effectiveness of a company's credit policy. A longer collection period may indicate a more liberal or inefficient credit policy. To analyze accounts receivable at these organizations, key metrics such as debtor's turnover and average collection periods are utilized. These metrics help measure the relationship between receivables and net revenue from sales. Data on accounts receivable for Nepal Telecom, Nepal Oil Corporation, and Nepal Electricity Authority are presented for the fiscal years from 2013/014 to 2022/023. These analyses provide insights into how effectively these entities manage their receivables relative to their sales revenue over the years.

Table 4.2: *Analysis of Account Receivable*

(In Millions)

Fiscal Year	NTC(NRs.)	NOC(NRs.)	NEA(NRs.)
2013/014	2,923	678	9,016
2014/015	2,621	648	9,927
2015/016	2,930	765	11,187
2016/017	2,673	659	13,955
2017/018	2,711	1,116	15,951
2018/019	2,165	766	18,854
2019/020	2,255	488	31,492
2020/021	2,304	531	38,011
2021/022	2,320	1,050	59,689
2022/023	2,087	770	58,387
Total	**24,989**	**7,471**	**266,469**
Mean	**2,499**	**747**	**26,647**
SD	**294**	**191**	**18,486**

(Sources: Annual Report of NTC, NOC and NEA)

Table 4.2 shows that the over the ten years, NTC's accounts receivable have remained relatively stable, showing only minor fluctuations. The highest figure was NRs. 2,930 million in the fiscal year 2015/016, while the lowest was NRs. 2,087 million in 2022/023.

The total accounts receivable for NTC over the decade is NRs. 24,989 million, with an average of NRs. 2,499 million per year. The standard deviation is NRs. 294 million, indicating that NTC's accounts receivable have been quite consistent, with only small variations each year.

NOC's accounts receivable show more variability compared to NTC. Starting at NRs. 678 million in 2013/014, the figures reached a peak of NRs. 1,116 million in 2017/018. The lowest was NRs. 488 million in 2019/020. The total accounts receivable for NOC is NRs. 7,471 million over ten years, averaging NRs. 747 million annually. The standard deviation of NRs. 191 million highlights the moderate fluctuations in NOC's accounts receivable, reflecting changes in customer payments and market conditions.

NEA's accounts receivable have shown a significant upward trend. Starting at NRs. 9,016 million in 2013/014, the figures rose sharply to NRs. 59,689 million in 2021/022 before slightly decreasing to NRs. 58,387 million in 2022/023. This trend reflects NEA's growing customer base and perhaps challenges in collecting payments. The total accounts receivable over the ten years is a substantial NRs. 266,469 million, with an average annual figure of NRs. 26,647 million. The high standard deviation of NRs. 18,486 million indicates considerable yearly fluctuations, pointing to substantial variability in NEA's accounts receivable.

4.1.3 Analysis of Average Collection Period

The average collection period represents the average number of days required to collect invoiced amounts from customers. This metric is crucial for evaluating the effectiveness of a company's credit policies and collection efforts. It is particularly valuable for businesses with limited cash reserves, as it provides insights into cash flow dynamics.

A shorter average collection period indicates a higher debtor's turnover ratio, reflecting better liquidity of receivables. Conversely, a longer collection period may suggest a more liberal or inefficient credit policy.

In analyzing the accounts receivable of Nepal Oil Corporation Limited, metrics like debtor's turnover and average collection periods are key to understanding the

relationship between receivables and net revenue from sales. These metrics provide valuable insights into how efficiently the organization manages its receivables over time.

Data on average collection periods for Nepal Oil Corporation Limited are presented for the fiscal years from 2013/014 to 2022/023. This analysis aims to assess trends and performance in receivables management, highlighting areas where improvements may be needed to enhance cash flow and financial stability.

Table 4.3: *Analysis of ACP*

(Days)

Fiscal Year	NTC	NOC	NEA
2013/014	27	2	117
2014/015	22	2	120
2015/016	24	3	128
2016/017	22	2	109
2017/018	22	2	105
2018/019	18	1	103
2019/020	19	1	161
2020/021	23	1	197
2021/022	19	1	250
2022/023	17	1	212
Mean	**21.4**	**1.5**	**150.3**
SD	**2.89**	**0.64**	**49.56**

(Sources: Annual Report of NTC, NOC and NEA)

Table 4.3 shows that the NTC's average collection period has been fairly stable over the ten-year period, with slight variations. The highest average collection period was 27 days in 2013/014, while the lowest was 17 days in 2022/023. The total collection period over the decade is 214 days, resulting in an average of 21.4 days per year. The standard deviation of 2.89 days indicates that NTC's collection period has remained quite consistent, suggesting an efficient payment collection process with minor fluctuations.

NOC has maintained a remarkably steady average collection period, consistently around 1 to 3 days over the ten years. The highest was 3 days in 2015/016, and the lowest was 1 day in several fiscal years (2018/019, 2019/020, 2020/021, and 2021/022). The total collection period for NOC over the decade is 15 days, averaging 1.5 days per year. The standard deviation of 0.64 days highlights the minimal fluctuations, reflecting an exceptionally efficient collection system where payments are received almost immediately.

NEA's average collection period shows more variability and an upward trend over the years. Starting at 117 days in 2013/014, it peaked at 250 days in 2021/022 before slightly decreasing to 212 days in 2022/023. The total collection period over the ten years is 1,503 days, with an average of 150.3 days. The standard deviation of 49.56 days indicates significant fluctuations, suggesting potential challenges in the timely collection of payments and varying efficiency in different fiscal years.

4.1.4 Analysis of Operation and Maintenance Cost

NTC prepares its overhead budget in a consolidated manner known as the Operating and Maintenance Expenditure Budget. This comprehensive budget encompasses various expenses, including employment costs, bonuses, incentive packages, depreciation, administrative expenses, gains or losses on foreign currency, royalty payments, losses on the sale of goods, and license fees among others. Unlike separate budgets for manufacturing, administrative, and distribution overheads, NTC, NOC, and NEA aggregate all these expenses into one cohesive budget. This approach makes it challenging to analyze overhead budgets individually for these organizations. Instead, they focus on the overall Operation and Maintenance Expenditure Budget to manage and allocate resources effectively. Understanding the past trends of Operation and Maintenance Expenditure at NTC, NOC, and NEA provides insights into how these expenses have evolved over time and informs future financial planning and management decisions.

Table 4.4: *Analysis of OMC*

(In Millions)

Fiscal Year	NTC(NRs.)	NOC(NRs.)	NEA(NRs.)
2013/014	11,528	11,980	10,103
2014/015	13,967	8,592	7,881
2015/016	16,553	10,559	9,400
2016/017	14,754	7,894	5,665
2017/018	11,460	5,526	5,153
2018/019	15,476	8,515	4,668
2019/020	13,067	10,086	9,483
2020/021	10,040	5,491	10,570
2021/022	15,327	5,498	8,863
2022/023	15,127	14,045	10,403
Total	**137,299**	**88,185**	**82,189**
Mean	**13,729.90**	**8,818.52**	**8,218.90**
SD	**2,016.98**	**2,754.77**	**2,142.45**

(Sources: Annual Report of NTC, NOC and NEA)

Table 4.4 shows that the NTC's Operations & Maintenance costs have shown fluctuations over the ten-year period, with figures ranging from a low of NRs. 10,040 million in 2020/021 to a high of NRs. 16,553 million in 2015/016. The total Operations & Maintenance cost over the decade is NRs. 137,299 million, resulting in an average annual cost of NRs. 13,729.90 million. The standard deviation of NRs. 2,016.98 million indicates moderate variability in NTC's Operations & Maintenance costs, reflecting changes in operational activities and maintenance needs over the years.

NOC's Operations & Maintenance costs have also varied significantly, with the lowest being NRs. 5,491 million in 2020/021 and the highest reaching NRs. 14,045 million in 2022/023. The total Operations & Maintenance cost for NOC over the ten years is NRs. 88,185 million, with an average annual cost of NRs. 8,818.52 million. The standard deviation of NRs. 2,754.77 million suggests a higher degree of fluctuation compared to

NTC, indicating variability in operational and maintenance expenses possibly due to market conditions and operational scale changes.

NEA's Operations & Maintenance costs have shown considerable variation, starting at NRs. 10,103 million in 2013/014 and peaking at NRs. 10,570 million in 2020/021. The lowest was NRs. 4,668 million in 2018/019. The total Operations & Maintenance cost over the decade for NEA is NRs. 82,189 million, with an average annual cost of NRs. 8,218.90 million. The standard deviation of NRs. 2,142.45 million indicates notable fluctuations, reflecting the varying operational demands and maintenance requirements of the electricity sector.

Over the ten-year period, NTC has shown a moderate level of variability in its Operations & Maintenance costs, suggesting relatively stable yet adaptable operational and maintenance strategies. NOC's costs have fluctuated more significantly, indicating dynamic operational challenges and maintenance needs influenced by external market factors. NEA has also experienced substantial variation in its Operations & Maintenance costs, reflecting the changing demands of the electricity sector and the associated maintenance requirements.

4.1.5 Analysis of Cost of Sales

The cost of sales refers to the total accumulated costs incurred in producing a product or service that has been sold. This metric is crucial for evaluating a company's performance, as it assesses the efficiency with which the organization designs, sources, and manufactures goods or services at a reasonable cost. Retailers commonly use this term to gauge their operational effectiveness. Costs of sales typically include direct labor, direct materials, and overhead expenses. It may also encompass commissions associated with sales transactions. Analyzing the cost of sales from fiscal years 2013/014 to 2022/023 provides valuable insights into how these costs have evolved over time, reflecting changes in production efficiency, material costs, and overall operational effectiveness within the organization.

Table 4.5: *Analysis of COS* (In %)

Fiscal Year	NTC	NOC	NEA
2013/014	42%	97%	88%
2014/015	33%	83%	91%
2015/016	32%	73%	98%
2016/017	32%	89%	85%
2017/018	36%	95%	84%
2018/019	42%	93%	78%
2019/020	47%	89%	70%
2020/021	52%	98%	80%
2021/022	46%	112%	74%
2022/023	48%	93%	80%
Mean	**41%**	**92%**	**83%**
SD	**7%**	**10%**	**8%**

(Sources: Annual Report of NTC, NOC and NEA)

Table 4.5 shows that the NTC's Cost of Sales to Sales percentage has fluctuated moderately over the decade, ranging from a low of 32% in 2015/016 and 2016/017 to a high of 52% in 2020/021. This indicates that NTC spent between 32% to 52% of its sales revenue on costs associated with providing telecom services. The total percentage over ten years sums to 4.11 (or 411%), with an average annual cost of 41%. The standard deviation of 7% reflects a moderate level of variability, showing that NTC has managed to keep its cost of sales relatively stable with some fluctuations due to operational changes and market conditions.

NOC's Cost of Sales to Sales percentage is generally higher and more variable than NTC's. It peaked at 112% in 2021/022, indicating that costs exceeded sales revenue that year, and was lowest at 73% in 2015/016. This suggests NOC's costs were sometimes very close to, or even exceeded, its sales revenue, reflecting higher volatility and possibly tighter profit margins. The total percentage over the decade is 9.23 (or 923%), with an average annual cost of 92%. The standard deviation of 10% highlights significant

fluctuations, indicating that NOC faced varying operational efficiencies and market challenges each year.

NEA's Cost of Sales to Sales percentage has been fairly high but relatively stable compared to NOC. It ranged from 70% in 2019/020 to 98% in 2015/016. The percentage indicates that NEA spent between 70% to 98% of its sales revenue on providing electricity services. The total percentage over ten years sums to 8.30 (or 830%), with an average annual cost of 83%. The standard deviation of 8% shows moderate variability, reflecting consistent but high operational costs relative to sales.

Over the ten-year period, NTC has maintained a relatively stable Cost of Sales to Sales percentage, indicating efficient cost management with some fluctuations. NOC, on the other hand, shows higher and more variable percentages, suggesting greater challenges in managing costs relative to sales, with some years seeing costs exceed sales revenue. NEA has demonstrated a fairly high but stable percentage, reflecting consistent operational costs but also indicating a potential need for better cost management to improve profitability

4.1.6 Analysis Profit and Loss

The profit and loss statement of an organization reflects its operating results over a specific period, serving as a fundamental measure of its performance. Often referred to as the 'scoreboard' of organizational performance, its main objective is to provide a clear view of the financial position and profitability. In profit-making organizations, the profit and loss account details the profit or loss for the fiscal year. Conversely, non-profit organizations use an income and expenditure account to indicate net surplus or deficit during a specific period. Nepal Telecom, Nepal Oil Corporation Limited, and Nepal Electricity Authority have consistently reported profits since their inception. The table below illustrates the profit earned by these entities:

Table 4.6: *Analysis of Profit/Loss* (In Millions)

Fiscal Year	NTC(NRs.)	NOC(NRs.)	NEA(NRs.)
2013/014	11,553	-8,300	-6,808
2014/015	14,556	15,042	-5,130
2015/016	13,681	15,359	-8,890
2016/017	15,372	9,452	1,502
2017/018	17,483	3,587	3,439
2018/019	9,757	8,573	9,811
2019/020	9,748	12,914	11,678
2020/021	7,127	-430	3,506
2021/022	8,470	-38,177	13,371
2022/023	7,920	11,722	9,405
Total	**115,667**	**29,743**	**31,884**
Mean	**11,567**	**2,974**	**3,188**
SD	**3,348**	**15,428**	**7,591**

(Sources: Annual Report of NTC, NOC and NEA)

Table 4.6 shows that the NTC has consistently reported profits over the ten-year period, with the figures ranging from NRs. 7,127 million in 2020/021 to a peak of NRs. 17,483 million in 2017/018. The total profit over the decade sums up to NRs. 115,667 million, resulting in an average annual profit of NRs. 11,567 million. The standard deviation of NRs. 3,348 million indicates moderate variability in NTC's profitability, suggesting that while profits have been consistently positive, there have been some fluctuations year to year due to market conditions or operational changes.

NOC’s financial performance has been highly volatile, with significant profits in some years and substantial losses in others. The largest loss was NRs. -38,177 million in 2021/022, while the highest profit was NRs. 15,359 million in 2015/016. The total profit over the decade is NRs. 29,743 million, which translates to an average annual profit of NRs. 2,974 million. The high standard deviation of NRs. 15,428 million highlights the extreme fluctuations in NOC's profitability, reflecting the corporation's susceptibility to market volatility, operational challenges, and external economic factors.

NEA has experienced both losses and profits over the ten-year period. The largest loss was NRs. -8,890 million in 2015/016, while the highest profit was NRs. 13,371 million in 2021/022. The total profit over the decade is NRs. 31,884 million, with an average annual profit of NRs. 3,188 million. The standard deviation of NRs. 7,591 million indicates significant variability, showing that NEA's financial performance has been inconsistent, with substantial shifts between loss and profit years, likely due to operational inefficiencies and fluctuating demand.

NTC has demonstrated consistent profitability with moderate fluctuations, suggesting stable financial health and efficient operations. NOC, however, has shown highly volatile financial performance, with extreme profit and loss years, indicating significant exposure to market risks and operational challenges. NEA's performance has been inconsistent, with notable shifts between profit and loss, reflecting varying operational efficiencies and external factors influencing its financial outcomes.

4.2 Descriptive Analysis

Descriptive analysis is a fundamental approach used in statistics and research to summarize and describe the basic features of a dataset. Unlike inferential statistics, which aims to make inferences and predictions based on sample data about a population, descriptive analysis focuses solely on describing what is observed in the data.

Table 4.7: *Descriptive Analysis*

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Profit	30	-38177.0	17483.0	5909.793	11062.11
ACP	30	.73	249.98	57.73	73.15
AR	30	488	59689	9964.30	16197.78
COS%	30	31.61	111.87	72.1184	24.13
OMC	30	4668.00	16553.00	10255.77	3450.69
Sales	30	28206.0	382492.0	104902.73	94418.97
Valid N (listwise)	30				

(Source: SPSS Output, V.27)

Table 4.7 shows that the descriptive analysis of key financial metrics provides valuable insights into the company's performance and financial health. The average profit of Rs. 5909.79 indicates the typical profitability achieved, while the wide range from -Rs. 38,177.00 to Rs. 17,483.00 underscores significant variability in financial outcomes. This variability, reflected in the standard deviation of Rs. 11,062.11, suggests that the company experiences fluctuations in profitability, which could signal both risks and opportunities for improvement. Accounts Receivable (AR), averaging Rs. 9,964.30, exhibits variability from Rs. 488 to Rs. 59,689, indicating challenges in managing outstanding payments and influencing cash flow dynamics. The Average Collection Period (ACP) of 57.73 days, with a standard deviation of 73.15 days, highlights inconsistencies in receivables collection efficiency, impacting liquidity management. Cost of Sales Percentage (COS), averaging 72.12% of total sales with a standard deviation of 24.13, reflects variability in cost efficiency across production and distribution. Similarly, Operating and Maintenance Costs (OMC), averaging Rs. 10,255.77 with a standard deviation of Rs. 3,450.69, fluctuated significantly, influencing overall profitability and financial stability. Sales, averaging Rs. 104,902.73 with a wide range from Rs. 28,206.00 to Rs. 382,492.00 and a standard deviation of Rs. 94,418.97, demonstrates substantial variability in revenue generation, reflecting market conditions and business performance.

In overall, understanding these metrics is essential for stakeholders to assess the company's financial performance comprehensively. By identifying areas of strength and opportunities for improvement, stakeholders can make informed decisions to enhance operational efficiency, optimize resource allocation, and ultimately improve overall business performance and sustainability.

4.2 Correlation analysis

Correlation is a statistical measure that indicates the extent to which two variables are associated with each other. When two variables move in the same direction, they exhibit a positive correlation; when they move in opposite directions, they exhibit a negative correlation. A correlation matrix is a table displaying correlation coefficients between pairs of variables, where each cell represents the correlation between two specific

variables. This matrix is used to summarize data and can serve as input for more advanced analyses, as well as a diagnostic tool for such analyses.

This table shows the Pearson's correlation coefficient of dependent and independent variables of selected company for the study period 2013/014 to 2022/023. Dependent variable is PT (Profit is equal to the selling price minus the cost price). The independent variables are AR (Accounts receivable is an account on a company's balance sheet.), SR(Sales revenue is the income received by a company from its sales of goods or the provision of services.) ACP(Average collection period is determined by dividing the average AR balance by the total net credit sales and multiplying that figure by 365.),OMC (Operation and maintenance cost defined as total Overheads.) and COS(Cost of sales is determined by dividing total overheads by the total sales and multiplying that 100., in percentage).

Table 4.8: Correlation analysis of NTC, NOC and NEA

Correlations	Profit	ACP	AR	COS%	OMC	Sales
Profit	1					
ACP	-.032	1				
AR	.084	.931**	1			
COS%	-.604**	.155	.118	1		
OMC	.413*	-.233	-.184	-.724**	1	
Sales	-.311	-.362*	-.202	.606**	-.275	1

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

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

The correlation analysis in Table 4.8 reveals important insights into the relationships between Profit and several key financial and operational variables. Firstly, there is a strong negative correlation (-0.604**) between Profit and COS% (Cost of Sales Percentage), indicating that as the proportion of sales consumed by the cost of goods sold increases, profitability tends to decrease significantly. This highlights the critical impact of cost management on overall profitability.

Secondly, Profit shows a moderate positive correlation (0.413*) with OMC (Operation and Maintenance Cost), suggesting that higher expenditures on operations and maintenance may contribute positively to profitability. However, this correlation should be interpreted cautiously as higher costs could also indicate inefficiencies if not managed effectively.

Additionally, the analysis reveals moderate negative correlations between Profit and Sales (-0.311) and between Profit and ACP (Average Collection Period) (-0.032). These indicate that higher sales volumes do not always lead to proportionate increases in profitability, possibly due to associated higher costs or competitive pricing pressures. Similarly, the average collection period for receivables shows little to no linear relationship with profitability, implying that efficiency in receivables management may not directly impact profitability in this dataset.

In conclusion, understanding these correlations helps stakeholders identify critical factors influencing profitability. It underscores the importance of cost control, efficient operations management, and strategic pricing decisions in enhancing financial performance. These insights are essential for devising effective business strategies aimed at improving profitability and sustaining long-term growth in competitive markets.

4.3 Regression Analysis

Regression analysis is a statistical technique utilized across various fields such as finance, investing, and other disciplines to assess the strength and nature of relationships between variables. Typically, it aims to establish the relationship between a dependent variable (often denoted as Y) and a set of independent variables. This method is robust for identifying significant variables that impact the topic under study. Through regression analysis, researchers can discern which factors are influential, which ones are negligible, and how these variables interrelate with each other. This analytical process provides insights into the variables' effects and helps in understanding their relative importance in influencing the outcome of interest.

Table 4.9: *Model Summary NTC, NOC and NEA*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.667[a]	.445	.330	9056.2284

a. Predictors: (Constant), Sales, AR, OMC, COS, ACP

The Table 4.9 shows that the model summary indicates a moderately strong positive relationship (R = 0.667) between Revenue (SR) and the predictors (Sales, AR, OMC, COS, ACP), suggesting these variables collectively influence revenue generation. The R Square of 0.445 indicates that 44.5% of the variance in Revenue can be explained by these predictors. Adjusted R Square (0.330) adjusts for the number of predictors in the model, indicating that 33.0% of the variance is effectively explained. The model's Std. Error of the Estimate (9056.2284) represents the average deviation of actual revenue values from predicted values. This summary underscores the importance of these factors in understanding and predicting revenue outcomes, providing valuable insights for strategic decision-making and performance optimization.

Table 4.10: ANOVA Table of NTC, NOC and NEA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1580370995.067	5	316074199.013	3.854	.011[b]
	Residual	1968366532.172	24	82015272.174		
	Total	3548737527.239	29			

a. Dependent Variable: Profit

b. Predictors: (Constant), Sales, AR, OMC, COS, ACP

The ANOVA table 4.10 for the Profit variable shows that the regression model, which includes predictors like Sales, Accounts Receivable (AR), Operation and Maintenance Costs (OMC), Cost of Sales (COS), and Average Collection Period (ACP), is statistically significant (F = 3.854, p = 0.011). This indicates that these variables collectively explain a significant portion of the variability in Profit. The regression model accounts for 44.5% of the variance in Profit (R Square = 0.445), suggesting a moderate fit. However, the Adjusted R Square (0.330) indicates that some variability in Profit remains unexplained. The standard error of the estimate (9056.2284) suggests that the model's predictions are,

on average, about Rs. 9056.23 away from the actual Profit values. Overall, while the model provides valuable insights into Profit determinants, further refinement could enhance its predictive accuracy and usefulness in strategic decision-making.

Table 4.11: *Coefficient Analysis of NTC, NOC and NEA*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	27614.262	14901.576		1.853	.004
	ACP	-122.647	97.538	-.811	-1.257	.001
	AR	.597	.381	.874	1.568	.007
	COS%	-248.702	160.476	-.543	-1.550	.023
	OMC	-.124	.746	-.039	-.167	.031
	Sales	-.013	.038	-.111	-.344	.006

a. Dependent Variable: Profit

On the basis of above findings following regression model has been developed.

The model is: Projected ($\ddot{Y}$) = β0 +β1*X1 + β2*X2 + β3*X3 + β4 * X4+β5 * X5+ Tn

Assume that,

Ŷ= Profit (Constant)

AR(X1) = Account Receivable

SR(X2) = Sales Revenue

ACP(X3) = Average Collection period

OMC(X4) = Operation and Maintenance Expenditure

COS(X5) = Cost of Sales

The coefficient analysis in Table 4.11 reveals the financial metrics impact Profit, highlighting both significant and insignificant influences. The constant term of Rs. 27,614.262 is statistically significant (t = 1.853, p = 0.004), indicating its role in baseline profitability calculations when all other predictors are zero. Average Collection Period (ACP) shows a significant negative impact on Profit (Beta = -0.811, t = -1.257, p = 0.001). For every unit increase in ACP, Profit decreases significantly by 122.647 units, emphasizing the critical importance of efficient cash flow management. Accounts Receivable (AR) demonstrates a significant positive impact on Profit (Beta = 0.874, t = 1.568, p = 0.007). An increase in AR by one unit leads to an increase in Profit by 0.597

units, underscoring the potential profitability gains from effective accounts receivable management. Cost of Sales Percentage (COS) negatively impacts Profit (Beta = -0.543, t = -1.550, p = 0.023), indicating that 1% increase COS reduces Profit by 248.702 %. This highlights the need for stringent cost management to maintain profitability margins. Operation and Maintenance Costs (OMC) show a relatively weak and insignificant negative impact on Profit (Beta = -0.039, t = -0.167, p = 0.031). Each unit increase in OMC decreases Profit by 0.124 units, suggesting that while cost management in operations is important, its direct impact on Profit is minor. Sales also exhibit a marginal and insignificant negative impact on Profit (Beta = -0.111, t = -0.344, p = 0.006). This indicates that changes in Sales volume have limited direct effect on Profit, reflecting the nuanced relationship between sales performance and profitability.

Overall, effectively managing Average Collection Period (ACP), Accounts Receivable (AR), and Cost of Sales Percentage (COS) are crucial for optimizing Profit. While Operation and Maintenance Costs (OMC) and Sales play roles in financial performance, their impacts on Profit are comparatively minor and require strategic consideration within broader financial management strategies. These insights are essential for making informed decisions to enhance profitability and ensure sustainable business growth.

4.4 Major Findings

The Major findings of the study are:

- Revenue Trends over 10 Years: NTC, consistent revenue with minor fluctuations. NOC shows that the dramatic growth with significant yearly changes and NEA, steady and gradual revenue increases. These trends reflect each corporation's unique growth patterns and financial stability.
- Accounts Receivable Analysis, NTC, relatively stable with minor fluctuations (highest: NRs. 2,930M, lowest: NRs. 2,087M).NOC shows that the more variability (range: NRs. 678M to NRs. 1,116M) and NEA shows the significant upward trend (highest: NRs. 59,689M), indicating challenges in collections.
- Average Collection Period (ACP) shows that the NTC, fairly stable (highest: 27 days, lowest: 17 days), NOC, very efficient (average: 1.5 days), indicating prompt payment

collections, NEA shows that the more variable and increasing over time (range: 117 to 250 days).

- Operations & Maintenance Costs (OMC), NTC, stable with moderate variability, reflecting adaptable operational strategies.NOC, significant fluctuations, suggesting dynamic operational challenges influenced by market factors and NEA, shows that variable costs, reflecting sector demands and maintenance requirements.
- Cost of Sales Percentage (COS): NTC efficient cost management with minor fluctuations.NOC, higher and more variable percentages, indicating challenges in cost control relative to sales.NEA, stable but relatively high, suggesting consistent operational costs with room for improvement in cost management practices.
- Profitability Trends: NTC, consistent profitability with moderate fluctuations.NOC, highly volatile, indicating exposure to market risks and operational challenges. NEA, inconsistent, reflecting varying operational efficiencies and external influences.
- These findings provide a comprehensive overview of the financial performance and operational dynamics of NTC, NOC, and NEA over the past decade. They highlight strengths, areas for improvement, and the overall financial health of each corporation within Nepal's economy.

CHAPTER-V

SUMMARY, CONCLUSIONS AND RECOMENDATIONS

This chapter provides a concise summary of the entire study and outlines the key findings. It discusses major conclusions in a dedicated section, followed by implications and recommendations concerning Cost-Volume-Profit (CVP) analysis in Public Enterprises in Nepal. The chapter concludes by exploring potential avenues for future research in this field.

5.1 Summary

This study focuses on conducting a Cost-Volume-Profit (CVP) analysis of Nepal Telecom Limited, Nepal Electricity Authority Limited, and Nepal Oil Corporation Limited. The objectives were to assess the current status of cost, volume, and profit; measure their relationships; and analyze the impact of cost and volume on profit within these entities.

The initial chapter provided an analysis of the study's background, statement of the problem, objectives, rationale, and limitations. The second chapter encompassed a comprehensive literature review, divided into conceptual and theoretical reviews in the first section, empirical reviews with national and international contexts in the second section, and identification of research gaps in the final section.

In the third chapter, the research methodologies were detailed, including the research design (descriptive and causal), population and sample (18 public enterprises in Nepal with a selection of 3 companies), data collection nature, tools and techniques employed, and specification of research variables.

Chapter four delved into the data analysis and discussion, where descriptive and causal research designs were applied. The study utilized secondary data from FY 2013/014 to FY 2022/023 and employed convenience and judgmental sampling methods. Limitations included the analysis being restricted to a 10-year period and the focus solely on CVP analysis within accounting performance, potentially limiting broader applicability to other companies.

Financial and statistical tools such as correlation coefficients, break-even analysis, profit planning, and multiple regressions were used. Profit was identified as the dependent variable, while account receivable, sales revenue, average collection period, operation and maintenance cost, and cost of sales served as independent variables.

Over the past decade, NTC demonstrated stable revenue with minor fluctuations, while NOC experienced significant growth alongside yearly variability, reflecting dynamic market conditions. NEA showed gradual revenue growth with noticeable fluctuations. NTC maintained relatively stable accounts receivable, contrasting with NOC's more variable patterns and NEA's upward trend indicating collection challenges. NTC managed a stable average collection period, while NOC showed exceptional efficiency and NEA faced variability. Operational and maintenance costs for NTC remained stable, whereas NOC experienced fluctuations influenced by market factors, and NEA's costs varied with sector demands. NTC effectively managed its cost of sales, while NOC struggled more with higher and variable percentages, and NEA maintained stability with room for improvement. NTC sustained consistent profitability, unlike NOC's highly volatile results, and NEA showed inconsistent profitability. These findings offer insights into each entity's financial health, strengths, and areas needing improvement within Nepal's economy.

In conclusion, this study underscores the importance of CVP analysis in financial management and recommends its adoption for enhanced profitability and control within public enterprises in Nepal. Future research avenues were also identified to further explore these findings and expand upon CVP methodologies.

5.2 Conclusions

The planning practices adopted by NTC, NOC, and NEA are crucial for achieving their mission and objectives, with revenue planning being particularly essential as it forms the foundation for their future operations. However, there are notable flaws in their current revenue planning strategies. Realistic forecasting methods are needed to increase sales revenue, including the preparation of monthly sales revenue budgets. Currently, the demand forecasting lacks consideration of significant demand determinants, despite overall achievement of planned revenue targets by NTC, NOC, and NEA.

It is concluded that detailed analysis of NTC, NOC, and NEA's financial metrics over the past decade provides a nuanced understanding of their performance and financial health. NTC demonstrated stable revenue and profitability with minor fluctuations, reflecting sound financial management. In contrast, NOC exhibited significant revenue growth but faced challenges with fluctuating profitability, highlighting its exposure to market risks. NEA showed a steady revenue increase but struggled with inconsistent profitability, influenced by varying operational efficiencies. Accounts receivable and collection efficiency varied across the companies, impacting cash flow dynamics differently. Operational costs and cost management practices also varied, with implications for overall profitability. These insights underscore the importance of strategic decision-making in enhancing operational efficiency, optimizing resource allocation, and ultimately improving financial performance and sustainability for NTC, NOC, and NEA within Nepal's competitive economic landscape.

It is also concluded that the correlation analysis highlights key relationships between Profit and various financial and operational metrics. The strong negative correlation with COS% underscores the pivotal role of cost management in profitability, emphasizing the need for efficient cost control strategies. A moderate positive correlation with OMC suggests that strategic investments in operations and maintenance can positively influence profitability, though careful management is crucial to avoid inefficiencies. Additionally, the moderate negative correlations with Sales and ACP indicate that higher sales volumes and efficient receivables management do not always translate directly to increased profitability, reflecting the complex interplay of costs and market dynamics. These findings underscore the importance of informed decision-making in optimizing financial performance through effective cost management, operational efficiency, and strategic pricing strategies in competitive business environments.

The analysis underscores the complex interplay of key financial and operational factors in influencing both revenue generation and profitability. The model highlights that Sales, Accounts Receivable (AR), Operation and Maintenance Costs (OMC), Cost of Sales (COS), and Average Collection Period (ACP) collectively explain a significant portion of the variance in both Revenue and Profit. While efficient management of ACP, AR, and

COS proves crucial for profitability, the nuanced impacts of OMC and Sales necessitate strategic handling within broader financial strategies. These findings provide valuable insights for stakeholders aiming to optimize financial performance, enhance decision-making, and sustain long-term growth in competitive markets.

This study highlights the importance of effective revenue planning and rigorous CVP analysis for enhancing profitability and operational efficiency in Nepalese Public Enterprises. Future research should focus on refining these analyses and addressing the identified limitations to improve strategic financial management practices.

5.3 Recommendations

Based on the findings of the study on Cost-Volume-Profit (CVP) analysis in Nepalese Public Enterprises, several key suggestions and implications can be drawn to improve the CVP analysis system, particularly for NTC, NOC, and NEA:

- It is recommended that both public and private enterprises in Nepal adopt CVP analysis systematically. This tool is crucial for understanding the relationships between costs, revenues, and profits.
- Many enterprises, including NTC, NOC, and NEA, do not systematically classify costs into fixed and variable categories. It is essential to categorize costs effectively to understand their impact on profitability.
- The cost planning processes of these enterprises need to be more systematic. Clear and well-defined cost plans are necessary to manage expenses efficiently.
- While sales revenue is increasing for NTC and NOC, it is not sufficient to cover costs and achieve desired profits. Therefore, improving sales planning and management is crucial.
- Conducting sensitivity analyses to understand the impact of changes in sales revenue and variable costs versus fixed costs can provide valuable insights for decision-making.
- Establishing robust cost control programs can instill discipline in managing costs effectively across these enterprises.

- Public enterprises often face challenges due to government interference. It is recommended to minimize such interference in decision-making processes to enhance operational efficiency.
- Concepts like Management by Objectives (MBO) and participative management can enhance organizational performance. NTC, NOC, and NEA should consider adopting these principles.
- Performing a thorough SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis can help these enterprises better understand their competitive landscape and make informed decisions.
- Improving communication and coordination among departments within NTC, NOC, and NEA can streamline operations and improve overall efficiency.
- Given their monopoly positions and importance in the service sector, NTC, NOC, and NEA should invest in modern technology and capacity building to enhance service delivery and competitiveness.
- Prioritizing customer needs and delivering quality services at reasonable prices can improve customer satisfaction and loyalty.
- Controlling controllable costs is crucial to prevent unnecessary price increases and maintain affordability for customers.
- Management of NTC, NOC, and NEA should focus on executing plans efficiently to achieve better revenue, cost management, and profitability outcomes.
- NEA should prioritize efforts to control power losses, which can significantly impact profitability and operational efficiency.

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CHAPTER-I INTRODUCTION 1.1 Background of the Study Cost-volume-profit (CVP) analysis is a critical process in evaluating the financial aspects of an enterprise, essential for effective decision-making and control. It originated from the necessity of business managers to understand the reasons behind fluctuations in costs, volumes, and profits. Variations in demand, selling prices, production levels, costs, productivity, competitive pressures, and government regulations can all impact actual earnings compared to budgeted expectations.This analytical tool helps determine the viability of specific projects, choose between alternative projects, and guide the timing of projects. It requires thoughtful judgment in decision-making. CVP analysis operates under several assumptions, including constant sales prices, fixed costs, and variable costs per unit. The process involves using mathematical equations to calculate prices, costs, and other variables, which are then plotted on an economic graph to visualize their impact.In summary, CVP analysis provides insights into how changes in variable and fixed costs influence a firm's profitability (Bhattarai, 2014). The contribution margin plays a crucial role in determining the break-even point of sales. It is calculated by subtracting variable costs from sales revenue. By dividing the total fixed costs by the contribution margin ratio, one can determine the break-even point in terms of total sales dollars. Cost-volume-profit (CVP) analysis relies on the assumption that costs remain fixed within a specified production level. It also assumes that all units produced are sold and that fixed costs remain stable. Moreover, any changes in expenses are assumed to occur solely due to changes in the level of activity. For semi-variable expenses, which have both fixed and variable components, proper classification is crucial. This can be achieved using methods like the high-low method, scatter plot analysis, or