APPLICATION OF COST VOLUME PROFIT ANALYSIS IN DECISION MAKING

(with reference to Chilime Hydropower Company limited and Butwal Power Company Limited)

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RECOMMENDATION

This is to certify that the Thesis

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(with reference to Chilime Hydropower Company limited and Butwal Power Company Limited)

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

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VIVA-VOCE SHEET

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according to the prescribed format. We recommend the thesis to be

accepted as partial fulfillment of the requirement for the

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DECLARATION

I, hereby, declare that the work reported in this thesis entitled "Application of Cost Volume Profit Analysis in decision making: with eference to Chilime Hydropower Company Limited and Butwal Power Company Limited)" submitted to office of the Dean, Faculty of Management, Tribhuvan University, is my original work done for the partial fulfillment of the requirement for the Masters of Business Studies (MBS) under the supervision of **Mr. Joginder Goet**, Lecturer, Shanker Dev Campus.

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ABBREVIATIONS

BEP	:	Break Even Point
BPC	:	Butwal Power Company Ltd.
CHPCL	:	Chilime Hydropower Company Ltd.
CM	:	Contribution Margin
CMPU	:	Contribution Margin Per Unit
CMR	:	Contribution Margin Ratio
CVP	:	Cost-Volume-Profit
DOL	:	Degree of Operating Leverage
FC	:	Fixed Cost
FY	:	Fiscal Year
GP	:	Gross Profit
i.e.	:	That is
Ltd.	:	Limited
MOS	:	Margin of Safety
NP	:	Net Profit
P/L Account	:	Profit/Loss Account
P/V Ratio	:	Profit Volume Ratio
S.N.	:	Serial Number
SPPU	:	Selling Price Per Unit
TFC	:	Total Fix Cost
VCPU	:	Variable Cost Per Unit

CHAPTER-I

INTRODUCTION

1.1 Background of the study

Water resources are important natural resources for the economic development of Nepal. Availability of abundant water resources and geo-physical features provide ample opportunities for hydropower production in Nepal. Out of the total hydropower generation capacity of about 83,000 megawatt (MW) in the country, about 42,000 MW of power generation appears feasible to date from financial–technical perspective. In view of the internal consumption and export possibility of hydropower in the context of the overall development of the country, an investment friendly, clear, simple and transparent policy is necessary to enhance the development process of hydropower. An open and liberal policy pursued in the hydropower sector after restoration of democracy has started yielding positive indications in the field of hydropower development. Past experiences as well as working in close association with the private sector, even though for a short period, have guided our path in this regard. It is also observed that the need to overcome the shortcomings and weaknesses that have emerged in the course of involvement and participation of the private sector in the water resource sector.

Energy development and consumption is one of the key factors in economic development. Energy resources, which are continuously available for the long duration and which have no detrimental to social effects, are compulsory for sustainable development. The facts that fossil originated energy sources are both exhaustible and have detrimental effects to environment has made inevitable to focus on alternative resources. Hydropower of Hydroelectricity is an energy generated by the force of moving water in the penstock of a hydropower unit. It is a leading source of energy as it provides more than 97% of all electricity generated by renewable sources. Other sources including

solar, geothermal, wind, marine energies and biomass account for less than 3% of renewable electricity generated.

Hydropower is a clean source of energy as it burns no fuel and does not produce green house gases (GHG) emissions, other pollutants or wastes associated with fossil fuel of nuclear plant. Hydropower has been used for centuries. The Greek used water wheels for grind wheat into flour more than 2000 years ago. In the early 1800s, American of Europian factories used the water wheels to power machines. The first modern turbine designed by James B. Francis in 1849 leads to the development of hydroelectricity sector. The first hydroelectricity power plant was built at Niagara Falls in New York, 1879. Today, Hydropower is the most efficient way to generate electricity. Modern hydro turbines can convert as much as 90% of available energy into electricity. The best fossil fuels are only about 50% efficient. Producing electricity from hydropower is cheap as once a dam has built and the equipment installed, the energy source flowing water is free. Hydropower plants are long lobed and their maintenance cost are low as compared to coal or nuclear plant.

Hydropower's low cost, near zero emission and ability to be dispatched quickly to meet peak electricity demand have made it one of the most valuable renewable energy worldwide. Worldwide about 20% of energy is generated by hydropower. According to International Energy Agency (IEA), currently 808000 megawatt of hydropower generation capacity is in operation of under consumption around the world. Energy information administration (EIA), office of energy market (2007-2009) forwarded that China ranks first in terms of energy generation with the generation capacity of 429.98 billion kilowatts hours, brazil ranks second with 370.63 billon KWhs, Canada ranks third with 365.30 billion KWhs, whereas Nepal generates only 2.69 billion KWHs. The inherent technical, economic and environmental benefits of hydropower make it an important contribution to the future world energy mix, particularly in the developing countries like Nepal.

The major energy resources base in Nepal consists of biomass, Hydroelectricity, petroleum products, natural gases, and coal reserves. Among the entire energy resource base, It is evident that biomass is the dominant resource base of the country with respect to utilization. Nepal is blessed with immense amount of hydroelectric potential and rank 2nd in terms of water resources after Brazil on global scenario. Nepal has more than 6000 rivers and rivulets with the total length of about 45000 Km. So, it has huge hydropower potential. In fact the perennial nature of Nepali rivers and the steep gradient of the country's topography provide ideal conditions for the development of some of the world's largest hydroelectric projects in Nepal. Nepal has roughly 83000 MW of hydropower potential but only 43000 MW is economically exploitable. According Nepal Electricity Authority (NEA), the current installed capacity of hydropower is 3356.82 GWH. Out of this 1038.84 GWH is contributed by Independent Power Producer (IPPs). Besides, such installed capacities in the system, the power plant were generating only 511 Mw. Hence, Bulk of economically feasible generation has not been realized yet. Although it has tremendous Hydropower, only about 40% of Nepal's population has access to electricity. Only energy needs is fulfilled by electricity. The bulk of the energy needs is dominated by fuel wood (68%), Agriculture (15%), Animal dung (8%), and Imported fossil fuel (8%).

The hydropower development in Nepal began with the development of 500 KW Pharphing power plants in 1977. In 1936 the 640 KW Sundarijal Hydropower plant was commissioned and in 1965 the 2.4 MW Panauti Hydropower plant was installed. The 92 MW Kulekhani Hydropower pnant (I &II) commissioned in 1982 is the only project offering seasonal water storage in Nepal. The 144 MW Kali Gandaki-A, hydropower project, commissioned in 2003 is the biggest hydropower system in Nepal is dominated by Run-of river projects. There is only one seasonal storage project in the system. Because of the seasonal variation of the river flow, there is excess power supply during the monsoon season (July-September) and shortage in the dry season.

Nepal electricity sectors predominantly a public sector story. In 1974 Small Hydro development Board (SHDB) which performs planning, survey, design, implementation, and operation/ maintenance of small hydropower plants throughout Nepal. Later in 1985 Nepal Electricity Authority (NEA) was formed under the Nepal Electricity Act, 2041 after merging Electricity Department, Nepal electricity Corporation and SHDB. The Nepal Electricity Authority (NEA) is vertically integrated power utility charged with responsibility of generation, transmission, and distribution of electric power in the country. It has operated virtually as a monopoly power utility. Until 1990, Hydropower development was under the domain of government utility, NEA only. To promote and encourage private Nepalese and foreign investment in Hydropower sector, government had adopted Hydropower Policy 1992. Water Resource Act 1992/Regulation 1993, Electricity Act 1992/regulation 1993. The hydropower power policy 1992 and other related Act provide excellent incentives to development of Hydropower in Nepal like generation license validity for 50 years, Income tax holiday of 15 years, Income tax when applicable at the rate of 10% below prevailing corporate income tax, 1% custom duty on imported goods for the project, exemption of import license, exemption on sales tax, government land to readily available on lease for duration of license. No license shall be required for the Hydro project having capacity up to 1000 kilowatt. later on after policy includes incentives provision and transparent process for attracting private investors. Foreign investors are allowed to invest 100% for developing hydropower. Private investment in hydropower began with the 5.1 MW Andhi Khola in 1991 followed by the 12.3 MW Jhimruk Project in 1994. Today there are many Independent Power Producers (IPPs) under domestic and foreign investment. Himal Power Limited, Bhotekoshi Power company, Chilime Power company, National Hydropower company, Butwal power company, Syange Vidyut Company, Arun Valley Hydropower Development company are operating under domestic investment. The foreign investors such as Asian Brown Boveri (ABB), Panda

Energy Group, and Statkraft are also involved in some of these companies. Snowy Mountain Engineering Corporation of Australia is another company operating in Nepal for Qest Seti Project intended to export power to India. The Butwal company is first independent Power producer preceding to 1992 Hydropower Development Policy.

Two types of marker are available for the sales of generated electricity, domestic and export. NEA operates as a Single-Buyer and Single-seller of electricity in the country. Under NEA, there is separate "Power Trade Department", which concludes Power Purchase Agreement (PPA) with enthusiastic Independent Power Producers (IPPs) and execution of the PPAs foe technically and financially viable power projects. This department also coordinates the power exchange and trade with India, monitors, and provides support in the administration of PPAs including processing of the invoices. One of the most important events related to private sector participation is establishment of standard terms in PPA agreement in 1998 which include; Rs 3 per KWh in wet season, Rs 4.25 per KWh in dry season, purchase rate escalated till 5 years at 6% p.a. and PPA validity of 25 years. However, PPA policy is restricted only to the project of 5 MW capacities and below. This rate was revised in 2003 at the level of RS 3.90 per KWh for wet season and Rs. 5.52 per KWh for dry season.

It does not matter in what business an organization is? The aim of it is to minimize cost and maximize profit. Due to existing risk and competition conditions, company management needs management accounting, which is a component of company's accounting system and designed solely to help managers in decision making process. The main aim of management accounting is to achieve cost effectiveness and increase profitability of the organization. We all practice cost effectiveness from the house wife who attempts to run household on a fixed budged to the public utility that choose between nuclear energy and fossil fuel. Cost effectiveness analysis and Cost

benefit analysis, together with system analysis, policy analysis, operational research, management science and other decision disciplines provides to make various decisions. Cost effectiveness compares various actions that might be taken in terms of their costs and their effectiveness in achieving desired goals. While the terms cost effectiveness did not become popular until very recently, cost effectiveness thinking has been practicing since 11th century. The first treatise on cost effectiveness was appeared in 1887 by A.M. Wellington entitled: The Economic theory of the location of Railways. The concept of cost effectiveness did not become an organized activity, did not attract much attention in the literature of decision making and did not get the name until after World War II. Cost effectiveness as we know today represents the meeting point of three stream of development. These originated, respectively, in economic theory, in practical engineering, and in the operational analysis of World War II. The time has brought about considerable improvement with best practices in Cost-effectiveness analysis and cost-benefit analysis.

Today, cost effectiveness analysis, cost benefit analysis, decision making analysis, etc. ate condensed under one discipline called Management accounting. Management accounting is defined as the process of indentifying, measuring, accumulating, analyzing, preparing, interpreting, and communicating information that helps managers to make various decisions and fulfill the objective of the organization. Management accounting is a young discipline as compared to financial and cost accounting but an outmost discipline in today's business management. Management accounting is continuously evolving, with the emphases shifting from a cost determination and financial control focus to the provision of advice that results in addition or creation of value. It provided accounting information that is useful in planning, controlling, and evaluating and provide the base for decision making, planning, controlling and directing activities.

The success of any business organization as measured in terms of profit depends upon sales volume, price and cost. The sales volume and price must be sufficient enough to cover all costs and allow satisfactory margin for net income, but we must also consider what our competitor and potential competitors are doing. Otherwise, we may price ourselves out of the marker or miss the opportunity to increase our profit. Hence, to manage any kind of business one must understand how cost respond to changes in sales volume and the effect of costs and revenues on profit. Management must make many critical operating decision regarding cost, volume, & price that affect the firm's profitability. There are various tools and techniques in Management accounting regarding cost volume and profit relationship like cost behavior analysis, Budgeting, Linear Programming Model, Standard Costing, Cost-Volume-Profit analysis, Pricing decision etc. Among the various techniques Cost-Volume-Profit (CVP) Analysis is also considered as important one.

Cost-volume-profit (CVP) analysis:

CVP analysis is a technique that examines changes in profits in response to changes in sales volumes, costs, and prices. It is a cost evolution model, which point out relations among const, production volume and profit. It is one of the most important tools in profit planning and control (PPC). PPC tools are incomplete without CVP analysis.

CVP analysis is a useful forecasting as well as managerial control tool used in management accounting. This technique expresses the relations between income, sales structure, cost, production volume and profit and includes breakeven point analysis and profit forecasting procedure. These relations provided a general economic activity model, which may be used by manager to make short term forecasts, to access company performance and to analyses decision making alternative. Cost volume profit analysis is evolved as a management tools to study the interrelationship among the following factors:.

- Prices of Products
- Volume of products
- Per unit variable costs
- Total fixed costs
- Mix of products sold

Cost-volume-profit analysis examines the behavior of total revenues, total costs and income as changes occur in the output level, the selling price, the variable cost per unit and fixed cost of the product. It is a technique helps to estimate the profit or loss as different activity level. It summaries the effects of changes in organization volume of activity on its costs, revenue and profit.

CVP analysis is a key factor in many decisions, including choice of products lined, pricing of products, marketing strategy and utilization of productive facilities. CVP analysis is undoubtedly the best tool the manager has for discovering the untapped profit potential that may exist in an organization. Accountants often CVP analysis to plan future level of operating activity and provide information about:.

Which products of services to emphasize

- The volume of sales needed to achieve a target level of profit
- The amount of revenue required to avoid losses
- Whether to increase fixed costs
- How much to budget for discretionary expenditures
- Whether fixed costs expose the organization to an unacceptable level of risk

CVP analysis also helps managers make business decisions such as whether to increase or decrease discretionary expenditure like advertising. It helps Managers to estimate future revenues, costs, and profit to help them plan and monitor operations. They use cost-volume-profit (CVP) analysis to identify the level of operating activity needed to avoid losses, achieve targeted profits, plan

future operations, and monitor organizational performance. Managers also analyze operational risk as they choose an appropriate cost structure.

Managers often want to know the level of activity required to break even. A CVP analysis can be used to determine the breakeven point, or level of operating activity at which revenues cover all fixed and variable costs, resulting in zero profit. We can calculate the breakeven point from any of the preceding CVP formulas, setting profit to zero.

1.2 Company Profile

As we know that Nepal is rich in water resources, so, it has huge potential of hydropower. Despite, hydropower being major resource endowment of Nepal. It is underutilized. Power shortage remains severe and this in turns puts a strong brake on the industrial development. In this light, the development of cost effective hydropower should be considered an extremely high priority issue under National Planning in order to raise productivity in all sectors of economic activity. The development of hydropower sector helps to achieve the millennium development goals with protecting environment, increasing literacy, improving health with better energy, contribution to GDP and many more advantages. Until 1990, hydropower development was under the domain of government utility, Nepal Electricity Authority (NEA) only.

For the growth of hydropower industry government has issued Hydropower Development Policy, 1992 (Revised in 2001) which has opened door to private entrepreneurs, domestic and foreign enterprises both for the investment in the study and development, operation and maintenance of hydropower projects. As a result many Independent Power producers (IPPs) came into existence. Among them Chilime Hydropower company Limited (CHPCL) and Butwal Power company Limited (BPC) has a huge contribution towards the development of hydropower sector in Nepal. They are listed companies of

Nepal in Nepal Stock Exchange (NEPSE). The study focus on Cost-volume-profit (CVP) analysis of these two companies.

1.2.1 Chilime Hydropower Company Limited (CHPCL)

The Chilime Hydropower Company Limited (CHPCL) was established in 1996 with the objective of promoting the utilization of resources within the country for the development of hydropower.

Chilime Hydropower plant is a peeking run off river type plant constructed and owned by Chilime Hydropower Company Limited. It is located at the bank of Bhotekoshi River in Rasuwa district. The plant with the installed capacity of 22.56MW is delivering the power of 20MW under the Power Purchase Agreement (PPA) with Nepal Electricity Authority (NEA) since 24th August 2003. The plant is designed to generate 137 GWh energy per annum. The generated electricity from the plant is purchased by NEA at the powerhouse and evacuated as per the PPA made on 11th Ashad 2054. The annual deemed energy salable to NEA is 132.9 GWh, excluding penalty-free outage of 36 hours (720 MWh) annually.

The plant started commercial generation from 00:00 hours of 8th Bhadra 2060 (24th August 2003). During the five years of operation, the plant has been operating successfully in terms of meeting the generation targets and productivity in terms of building up a long lasting system of rationalized operation, diligent observation system, careful maintenance and getting a very high availability of the plant despite few obstacle.

The main objective of the CHPCL is also to be a leading enterprise in the power sector. In order to achieve this objective it has been focusing on the development and construction of various projects. At present, the company is having four hydroelectric projects in pipe line. Two projects namely, Sanjen upper hydropower projects with the installed capacity of 11MW in cascade are

planned to develop by forming a new subsidiary company to share the hydropower benefit to the local people and VDCs of Rasuwa also. The middle Bhotekosi Hydroelectric project with the installed capacity of 80MW is located in Sindupalchowk district and it is planned to develop with minimum equity share participation of the company and giving opportunity to local hydropower developers and financial institution. The company has recently received the study license of another medium sized projects, the Rasuwagadhi Hydroelectric project with installed capacity of 75MW, for feasibility study and environmental impact assessment study.

The Chilime Hydropower company Limited (CHPCL) was established in 1996 with the objective of promoting the utilization of resources within the country for the development of hydropower. It is the first public company formed with 51% of the share participation of the Nepal Electricity Authority, 25% of the share participation of employers of the Nepal Electricity Authority and remaining 24% being allocated to the general public.

1.2.2 Butwal Power Company Limited (BPC)

Butwal Power Company Limited (BPC) was established in 29th December, 1965 (2022/09/14 B.S.) as a private limited company under Company Act 2021 of Nepal . the company formed with the 68.95% of the share participation of the Shangri-La Energy Limited, 10% of share participation of General public, 9.09% of Government of Nepal, 6.05% of Interkraft Nepal , 2.79% of United Mission of Nepal, 2% of Employees, 1.06% of Nepal Electricity Authority and remaining 0.06% share participation of Nepal Industrial Development Corporation.

The core business areas are generation of electricity, distribution of electricity and providing engineering and consultancy services to hydropower and infrastructure project. In addition the company has strategic investment in other companies. BPC wholly owns and operates the 12MW Jhimruk Hydropower

Plant and 5.1 Mw Andhi Khola Hydropower Plant and developed the 4MW Khudi Hydropower Projects, which is in operation since 2007. It provides consultancy services through BPC Hydro consult a leading hydropower consultant in Nepal.

BPC's generation business is responsible for the smooth operation and maintenance of two power plants, the 5.1MW Andhi khola and 12 MW Jhimruk. The generated electricity is sold to NEA under Power Purchase Agreement (PPA) and local consumers. The major portion of revenues comes from generation business.

The main objective of the company is to be a leading enterprise in the power sector with excellence in providing innovative and quality products and services to meet the growing demand for efficient and clean energy. BPC is committed to providing quality and competitive products and services to satisfy customers need and conducting business in an environmentally and socially responsible manner. The mission of the company are to be a competitive hydropower developer and an electric utility, provide innovative engineering solutions and management services, practice corporate social responsibility and maximize value for all stakeholders.

BPC has been actively involved in the establishment of subsidiaries for vertical and horizontal expansion and integration of its business operations. They include Himal Power Limited, Nepal Hydro and Electric Limited, Khudi Hydropower Limited, BPC services Limited, Nyadi Hydropower Limited, Jhimruk Industrial development Centre (P) Limited & Hydro Lab Private Limited.

BPC has aggressive plan to develop green field projects and expand business in the energy sector. The company has a number of green field projects in hand. Mix of medium and large projects ranging from 10 to plus to 100 MW plus are targeted for expansion of generation business. The project in progress are

Kabeli A Hydropower project (30MW), Nyadi Hydropower Project (20MW), Andhi Khola upgrading project (Upgraded to 9.4 MW), Bhim khola Hydropower project (9MW), and Marsyangadi III Hydropower project (42MW).

1.3 Statement of the Problem

In the present situation, the world has been facing the energy problem. Hydropower can be the best alternative source of energy. No other energy source, renewable and non-renewable ban be best to solve present energy problem. Nepal has an enormous hydropower potential which may have huge contribution to world energy. But is very low in terms of utilization i.e. about only 1% of available capacity. The major problem behind this are policy inconsistencies, planning deficiencies, licensing problem, PPA related problem, financial constraints, political instability, NEA monopoly in buying electricity etc. These problems are major constraints in the growth of Hydropower Company which can solve major problems in the country.

The problem of the study is directed towards the study of CVP analysis in two major Hydropower Company of Nepal: Chilime Hydropower Company Limited (CHPCL) and Butwal Power Company Limited (BPC). It focuses on the problem of how CVP analysis can be used in planning and decision making of both companies. There are various tools and techniques used under CVP analysis. The study indentifies whether both the company practices the tools of CVP analysis or not. There are various problems regarding the use of CVP analysis in Hydropower Company in Nepal as there is no use of direct costing which classify the cost on the basis of operating volume. Hydropower Company uses a high proportion of machinery and equipment in producing revenue use of such machine regarding capacity utilization. Thus, the main problem of the study is how the CVP analysis tools and techniques can be used to carry out planning, decision making and controlling function.

- Whether the CHPCL & BPC generate electricity as per installed capacity of not?
- what is the influence of Nepal Electricity Authority (NEA) in both companies regarding price?
- whether CHPCL and BPC practices the tools and techniques of CVP analysis in planning and decision making of not?
- What are the major problems regarding the use of CVP analysis?
- Which firm is more competent regarding cost, volume and profit?
- Whether the firm is able to satisfy the need of local consumer of not?
- whether the firm is able to supply the electricity as per the demand of Nepal Electricity Authority or not?

1.4 Objective of the study

Objectives are the measurable outcomes of the problem. objectives must be tangible, specific, concrete, measurable and achievable. As we know that objective of every firm is to make profit or plan profit. The main objective of this study is also to identify the various tools and techniques of CVP analysis used in CHPCL and BPC for profit planning. It aims to estimate the fair value of total cost, total revenue, and profit at carious sales levels and their relationship. The objective of the study is to provide base for the analysis which suggest manager with a powerful tool for identifying the course of action that will improve the profitability. Only by learning to think in CVP terms can manager move with the assurance towards the firm's profit objectives.

- The main objective of the study is to determine how the various tools and techniques of CVP analysis are used in profit planning and decision making of CHPCL and BPC. In order to achieve these objective many sub-objectives needs to be set. They are listed below:
- To study and analyze the variable and fixed of BPC and CHOCL along with contribution margin and operating profit.

- To analyze the Breakeven level and Margin of safety of both company and compare them.
- To assess the most favorable combination of variable cost, fixed cost, selling price, sales volume to maximize the profit.
- To analyze the effect of other income and expenses on breakeven analysis and margin of safety analysis.
- To examine how Power Purchase agreement (PPA) affect the pricing of both company.
- To evaluate the sensitivity of various factor on profitability of both company.
- To analyze the cost Volume Profit (CVP) relationship.
- To provide appropriate suggestions.

1.5 Significance of the Study

Cost-volume-profit analysis is a key factor in many decisions making regarding cost, volume, profit, product mix, profit and many others. The subject matter included in CVP analysis itself shows its significance in the organization. It identifies the level of activity needed to avoid losses, achieve targeted profit, plan future operations and monitor organizational performance. It helps manager to estimate future revenues, cost and profit to help them plan & monitor operations. The information derived from the CVP analysis helps manager to analyze operational risk as they choose an appropriate cost structure.

this research studies about the practice of CVP analysis in Hydropower Company namely Chileme Hydropower Company and Butwal Power Company. The significance of the study is to provide various results of CVP techniques which can be used by company for planning and decision making. The applied technique of CVP analysis in both company derived some important figure. These figures are significant in many ways. They are listed below:

- It suggests use of CVP analysis as managerial tools in decision making.
- It provides information about the relationship among revenues, cost and Profit.
- It helps to monitor operation by comparing expected and actual.
- It determines the profitability risk of the company with the help of CVP analysis.
- It provides literature to the researcher who wants to carry out further research in the related field.
- This research work may also provide recommendation to related department of the company.

1.6 Limitation of the Study

Basically, this research is done for the partial fulfillment of Masters of business studied (MBS). So it limited only to academic purpose. Time limitation, financial problem, lack of research material and experience are main element which put constraints on study. This study is only limited to CVP analysis of CHPCL and BPC so the result obtained cannot be applied to the overall performance of the organization. As far as possible every effort has been made to provide real picture of the study. However, it has some limitation. they are listed below:

- The analysis is based on short period of time i.e. from 2063/64 to 2067/68.
- The study is mostly based on secondary sources of data.
- The study is based on certain assumption related to CVP analysis which may change as per change in time.

1.7 Organization of the Study

This research work has been divided into five chapters as shown below:

Chapter I: Introduction

The first chapter introduction deals with the subject matter of the study. This chapter consists of background of the study, introduction of organization, statement of the problem, objective of the study, significance of the study limitation of the study and organization of the study itself.

Chapter II: Review of Literature

The second chapter incorporates review of theoretical and related literature regarding the subject matter. Many writers and researchers have given their ideas about the related topic.

Chapter III: Research Methodology

This chapter explains about the research methodology used for evaluating and analysis of data. This includes research design, nature and sources of data, population and sample, research variables, different statistical and financial tools used in the study.

Chapter IV: Presentation and Analysis of Data

This chapter deals with the major part of the study in which all collected relevant data are analyzed and interpreted by the help of different financial and statistical tool. This chapter also explains the major findings of the study.

Chapter V: Summary, Conclusions and Recommendations

This chapter is suggestive to all concern in accordance of analysis and interpretation of data. It deals with Summary and Conclusions of the study and recommendations as per findings.

CHAPTER-II

CONCEPTUAL FRAMEWORK AND REVIEW OF LITERATURE

2.1 Conceptual Framework

2.1.1 Concept of Profit Planning and Control

Profit planning and control is an important approach, mainly in profit oriented enterprises. Profit planning is merely a tool of management. It is not an end of management or substitute of management. It facilitates the managers to accomplish managerial goals in a systematic way.

The management is efficient if it is able to accomplish the objectives of the enterprise. It is effective, when it accomplishes the objectives with minimum effort and cost. In order to attain long-range efficiency and effectiveness, management must chart out its course of action in advance. A systematic approach that facilitates effective management performance is a profit planning and control, or budgeting. Budgeting is therefore an integral part of management. In a way, a budgetary control system has been describe as historical combination of a goal-setting machine for increasing an enterprises profit, and goal-achieving machine for facilitating organization co-ordination and planning while achieving and budget targets.

Profit is an ultimate goal of every business house. They involve in a business for making profit. Profit cannot be achieved easily. It should be manage well with managerial skills. So profit is the planned and control output of management. By element, profit is the difference of revenue, and cost. Profit plan, thus, refers to the planning of revenue (i.e. increase the revenues), and planning of cost (i.e. increase the efficiency of cost.)

Comprehensive profit planning and control is a new term in the literature of business. Though it is a new term, it is not a new concept in management. The other terms, which can be used in same context, are comprehensive budgeting,

managerial budgeting, and simply budgeting. The profit planning and control can be defined as a process of a management that enhances the efficiency of management.

"Comprehensive profit planning and control is a systematic and formalized approach for accomplishing the planning, co-ordination and control responsibilities of management" (Welsch, et al.,2000:456).

"The concept of a comprehensive budget covers its use in planning, organizing and controlling all the financial and operating activities of the firm in the forth coming period" (Yuch &Williamson, 2000:305).

"A profit plan or budget is the formal expression of the enterprises plans and objectives stated in financial terms for a specified future period of time" (Pandey, 1999:267).

Profit planning and control involves:

- Development and application of broad and long range objective for enterprises.
- Specification of goals.
- Development of strategic long range profit plans.
- Specification of a tactical short range profit plans detail by assigned responsibilities.
- Development a system of periodic performance reports details by assigned responsibilities.
- Control system.
- Follow up procedure.

Hence, profit planning and control represents an overall plan of operations, providing guidelines to management and acting as signal light for the management. It enables the management to correct its policy. Profit planning and control coves a definite periods of time and formulates the planning

decision of management. It consists of three main budget (Bajracharya,et al.,2008:1-2)

- Operational Budget: Budget related with revenue and expenses, such as sales budget, production budget, purchase budget etc.
- Financial Budget: Budget related with financial statements, such as: Balance sheet, Income statement, etc.
- Appropriation Budget: Budget related with advertising and publicity expenditure, research. etc

2.1.2 Role of Profit Planning and Control

An effective budgeting system is vital to the success and survival of a business firm. Without a fully coordinated budgeting system, management cannot know the direction the business is taking out. Organizations that do not plan are likely to wonder aimlessly and ultimately succumb to the swirl of current events. Other benefits of budgeting or profit planning and control are (Bajracharya, et al., 2008:2-3).

- Basic policies developed as the pre-requisite of profit planning and control show direction to the business.
- It provides definite goals and objectives that serve as a benchmark for evaluating subsequent performance.
- It compels and motivates management to make an early and timely study of its problems. It generates a sense of caution and case, and adequate study among managers before they make decisions.
- Profit planning and control co-ordinates the activities of the entire organization by integrating the plans and objective of the various parts. By doing so, it ensures that the plans and objectives of those parts are consistent with the broad goals of the entire organization.
- It compels management to plan for the most economical use of labor, material and capital.
- It pinpoints efficiency and inefficiency.

- It uncovers subsequent bottlenecks before they occur.
- It reduces costs by increasing the span of control because fewer supervisors are needed.
- It provides a valuable means of controlling income and expenditure of a business, as it is a ‘plan for spending’.
- It reveals weakness, inefficiencies and deviations in the organization very promptly which can be checked immediately to achieve a desired goal.
- It develops the attitude of cost consciousness, stimulates the effective use of resources, and creates an environment of profit conscious throughout the organization. It emphasizes how much should be spent to achieve a goal.
- As decentralization of responsibility is a feature of profit planning, each manager works critically in his own areas of responsibility. Profit planning thus fixes the responsibility center for manger.
- Well organized profit planning and control programs enable the management to maintain a levels of profits, which will ensure the existence of the business and the fulfillment of management responsibilities.

2.1.3 Cost Volume Profit Analysis

The relationship between cost volume and profit is shown by Cost-volume-profit-analysis. It is an analytical tool for analyzing the relationship among cost, price, profit, sales and production volume. Mainly there are three elements in cost-volume-profit analysis. They are cost, sales or production volume and profit. ALL these terms are interconnected and dependent on one another. For instance profit per unit of a product depends on its selling price and cost of sales. The selling price to a greater extent will depend upon the cost depends upon the volume of production.

It is highly essential for the management to have the complete knowledge about the interrelationship among the, volume and profit. A study concerning this inter-connection is undertaken through cost-volume-profit analysis. Cost-volume-profit analysis is extremely helpful in profit planning and control, management decision, cost control, budgeting etc.

Cost-volume-profit analysis can be regarded as a sophisticated method or analytical tool used in management. The uses of this method help in determining the different levels of products or sales to avoid losses, to earn a desired net profit and so on. The cost-volume-profit relationship also helps management to find out right solution for following question:

- What sales volume is needed to break even?
- What sales volume is necessary to earned a desired a net profit?
- How will the change in selling price affect the profit position in the company?
- How will the change in cost affect profit?
- Which product or product mix is profitable?
- Which product or operation of a plant should be discontinued?
- What will be the new break even sales if these certain changes on fixed and variable cost? etc.

In this way, CVP analysis is a tool of management accounting to show the relationship between components of profit planning. Here, cost refers to variable and fixed cost. The volume refers to sales or production unit and profit refers to the difference between sales volume and cost (Dangol, et al., 2065:160)

2.1.4 Purpose of CVP Analysis

Cost volume profit analysis helps management in a number of ways. The following purposes are served by it (Dangol, et al., 2008:160).

- Calculation of profit resulting from a budgeted sales volume.
- Calculation of sales volume to break-even.
- Calculation of sales volume to produce desired profit.
- Effect of changes on price, costs and profits.
- Determination of new break-even point for changes in cost and selling price.
- Measurement of effect of changes in profit factors.
- Choosing the most profitable alternatives.
- Determining the optimum sales mix.
- Determination of capacity and equipment selection.
- Long term Decision on continuance or discontinuance of products.
- Make or buy decisions on sub-assemble or part.
- To contemplate the increase or decrease in profits due to the change in method of production, etc.

2.1.5 Assumptions of Cost-Volume-Profit Analysis

The analysis of cost volume and profit is based on the following assumptions:

- All cost can be classified into fixed and variable component.
- The selling price remains unchanged irrespective of the volume of sales.
- The per unit variable cost and the fixed costs always remain the same.
- There is no change in production capacity and skill or capacity of the workers.
- In case of multi-product companies the sales mix remains the same.
- There is no difference between the production and sales volume. It means there is no existence of opening and closing stock.

2.1.6 Application of CVP Analysis in Profit Planning and Control

Cost-volume-profit analysis is an important tool for profit planning. It has been defined as a managerial tool showing the relationship among cost selling price, profit and volume of capacity. CVP analysis can be applied in the following respects (Dangol, et al., 2008:160).

- It helps in fixation of selling price.
- It is helpful in cost control.
- It helps to maintain the desire profit.
- It also assists the management in understanding the behaviors of cost and helps in budgetary control.
- It helps in determining the level of output where all the costs can be met.
- It assists the management in profit planning.
- It also assists the management in performance evaluation for the purpose of management control.
- It helps to measure the effect on profit due to the change in selling price.
- It helps very much in making managerial decisions such as make or buy a part, drop or continue a department or product line, accept or reject a special order, selection of a profitable product mix etc.

2.1.7 Special Problems in Cost-Volume-Profit Analysis

Cost-volume-profit analysis is applied to individual products or parts of a business and all the products or activities combined. In the latter case, three special problems can be encountered which are as follows (Welsch, et al., 1999: 513-518)

2.1.7.1 The Activity Base

When two or more products or activities are combined for break-even analysis, the activity base is usually in amount. Production unit is used for single product. The activity base must be in additive units using a common denominator of volume or output in multiple products Therefore, for the company as a whole, net sales amount are usually the only satisfactory common denominator because manufacturing, selling and administrative activities are expressed in combination.

2.1.7.2 Inventory change

Usually the budgeted changes in inventories (i.e. finished goods and work-in-process) are immaterial in amount and thus may be disregarded in cost-volume-profit analysis. On the other hand, when the change budgeted inventory is significant; it should be included in the analysis. Including the effect of inventory changes in cost-volume-profit analysis requires subjective judgments about what management might do (about making inventory changes) at different volume levels and the conceptual precision that is desired. Management considers two practical approaches or policies in inventory changes often used:

- Disregard the inventory changes.
- Include the inventory changes.

2.1.7.3 The Non-operating Incomes and Expenses

Non-operating income and expenses and extra ordinary gains and losses, if material in amount, cause another problem in CVP analysis. The basic issue is whether they should be included or excluded in CVP analysis. Extra-ordinary gains and losses are non-recurring and unusual; therefore, they should be excluded. Non-operating incomes and expenses are recurring but they are not related to ongoing operations. Management policy may be:

- Include the non-operating incomes and expenses.
- Exclude the non-operating incomes and expenses.

2.1.8 Approaches to Cost-Volume-Profit Analysis

The CVP relationships can be analyzed through different approaches, which are:

- Contribution margin approach.
- Formula (Equation) approach.
- The graphic (Break-even chart) approach.

2.1.8.1 Contribution Margin Approach

Contribution margin is the difference between sales revenue and variable cost. In other words, it is the balance available to realize profit after recovering fixed expenses. The higher contribution margin is the indicator of sound profitability position.

The contribution margin income approach to cost volume profit analysis allows the preparation of pro-forma (projected) statements from the available information. BEP and other required CVP relationship can be explained through a contribution margin statement. A contribution margin statement is the variable costing income statement whose philosophy is all fixed cost are period cost that should be deducted from the contribution margin of the same period. Only the variable costs vary proportionally to the level of output or sales. The contribution margin is calculated in the following way (Bajracharya, et al., 2008: 203-204).

Total contribution margin (TCM) = Total Sales revenue – Total Variable Cost

TCM= Fixed cost ± Profit/Loss

CMPU = SPPU - VCPU

The ratio between the contribution margin and sales is called contribution margin ratio. Higher contribution margin results in higher profit and vice versa. It can be increased by increasing the selling price per unit, decreasing the variable cost per unit, switching the production to more profitable products etc. It is calculate as follows:

$$\text{CM ratio on the basis of total} = \frac{\text{Total Contribution Margin}}{\text{Total Sales}}$$

$$\text{CM ratio on the basis of per unit} = \frac{\text{Contribution Margin Per Unit}}{\text{Selling Price Per Unit}}$$

If sales, cost, and profit at 2 different periods is given with constant Fixed Cost

$$\text{CM ratio} = \frac{\text{Difference in Profit}}{\text{Difference in Sales}}$$

2.1.8.2 Formula Approach

The most popularly used approach to the break-even point and cost volume profit analysis is the formula, also known as the equation. It is particularly because the equation provides the most general and the easiest to remember-approach to any cost-volume-profit situation. The formula approach uses an algebraic equation to calculate the break-even point. The answers provided by solving the equation may sometimes, need to be rounded to whole numbers of units or lot sizes. The rounding of break even points is always done upward because this will provide a small profit rather than the small loss that would be shown from rounding downward (Bajracharya, et al.,2008: 204-205).

The calculation in the equation approach is similar to that of the contribution margin statement approach. The equation is merely a restatement of the other.

To develop the cost-volume-profit equation, see the following justification;

Contribution Margin Approach	Symbol or Equation
Sales Volume (Units)	Q
Selling Price Per Units	P
Sales Revenue (Rs.)	Q × P
Less, Variable Costs	Q × VCPU
Contribution Margin	Q × P – Q × VCPU
Less, Fixed Costs	FC
Net Profit	Q × P – Q × VCPU - FC

Sales = FC + VC + Profit

The equation can be simplified by using symbols as;

Q x P = Q x VCPU + FC + Profit

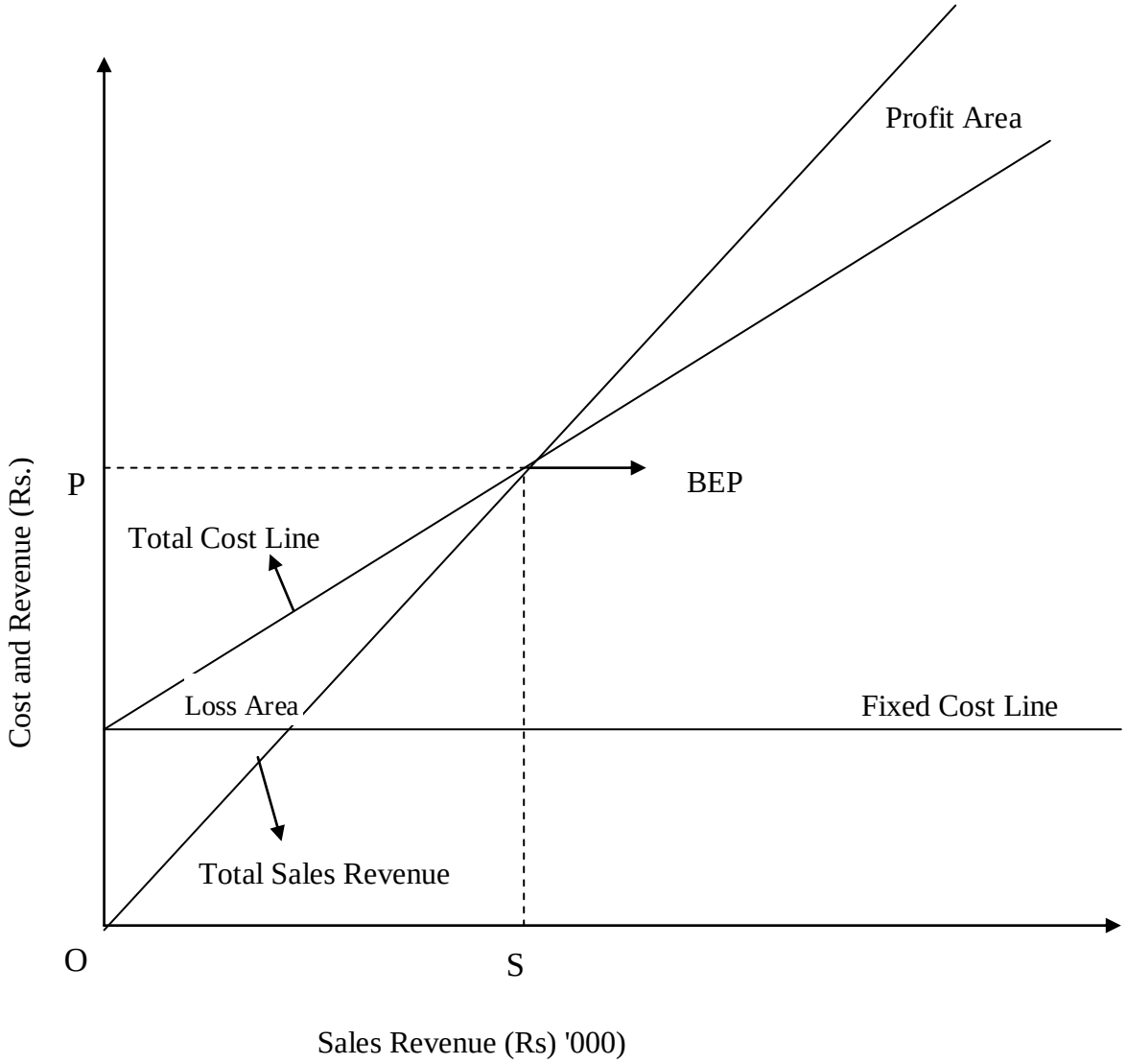
Solving the equation, we get,

Sales unit (Q) = $\frac{FC + Profit}{CMPU}$ Sales revenue (Rs) = $\frac{FC + Profit}{CM\ ratio}$

2.1.8.3 The Graphic Approach to CVP Analysis

A break-even chart is used to graphically depict the relationship among revenues, variable cost, fixed costs and profit (or losses). The no profit/no loss point (the break-even point) is located at the point where the total cost and total revenue lines cross. Below this point, the firm losses, and above this point, the firm earns profit (Bajracharya, et al., 2008: 202-203).

Figure: 2.1
Graphical Approach to CVP Analysis



In the given figure, the fixed costs remain constant in any level of output, so it is parallel to X-axis. Variable cost slope upward from the origin to right but the

slope depends on variable cost ratio. The total costs increases with the increase in volume. It includes fixed cost as well as variable cost. Hence, it is started from the point of intersection of fixed cost curve and X-axis and slopping upward to right side. The sales curve is originated from the origin 'o'. It is because the revenue will be zero, if sale is zero. An equilibrium point between revenue curve and total cost curve is known as Break-even-point. OS is the break-even sales volume and Q is the break-even point. If the actual sales volume is more than break-even sales, the business will earn profit and if it is less than break-even sales, the business will earn losses. To sum up, break-even-point is that point where, Total sales revenue = Total costs.

2.1.9 Break-Even Analysis

Break-even point is the volume of sales where there is no profit or no loss. In other words, the volume of sales in which the total cost equals the total revenue is called the break-even point. It is the bridge between the loss area and profit area. Profit begins from the break-even point. It is the survival point where all the firms must at least remain to sustain or continue the business. It is computed as follows:

$$\text{BEP in unit} = \frac{\text{FC}}{\text{CMPU}}$$

$$\text{BEP in Rs} = \frac{\text{FC}}{\text{CM Ratio}}$$

$$\text{BE Ratio} = \frac{\text{Break - even sales}}{\text{Total sales}}$$

2.1.9.1 Application of Break-Even Analysis

The break-even analysis is very useful in the area of managerial decision making. It is extremely a valuable technique with management. Some of the important uses of break-even analysis are summarized below (Dangol, et al., 2008:170-171).

- Determination of 'no-profit no loss' sales volume.
- Calculation of sales volume to earn desire profit.
- Determination of selling price per unit for earning a desired profit.
- Calculation of sales volume to meet proposed expenditure.
- Impact of change in costs on profit.
- Determination of margin of safety.
- Calculation of sales volume required to offset price reduction.
- Determination of the optimum sales mix
- To help the management in decision making e.g. make or buy a part, accept or reject a special order, pricing of the product, drop or continue a product line etc.

2.1.9.2 Assumptions of Break-Even Analysis

Contribution analysis and break-even analysis are based on a specific set of assumptions that should be clearly understood. These underlying assumptions are (Dangol, et al., 2008:172-173).

- All cost can be classified into two parts, fixed cost and variable cost. There is no cost other than fixed and variable.
- There is a relevant range of validity (activity) for using the results of the analysis and sales price does not change as units of sales change.
- There is only one product or in case of multiple products, the sales mix among the products remain constant.
- Basic management policy about operation will not change materially in short run.
- The general price level (inflation/deflation) will remain essentially constant or zero.
- Efficiency and productivity per person will remains essentially unchanged in the short run.

If any of the above assumptions were changed, revised budget would be needed for a new analysis.

2.1.9.3 Limitations of Break-Even Analysis

Break-even analysis in many business situations can be used for effective decision-making, but there are many shortcomings or limitations in its analysis and interpretations. Some of these can be listed as (Dangol, et al.,2008:172-173).

- The assumptions of producer's market phenomenon not hold good for all types of commodities.
- The fixed costs may not remain constant as well as the variable costs may not vary in fixed proportions at different levels of output.
- With variation in the prices of the items or services, which also depend on the factors, affecting its demand and supply will certainly affect demand of the commodity. This phenomenon is not covered in break-even analysis.
- Identification of fixed and variable costs involved in production process is very complicated. A shift in product mix changes the break-even point.
- Customers may be given certain discount on purchase to promote sales. This revenue may not be given certain discount on purchase to promote sales. This revenue may not be perfectly variable with level of sales. Output.

2.1.9.4 Cash Break Even Point

Break-even-point which is determined excluding non-cash expenses such as deprecation and amortized expenses from the fixed cost is considered as cash break-even-point. So,

$$\text{Cash BEP (unit)} = \frac{\text{FC - Non cash expenses included in fixed cost}}{\text{CMPU}}$$

$$\text{Cash BEP (Rs)} = \frac{\text{FC - Non cash expenses included in fixed cost}}{\text{CM ratio}}$$

2.1.10 Managerial uses of CVP Analysis

Planning, controlling and decision making are the essential managerial function. CVP analysis helps the manager to plan for profit, to control cost and make decision. It is necessary to describe in greater details about its usefulness to management.

2.1.10.1 Management plan further operations with CVP Analysis

Profit does not just happen they must be managed and planned. By estimating the selling price, variable cost, fixed cost and sales volume management can estimate profit. The estimated profit can be examined by estimating selling price, variable cost, fixed cost and sales volume. If management believe if profit is too low or too high, then CVP analysis can be used to determine the likely effect of changes it may wish to make in any of the variables. CVP analysis can be used as a starting point and as a quick and easy way to determine the likely effects of management policy changes.

2.1.10.2 Management uses CVP Analysis to analyze performance

Management should determine the reason for difference between budgeted and actual result. CVP analysis can make an important contribution in planning, organizing and controlling. It provides a framework for planning future operation and means for determining the likely effect of various ways of organizing those operations.CVP can be used to control current operation by comparing actual result with planned result.

2.1.10.3 Determination of Selling Price

Selling price has most sensitive effects in demand, profit and break even. A selling price of a product covers all costs plus a required margin. Normally business firm have a goal of charging certain percent of profit margin of selling price. The profit margin and selling price depend on many factors including the nature of item, competition and the required return on investment.

2.1.10.4 Management uses CVP Analysis to know the safety of business

The higher the margin of safety the safety is the business and lowers the margin of safety the risky is the business. So margin of safety analysis is possible through cost volume profit analysis.

2.1.10.5 Profit pick up in incremental sales

Up to break-even-point, the company earns nothing i.e. profit begins only after the break-even-point. Each unit sold beyond the break-even-point contributes towards profit. Therefore, each unit sold beyond break-even-point gives profit equal to contribution margin per unit.

2.1.11 Cost-Volume-Profit Analysis for a Multi-Product Firm

Sales mix can be defined as the relative combination of two or more products represented in total. It is not only the sales revenue that makes profit. The proportion of the sales contributed by different products generally changes the amount of profit. Managers try to achieve that combination or mix that will yield the greatest amount of profit. If a company sell more than one product, these may not be equally profitable. So the company's profit will depend upon the ratio of each product's sales to total sales revenue. Profit will be greater if high margin item make up a relatively large proportion of total sales than if sales consist mostly of low margin items. Changes in sales can cause great variations in a company's profit. A shift to low margin items can cause the total profit to decrease even though total sales increase. In the contrary, a shift in the sales mix from low margin item to high margin items can cause the reverse effect i.e. total profit may increase even though total sales decrease (Bajracharya, et al., 2008: 226-227).

2.1.12 Break-Even Point for Multi-Product or Sales mix

In multi-product firm, BEP is calculated in aggregate. The sales mix is used to compute a weighted average unit contribution. This is the average of the

several product unit contribution margin weighted by the relative sales proportion of each product. The following procedures are followed to calculate BEP for sales mix of multi-product (Dangol, et al., 2008: 189)

For determination of break-even units:

Step 1:	To find out sales mix ratio in units.
Step 2:	To find out unit contribution margin for each product.
Step 3:	To multiply the sales mix ratio and unit CM of each product.
Step 4:	To find out weighted average CM by adding products of step 3
Step 5:	To find out overall break-even units by using following formula: Overall Break-even point= $\frac{\text{Fixed Cost}}{\text{Weighted Average Contribution Margin}}$

For determination of break-even in terms of Rs:

Step 1:	To find out sales mix ratio in sales amount.
Step 2:	To find out contribution margin ratio of each product.
Step 3:	To multiply the sales mix ratio and CM ratio of each product .
Step 4:	To find out Overall CM ratio by adding the products of step 3
Step 5:	To find out overall break-even point in Rs by using following formula. Overall Break-even point = $\frac{\text{Fixed Cost}}{\text{Overall Contribution Margin Ratio}}$

$$\text{Sales Mix} = \frac{\text{Individual Products' Sales Units or Value}}{\text{Total of all Product's Sales Units or Value}}$$

2.1.13 Method of Segregating Mixed or Semi variable Cost

CVP analysis requires the segregation of all semi-variable costs into variable and fixed cost. To segregate semi variable cost into fixed cost and variable cost is necessary because with this, we can add fixed cost proportion in total fixed

cost and variable cost proportion in total variable cost. So, with following method, we can carry out this.

2.1.13.1 High Points and Low Points Method

Under this method, we calculate total sale and total cost at highest level of production. Then we calculate total sale and total cost at lowest level of production. Because, semi variable cost have both variable and fixed cost. We first calculate variable rate with following formula:

$$\text{Variable cost per unit (b)} = \frac{\text{High Cost - Low Cost}}{\text{High Output - Low Output}}$$

This rate shows variable cost of sale value. By using this rate, we also calculate variable cost of sale at highest level. Now, same variable cost will be deducted from total cost at the highest level of production. Reminder will be fixed cost.

Fixed cost (a) = Total Mixed cost - variable cost per unit x Output in units

2.1.13.2 Graphical Method

Under this method, we draw the graphic line of semi variable cost by taking output on ‘x' axis and total semi variable cost at ‘y' axis. After this, we do judgment and select a point where will be our fixed cost in semi variable cost. After this, we draw the line of best fit. This line shows the fixed cost which will not be changed after changing output.

2.1.13.3 Analytical Method

Under this method, cost accountant does some analysis for dividing semi variable cost into fixed cost and variable cost. After this, he calculates fixed cost on that rate which analyzed. Suppose, a cost accountant says that in the total semi variable cost, there may be 30% fixed cost and 70% variable cost. Now, total semi variable cost will be divided on this basis. If production level will increase, variable cost's proportion will increase with same rate. But fixed cost will not change.

2.1.13.4 Level of Activity Method

According to this method, the output at two different level is compared with corresponding level of expenses. Since fixed cost remain constant, the variable overheads are arrived at by the ratio of change in expenses to change in output Variable cost will be calculated as below

$$\text{Variable cost} = \frac{\text{Change in cost}}{\text{Change in production volume}}$$

2.1.13.5 Least Square Method (Regression Analysis)

Regression Analysis determines the nature and strength of relationship between two variables. It is a statistical tool for estimating mathematical relationship between dependent variable(y) and independent variable(x). With the help of it, unknown value of one variable can be estimated on the basis of known value of other variable.

This is a statistical technique used to segregation of semi variable cost. It can be used for medium term forecasting by applying regression equation which seek to establish the line of "best fit" to the observed data. Regression model is shown below:

$Y = a + bx$

Where, Y = Dependent variable (Total cost)

a = Intercept coefficient, estimated fixed cost

b = Slope coefficient, estimated Variable cost per unit

x = Independent variable, level of activity (output)

Least square estimate of regression coefficient "b" and intercept coefficient "a" can be obtained by using the following formulas:

$$\text{Variable Cost per unit, } b = \frac{n\sum xy - \sum x \sum y}{n\sum x2 - (\sum x)2}$$

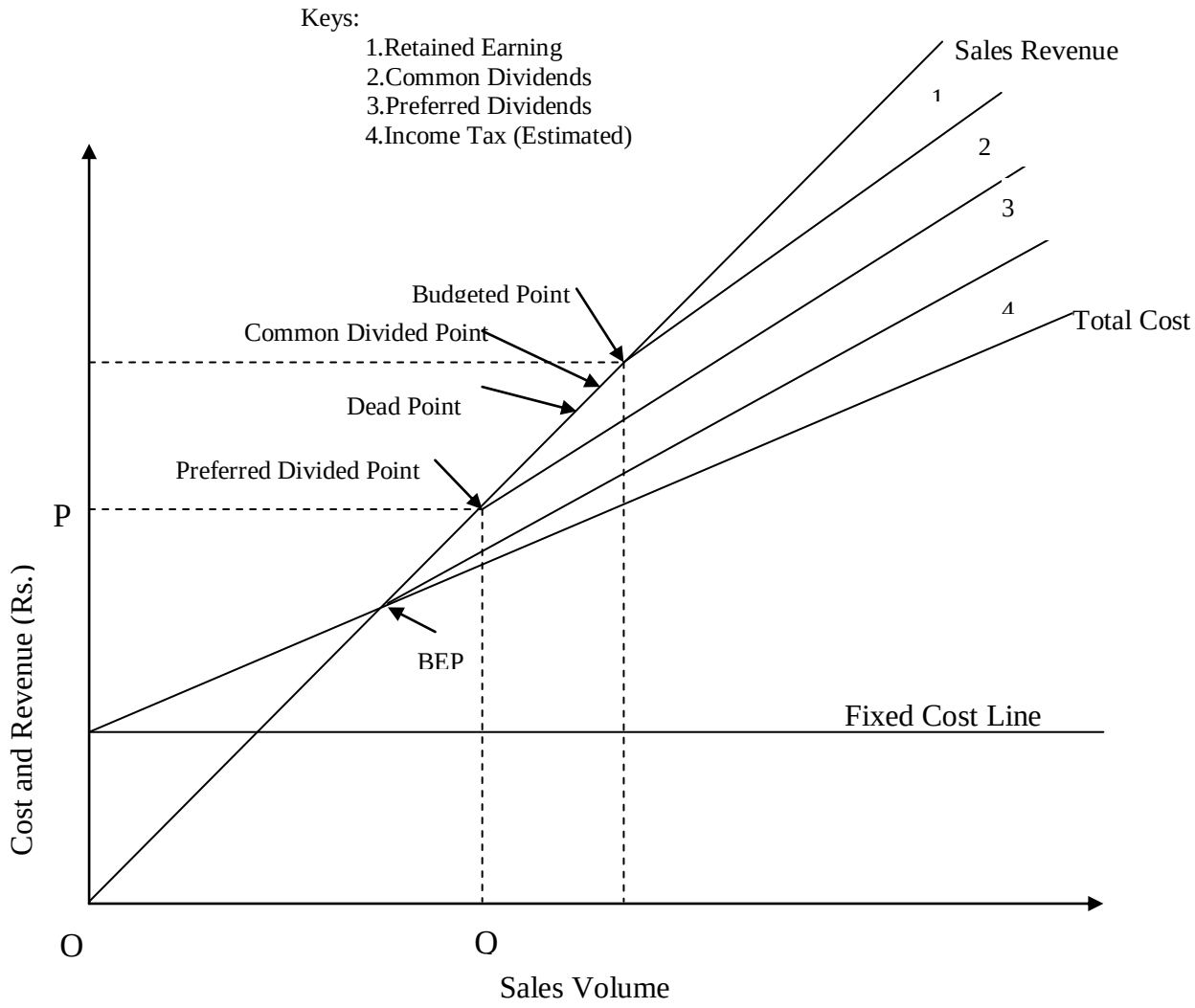
$$\text{Fixed cost} = \frac{\sum Y}{n} - b\frac{\sum X}{n}$$

2.1.14 Economic Characteristics of Cost-Volume-Profit Analysis

Where cost-volume-profit analyses are reasonably accurate, they can help management decision-making. Essentially, CVP analysis offers greater insight into the economic characteristics of a company and may be used to determine the approximate effect of various alternatives. CVP analysis is based on estimates, however, the arithmetical manipulations generally involve average, and hence the results should never be interpreted as precise. Rather, the analysis many be characterized approximately as a 'slide-rule' approach that may used to develop and test, with a minimum of effort, the approximate effect on costs and profits of several types of management decisions (Welsch, et al.,1999: 467-468).

Figure: 2.2

Economic Characteristics of Cost-Volume-Profit Analysis



Above break-even chart with economic characteristic indicates few of the economic characteristics of a business, which are (Welsch, et al.,1999: 468).

- Fixed costs, variable costs and total costs at varying volumes.
- The profit and loss potential, before and after income taxes, at varying volumes.
- The margin of safety-the relationship of budget-volume to break-even volume.
- The break-even point.
- The preferred dividend or danger point-the point below, which preferred dividends are not, earned.

- The dead point-the point where management earns only the 'going' rate on the investment.
- The common dividend or unhealthy point-the point below which earnings are insufficient to pay the preferred dividends and the expected dividend on the common stock.

All these points, and as others, can be computed if data are developed for cost-volume-profit purposes.

2.1.15 Cost-Volume-Profit Analysis with Limiting Factors

CVP analysis is helpful in profit planning and a company will be able to produce any number of outputs, number of outputs of its choice (desires). But in real word it is not possible, because of some critical factors like finishing machine or raw material or labor. These critical factors in the CVP analysis are known as constraint.

2.1.15.1 CVP Analysis with Single Constraint

Scarce resource should be efficiently allocated in order to maximize the CM particular simple and instructive situation arises when there is only one constraining resource. This can occur if the firm's products are all produced on a single machine and output is limited by hours available on this machine. In the same way single resource constraint arise, if the firm's products are all produced with only one material and output is limited by quantity available for that material. When there is a constraint for a scarce resource to have alternative uses, the contribution per unit should be calculated for each of these uses. Then, the available capacity for such resource should be allocated to the alternative uses on the basis of contribution per scarce resource (Munankarmi, 2003: 146).

2.1.15.2 CVP Analysis with Multiple Constraints

Where more than one scarce resource exists, the optimum production program cannot be established by simple process supplied in single resource constraint. Under the circumstances simple allocation of resource or the basis of contribution margin per units is neither feasible nor desirable. Contribution margin per unit of scarce resources may be different scarce resources may be the ranking of product; because production processes are affected by many constraints factors rather than single constraint. In such situation, Linear Programming technique may be used to optimize product mix. The linear programming formulation is required to determine a production plan that maximizes contribution for the product mix. Linear Programming is a mathematical technique, which shows how to arrive at the optimum results, allocation of available resources in a meaningful manner. It is basically concerned with the problem of allocating limit resources among competitive activities in an optimal manner. It is a technique to optimize the allocation of scarce resources in product mix problems which provides a valuable extension to cost-volume-profit analysis (Munankarmi, 2003:148).

2.1.16 Risk Measurement: Operating Leverage

Operating leverage is a measure of the extent to which fixed costs are being used in organization. The relationship if company's variable and fixed cost is reflected in its operating leverage. Generally highly labor intensive organizations have high variable costs and low fixed costs and this has low operating leverage and relatively low break-even point. Conversely, organizations that are highly capital intensive have a cost structure that includes low variable and high fixed costs, which reflects high operating leverage with high break-even point. It shows that fixed costs and operating leverage has direct relationship. Higher the amount of fixed costs higher the operating leverage and break-even point and vice versa. In other words, the firm with relatively high operating leverage has proportionally high fixed

expenses and the firm's break-even point will be relatively high. The operating leverage factor is determined as under (Munankarmi, S.P.2003:145).

$$\text{Degree of Operating Leverage} = \frac{\text{Contribution Margin}}{\text{Net Income}}$$

2.1.17 Sensitivity Analysis

Sensitivity Analysis is the measurement of elasticity of the change in cost, volume and profit factors or break-even point or given profit. The strategist should focus more on the factor, which is more sensitive or responsive for profit. To measure the sensitivity of cost–volume profit factors one can see the impact of certain percentage or amount change in volume, price or cost factors on net profit. In other words, sensitivity analysis is the measurement of responsiveness in outcome with the changes in determinant variable. We know that the goal of a business enterprise is to maximize profit. Profit is the excess of revenues over the total costs.

Net Profit= Total sales revenues =Total costs
= Sales Unit × SPPU – Sales Units × VCPU – Fixed Cost - Taxes
So that, Profit= F (Sales Volume, Selling Price, VC, FC, Taxes etc)
Means, Profit are the function, Price, VC, FC, taxes and so on.

But none of the factors remain unchanged; sometimes the manager can intentionally change the price and cost as a part of strategic decisions. But the strategy should focus more on the factor, which is more sensitive or responsive for profit. Therefore, to measure the sensitivity of cost-volume-profit factors, we can see the impact of certain percentage or amount change in volume, price or cost factors on net profit (Bajracharya, et al., 2008:345).

2.2 Review of the Related studies

2.2.1 Review of Books

In this section the review of books published by different management expert relating to Cost-Volume-Profit analysis were made.

Cost volume profit analysis is concerned with examining the relationship between changes in volume and changes in total revenue and costs in short term. Drury has compared the economist and accountant models of Cost volume profit behavior. The major differences are that the total cost and total revenue functions are curvilinear in the economist model whereas the accountant's model assumes linear relationship. However we have noted that the accountant's model was intended to predict Cost volume profit behavior only within the relevant range, where a firm is likely to be operating on constant returns to sale. A comparison of the two models suggested that, within the relevant production range the total cost and total revenue functions are fairly similar (Drury, 1989:767).

Cost volume profit analysis includes the elated concepts of (a) contribution margin and (b) Break-even-analysis. These concepts entered the mainstream of management accounting starting in the 1930's with major emphasis in the 1950's. Both concepts rest upon the concept of cost variability (i.e. flexible or variable expenses budgets). Contribution analysis involves a series of analytical technique to determine and evaluate the effects on profit of changes in sales volume, sales price, fixed expenses and variable expenses. Basically, it applies the concept of contribution margin, income statement: Revenue minus variable expenses equals contribution margin and contribution margin minus fixed expenses equals profit. Break-even-analysis focuses on the break-even-point i.e. the point at which profit is zero because sales revenue is equal to total cost. The result of break-even-analysis is usually graphed to show the relationship between sales revenue, fixed expenses and variable expenses within a relevant range of sales volume (Welsch, et al.,1999:678).

The study of the interrelationship of cost, sales and net income is usually called cost volume profit analysis. Cost volume profit analysis examines the response of profit to changes in volume. It relies on linear cost analysis and on linear revenue assumptions. To gain understanding of cost volume profit analysis the common example of a firm which produces only single product will be used. The analysis will be expanded to cover firms with several products by multiple divisions (Koirala, et al., 2067:375).

Cost volume profit analysis is the process of examining the relationship among revenue, cost and profit for a relevant range of activity and for a particular period. It is one of the most important and powerful tool that a manager have at their command in short term planning. It helps managers to understand the interrelationship between cost, volume and profit in an organization by focusing interaction between the following five elements (a) price of product (b) volume of activity (c) variable cost (d) fixed cost and (e) sales mix. Cost volume profit analysis seeks to estimate the profit or loss at different activity level. The aim of CVP analysis is to have a fair estimate of (a) Total cost (b) Total revenue and (c) Profit at various sales volumes. Cost volume profit analysis provides management with a comprehensive overview of the effect on revenue and cost of all kind of short run financial charges. It is related to profit, sales volume and costs (Munankarmi, 2003:326).

Cost volume profit analysis consists essentially in examining the relationship between changes in volume (output) and changes in profit. The scope of cost volume profit analysis ranges from the determination of the optimal output level of a single product department to the determination of the optimal mix of large multi product firm. All these decision rely on the simple relationship between changes in revenue and costs and changes in output level (mixes). Output should be expanded or the output mix should be altered if the incremental revenue resulting from the change exceeds the incremental costs of making the change. Thus, all cost, volume and profit amount is characterized

by their emphasis on cost and revenue behavior over various ranges of output level and mixes(Dangol, et al., 2008:526).

2.2. 2 Review of Previous Research Works

A number of studies have been done by students of MBS, relating to Cost volume profit analysis in Nepal. This section is focused to review some of those dissertations.

Adhikari (2004) has done the research on *"Profit Planning in Manufacturing enterprises, a case study of DDC"*

Main objectives :

- To analyze the functional budgets on sales and production sector of DDC.
- To analyze various accounting ratios, major the profitability and efficiency of DDC, analyze the budget target and its achievement along with reason of deviation (if any), provide valuable recommendations and suggestions based on analysis.

Major findings:

- DDC has practice short term planning rather than long term planning; the time is covered by interim period any by product.
- Production and sales of DDC is increasing annually although the growth rate is fluctuated, the correlation between actual and targeted sales is positive.
- The corporation has no proper practice in segregating cost into fixed and variables.
- DDC has applied stable inventory policy with opening stock of inventory but this policy is not applied in practices. It has 1% store losses and 0.5% distribution losses of milk.
- There is positive correlation between target actual productions of milk

- DDC has prepared direct labour budget only based on technical and administration; it is not prepared according to the time and rate.
- Capacity utilization is very high but production ratio is very low.
- The CVP analysis shows that DDC is operating below the break-even point and flexible budget of DDC shows 90% variable cost of sales revenue.
- DDC has lack of budgeting experts, skilled planners and entrepreneurship. Planning department has no adequate authority to decide and create new ideas to formulate various plans.
- Most of the budget figures are higher than actual sales.
- DDC utilized corporate fund as long-term loan and from international agencies like US aid.
- DDC has not clear attainable objectives, policies and strategies, timely accounting and auditing work are not maintained, financial statements accounting are out of the financial rules.
- The present management doesn't have any program of perfect profit planning.

Bhandhari (2006) has presented a dissertation on the topic *"Cost Volume Profit Analysis of Nepal Telecom".*

Main objectives :

- To study the relationship between cost volume and profit of Nepal telecom.
- To analyze the impact of Cost volume profit on performance of Nepal telecom.
- To provide suggestion for the betterment of the organization.

Major findings:

- Sales plan of Nepal Telecom is not properly maintained. The industry uses the various methods for sales planning like market survey,

distribution network etc but up to date proper record are not maintained. So they have poor budgeting system.

- Out of the total cost of Nepal telecom, variable cost is around 17.25% in every year, which causes high contribution margin.
- The profitability of the company is satisfactory. Every year the company success to generating the profit and up to the fiscal year 2062/63 the company is able to maintain the reserve and surplus of Rs. 5825855017.
- Nepal telecom is utilizing only 50% of its capacity. Therefore there is high possibility to increase their profit in near future.
- Since the service produced by Nepal telecom has poor quality but due to lack of substitute quality service provider, the company is able to generate profit.
- As the DOL is low which indicate the company is at low risk. If the sales revenue decreases it will affect on its profit by minimum amount and vice-versa.
- The financial position of the company is satisfactory.

Karn (2008) has presented a dissertation on the topic of *"Profit Planning Mechanism of Nepal Telecom".*

Main objectives :

- To analyze the financial position of Nepal Telecom.
- To analyze the target and actual budget of Nepal Telecom.
- To assess the strength and weakness of Nepal Telecom.
- To provide necessary suggestion and recommendation wherever necessary based on finding.

Major findings :

- Budgets are prepared on the basis of historical data. But Nepal Telecom actual sales are less than budgeted sale during the study period. It shows inefficiency of management in planning.

- The Karl Pearson's co-efficient of correlation between GDP and sales volume (r) is found to be 0.99 which implies that there exist a high degree of positive correlation between GDP and sales volume. This means the two variable moves in the same direction i.e. if GDP increases than sales volume also increases and vice-versa.
- The interest coverage ratio is 1764.53 times which implies that the firm is able to pay interest on borrowed capital.
- The calculation show that the average Return on equity ratio of NT for past 5 year period is around 13.7 percent which indicate that the equity holders of NT earned Rs13.7 on return of their investment of Rs100 over the last 5 year period.
- The average debtor turnover ratio of NT for past 5 years is 2.82 times which indicates the shorter time lag between credit sales and cash collection.
- The average Net profit margin of NT for past 5 years is 38.36 percent which is higher than the general standard average of at least 25 percent for this line of business. The ratio seems to be stable during study period. The overall ratio trend shows a small swing in either direction of ratio within the range of 37.6% to 40.20% over the five year period.

Shrestha (2009) has conducted a research on the topic *"CVP Analysis of a Nepal Aushadhi Limited".*

Major objectives :

- To analyze the different components of cost as per cost behavior.
- To study the application of CVP Analysis in NAL
- To evaluate the sensitivity of profitability.
- To analyze the CVP and impact in profitability of NAL.
- To study the profitability and financial position of NAL
- To provide suggestion and recommendation on the basis of major finding.

Major findings:

- Sales trend of NAL shows the negative trend which can further increase the net loss.
- Break-even sales were more than actual sales. The industry was suffering from huge loss every year.
- MOS of NAL is negative in every year. The industry might be bearing high risk.
- Out of total cost of NAL variable cost is 97.30%, 98.58%, 85.29%, 99.49% and 99.16% for the fiscal year 2059/60 to 2063/64 respectively.
- The company has low contribution margin i.e. it is difficult to recover fixed cost.
- The profitability of the industry is very poor. Every year the industry is suffering from loss and which is accumulated to Rs. 230, 376, 418 unto fiscal year 2063/64.

Panday (2010) has carried out a research work on topic *"Effectiveness of sales planning in Nepal Telecom".*

Major objectives :

- To analyze the existing sales planning system of Nepal Telecom with seasonal demand.
- To study the relationship between sales plan with other expenses.
- To analyze the relationship between sales and profit.
- To analyze break-even-point of NT.
- To provide suitable suggestion and recommendation on the basis of study.

Major findings:

- NT has the practice of preparing short-range sales budget but long-range sales budget is not prepared in details. Also there is a system of keeping Management Information System Report in this company.

- The total actual sales units of NT are in increasing trend. Actual sales revenue is always higher than target except FY 2062/63.
- The actual sales units of PSTN telephone service of NT is fluctuating every year.
- There is a high degree of positive correlation of total sales units, but low degree of positive correlation of PSTN telephone service.
- The regression equation and straight line of trend shows increasing trend of overall sales.
- Profitability ratios i.e. Net profit ratio, operating profit ratio shows better performance of Nepal Telecom in generating profits from sales.
- Debtor turnover ratio and average collection period of NT are not good which indicates the inefficiency in collection of credit sales on time.
- As the degree of operating leverage is low, which indicates the company is at low risk. If the sales revenue decreases it will effect on profit by minimum amount and vice-versa.
- The CVP analysis of NT shows the break-even-point is satisfactory.
- The installed capacity has not been fully utilized in NT. If the installed capacity is utilized fully, the operating expenses will go down.
- Current asset turnover ratio, Fixed asset turnover ratio and Total asset turnover ratio of NT are also low, which indicates the inefficiency of management in utilization of current asset, fixed asset and total asset.

Mainali (2010) has submitted the thesis on the topic "*CVP Analysis as a tool of a profit planning and control"*.

Main objectives :

- To analyze the impact of cost volume profit and performance of STLC.
- To provide the suggestion for the betterment of the selected organization.
- To study the relationship of cost volume and profit
- To analysis the cost and profit and loss of STCL

Major findings:

- The company sold different products among them agricultural material and machine equipment on total sales found nominal. But other products made highest contribution total sales.
- Expenses on salt Trading Corporation Limited are fluctuated variable cost as well as fixed cost increased or decreased during the period. It has no details of systematic expanses plan.
- From the correlation analysis, it is found that there is a high degree of positive correlation between sales and net profit changes in sales made changes in profit but change is not in same ratio.
- This corporation has no lower BEP ratio. Lower BEP indicates strength position of the corporation, therefore the condition of the corporation is not so good taking the reference of the BEP ratio.
- The higher percentage of ratio indicates that the company is in strong profitability position.
- Contribution Margin of the corporation is not stable and satisfactory.
- The profit trend of the company is not satisfactory as compare to profit; proportion is very low with fluctuating trend.
- Financial position of the company is not so good Net profit Margin, profitability ratio and other things are not satisfactory.

2.3 Research Gap

There is a significant gap between present research work and the previous research works. There are hundreds of researches which are conducted mainly on profit planning and control of public enterprise of Nepal focusing on the overall aspect of the profit planning but could not deal on specific tools like cost-volume-profit analysis. This is the age of specialization and not that of generalization. It is realized that specific tools become more effective than overall tools as a whole. These were the main weaknesses of earlier studies. To overcome these weaknesses the researcher is intended whole-heartedly to

conduct this research. For this purpose, the researcher will examine the current practice of cost volume profit analysis in the Nepal Telecom. There are few thesis on the topic but they do not seem to consider all the relevant data of the organizations as they are difficult to understand and deal with. A similar thesis on the topic was conducted by a TU student Luvkush Kairatee taking into account the data until the fiscal year 2064/65. There has been a long time gap between the study and the present situation which has been addressed by this research. This research would definitely pave the way for further research on CVP Analysis of hydropower projects.

CHAPTER-III

RESEARCH METHODOLOGY

3.1 Concept of Research Methodology

Research methodology is a way to systematically solve the research problem. In another words research methodology refers to the various sequential steps to be adopted by a researcher in studying a problem with certain objective in view. Methodology is the research method used to test the hypothesis in which different process are used to collect, analyze and interpret the facts and figures. A research methodology helps us to find out accuracy, validity and suitability. Research is a systematic inquiry of any particular topic and methodology is the method of doing research in a well manner. Hence, research methodology is the systematic study of research problem that solve them with some logical evidence. This chapter consists of the methodology of studying Cost-Volume-Profit-Analysis of Butwal Power Company limited and Chilime hydropower company limited. The research methodology includes research design, nature and sources of data, research variable and tools used.

3.2 Research Design

Research design is highlighted for ascertaining the basic objectives of the study. Research design includes definite procedures and techniques which guide in sufficient way for analyzing and evaluating the study. Research design is a plan structure and strategy of investigation conceived so as to obtain answer to research questions and to control variances (Kothari, 1984:43). This study is carried out by using both quantitative and qualitative analysis methods. The secondary data has been used for analysis. Hence in the present study, descriptive as well as analytical research design has been followed. Attempts have been made to explore CVP analysis of Butwal Power Company limited and Chilime hydropower company limited.

3.3 Nature and sources of Data

The data used in this study are secondary as they are collected from concerned authorities. For any research work, information is considered as the lifeblood. Thus it is the major task to gather the information and data. To fulfill the objectives of the study secondary data have been used.

Secondary data have been taken mainly from the following sources.

- Published and unpublished documents and annual reports Butwal Power Company limited and Chilime hydropower company limited, Journals, government and non-government publication.
- Other supportive book from central library of Tribhuvan University, library and websites (**www.nea.gov.np**).
- Textbooks on the relevant issues.

3.4 Population and Sample

The total present number of hydropower cpmpany in Nepal was the population of this study. However, due to various constraints of mine like time, resources, etc., only two representative hydropower company is selected for my research works i.e. Butwal Power Company limited and Chilime hydropower company limited. This study covered last five years period from the fiscal year 2062/63 to 2066/67.

3.5 Data Analysis Tool

The data collected from different sources are to be recorded systematically and identified. The available information is grouped as per the need of research work in order to meet research objective. The collected data are presented in appropriate forms of table and charts. For analysis purpose different kinds of financial as well as statistical tools have been applied which are time series, mean, correlation, regression, graphs, BEP chart, bar diagram etc. Similarly the accounting tools have been used as per the necessity of the analysis such as contribution margin, breakeven point, margin of safety, sensitivity analysis etc.

3.6 Period Covered

For making the research work reliable and fruitful the research mark has been covered the five years data from trend analysis and one year for the analysis of cost, volume variables and related aspects. The collected data have been covered the period of FY 2062/63 to 2066/67.

3.7 Research Variables

In this research work, focus has been given to cost-volume-profit matter of Butwal Power Company limited and Chilime hydropower company limited. Mainly the overall cost structure, sales volumes and profit of the organization focused variables in this study.

3.8 Research Procedure

The research procedure includes the following steps for the study.

- Collection of various books and other publication relevant for the study.
- Assimilation of useful secondary data.
- Description and analysis of collect data in lights of theoretical basis.
- Tabulation and presentation of data through tables, charts, graphs etc.
- Analysis of data by using approved financial and statistical tools.
- Extraction of valuable conclusion and recommendation.

CHAPTER IV

DATA PRESENTATION AND ANALYSIS

This chapter is the essential part of the research. In this chapter both the primary and secondary data are presented in systematic manner. The sources of date were company brochure, annual report and website, NEPSE website, SEBON library & website. NEA website and annual report, and general books and websites related to CVP analysis & Hydropower. Those collected data are presented in systematic formats and analyzed using different appropriate tools and techniques. The presentation & analysis of date includes collecting, organizing, tabulating, graphing and performing statistical analysis. Here, secondary and primary data collected from different sources are presented in understandable from and analyze separately using both qualitative and quantitative measure whichever is appropriate. The major findings of the research depend on data presentation & analysis. Here, data of only five years i.e. from 2062/2063 to 2067.2068 is considered for analysis.

The data related to Butwal Power Company limited and Chilime Hydropower Company limited is discussed below.

4.1 Electricity generation and sales of CHPCL and BPC

As we know that Electricity Act has open energy sector for the private sector. Any person of corporation body who desires to conduct survey, generation, transmission, or distribution of electricity should submit an application to prescribed officer along with the economic, technical and environmental study report. They must have to obtained survey license, generation license, transmission license, and distribution license. No such license shall be required up to 3000 kilowatt.

After obtaining the license, electricity ban be generated and sold. If any person desires to sell the electricity in bulk, Government of Nepal may purchase or

cause to purchase such electricity to the national grid. For the sales of electricity, two types of market i.e. domestic and export are available. Domestic market includes local consumer and NEA. Hydropower Company has to sign the power Purchase agreement (PPA) with Nepal Electricity Authority (NEA) which is government owned national utility for the sales of electricity. PPA policy is restricted only to projects of 5 Mw capacities and below. There is no PPA policy for project above 5 MW. The PPA rates from hydropower company i.e. independent power producers (IPP) is set at the level of RS. 3.90 per KWH for wet season and RS. 5.52 per KWh for dry season. For the export of electricity bilateral arrangement exist with India.

Butwal Power Company Limited (BPCL) and Chilime Hydropower Company Limited (CHPCL) are one of the leading hydropower company which generate and sells electricity on the basis of above conditions. They only sales electricity to domestic market i.e. local consumer and Nepal electricity authority (NEA). Electricity is produced at large generating stations, which is then transmitted at high voltage to the load centers and transmitted to consumer at the reduced voltage through local distribution systems.

4.1.1 Butwal Power Company Limited (BPCL)

Energy generation and sales are the core business of the company. The major portion of revenues comes from electricity sales. BPC,s generation business is responsible for the smooth operation and maintenance of its two power plants, the 5.1 Mw Andhi Khola and 12 MW Jhimruk. Both of them were in full operation.

Total capacity =5.1 MW + 12 MW= 17.1 MW

Total capacity in a year= (5.1x24x365)MWh + (12x24x365)MWh

=44676MWh + 105120MWh

=149796 MWh

=149796x1000 KWh

=149796000 KWh

Generation of Electricity: Generation decision is solely responsible for smooth operation and maintenance of BPC,s power plant. The generation of electricity of electricity for 5 years is given below.

Table: 4.1

Generation of electricity of BPC

years	Generation				Total		
	Andhi Khola centre		Jhimruk Centre				
	Qty (KWh)	Plant Factor (%)	Qty (KWh)	Plant Factor (%)	Qty (KWh)	Plant Factor (%)	Change (%)
2062/63	40320000	90.24	61760000	58.75	102080000	68.14	
2063/64	40740000	91.18	63250000	60.17	103990000	69.42	1.88
2064/65	40190000	89.98	67190000	63.92	107380000	71.68	3.26
2065/66	36670000	82.07	64540000	61.39	101210000	67.56	-5.75
2066/67	38680000	86.57	63230000	60.15	101910000	68.03	0.7

(Source: Annual reports of BPC, 2062/63-2066/67)

The above table shows that total generation of electricity is increasing in first three years but decreases in the last two years of operation but still unable to meet their installed capacity of 17.1 MW of BPC. The highest average load factor of BPC is only 71.68% in 2064/65.

Sales of Electricity:

BPC sales electricity from two plants. The sales of generated energy are in two forms, Bulk sales to Nepal Electricity Authority (NEA) under Power Purchase Agreement (PPA) and retail sales to BPC's own customer (local consumers). The largest portion of revenue comes from sales of NEA.

Sales to NEA

Table : 4.2
Sales to NEA

years	Centre						Total	
	Andhi Khola centre			Jhimruk Centre				
	Qty (KWh)	Rate	Amount (Rs.)	Qty (KWh)	Rate	Amount (Rs.)	Qty (KWh)	Amount (Rs.)
2062/63	27473888	2.98	81872186	57429867	4.12	236611052	84903755	318483238
2063/64	27337599	3.16	86386813	56947341	4.37	248859880	84284940	335246693
2064/65	26620967	3.35	89180239	61196808	4.63	283341221	87817775	372521460
2065/66	26022012.4	3.67	95390259	56967987.6	4.91	279712819	82990000	375103078
2066/67	26518574.2	3.86	102304694	54921425.8	5.2	285591414	81440000	387896108
Total	**133973041**		**455134191**	**287463429**		**1334116386**	**421436470**	**1789250577**

The above table shows BPC sales electricity to NEA from two plant; Andhi Khola and Jhimruk. The sales rate is different from both plants depending upon wet and dry season. BPC sold electricity to NEA on contract basis . it has a contract of supplying 30GWh and 55GWh from Andhi khola and Jhimruk respectively till 2066/67.

Sales to local consumer:

Table: 4.3
Electricity sales to consumer

years	Centre						Total	
	Andhi Khola centre			Jhimruk Centre				
	Qty (KWh)	Rate	Amount (Rs.)	Qty (KWh)	Rate	Amount (Rs.)	Qty (KWh)	Amount (Rs.)
2062/63	10593765	3.1	32840672	1236235	4.58	5661956	11830000	38502628
2063/64	10880325	3.41	37101908	1269675	5.07	6437252	12150000	43539160
2064/65	10907116	3.626	39549203	1964832	4.89	9608028	12530000	49157231
2065/66	9157005	4.04	37020755	3712995	5.03	18676365	12870000	55697120
2066/67	9612000	4.78	45910979	3738000	5.25	19624500	13350000	65535479
Total	51150211		192423517	11921737		60008101	62730000	252431618

Sales to consumer or distribution in BPC started through Andhi Khola hydroelectric and rural electrification project (AHREP) in 1990 AD. BPC distribute electricity in 4 districts of western and mid western region of Nepal, The districts are Syangjam Palpam, Pyuthan, and Arghakhanchi, BPC consumer are categorize as either industrial or domestic, and domestic consumer are further subdivided into metered and cutout. There are 34428 consumers in the fiscal year 2066/067. These consumers are provided service through two distribution center and two branch offices. These two distribution centre are Syangia/Palpa distribution centre located at Galyang and Pyuthan/Arghakhanchi distribution centre located at Nayagun, Pyuthan, Distribution division is responsible for technical and financial planning, design construction, operation and maintenance of the distribution, BPC distributes electricity to consumer through user's organizations (UOs) which helps in construction of Distribution Network through labor contribution as well as in the operation and maintenance of network and revenue collection. Presently (2066/067), UOs has reached to 71 to provide service to consumers.

Internal Consumption & Transit loss

Table : 4.4
Internal Consumption & Transit loss (In KWh)

Year	Internal consumption		Transit Loss		Total
	Andhi Khola	Jhimruk	Andhi Khola	Jhimruk	
2062/63	133765	232990	2107042	1114942	3588739
2063/64	120382	234204	2673935	1291807	4320328
2064/65	118905	230642	3063764	1877898	5291209
2065/66	118759	227136	2617067	1579913	4542875
2066/67	182611	245312	3610251	2106916	6145090
Total	**674422**	**1170284**	**14072059**	**7971476**	**23888241**

BPC uses huge amount of energy in internal consumption and transit loss. This is one of the main reason that cause variation in generation and sales as shown

in Fig 2.6. This increases the gap between generation and sales which is fulfilled by purchasing from NEA. More internal consumption and transit loss means loss of revenue. The internal consumption has reached to 3907008 KWh in 2066/067 which was only 3588739 in 2062/063. These figures are far greater than internal consumption and transit loss in CHPCL as shown in table 4.8. For loss minimization it uses Tamper Proof seal in the distribution system. It helps to control the unauthorized and illegal use of electricity.

4.1.2 Chilime Hydropower Company Limited (CHPCL)

Electricity generation and sales is also a core business of Chilime Hydropower Company Limited (CHPCL) . Chileme Hydropower plant is a peaking run off river type constructed and fully owned by Chilime Hydropower Company Limited (CHPCL). The electricity generated from the plant is purchased by Nepal electricity Authority (NEA) under Power Purchase Agreement (PPA) made on in Ashad 2054. The plant has started its commercial generation from 00:00 hours of 8th Bhadra 2060. The plant has been operating successfully in terms of meeting generation targets. The generated electricity from the plant is being fed to the National Grid.

Total installed capacity = 22.56 MW

=(22.56x24x365) MWh

=197625.6x1000KWh

=197625600KWh

Generation of Electricity

CHPCL generate electricity from single plant. The generation of electricity from Chilime Hydropower plant for five years (i.e. from 2062/63 – 2066.67) is given below:

Table: 4.5
Generation of electricity

Year	Generation (KWh)		Average yearly plant factor (%)	% change
	Deemed	Actual		
2062/63	133223644	145083730	73.42	-
2063/64	132790000	147619730	74.70	1.74
2064/65	132795000	145075000	73.41	-1.73
2065/66	137585000	146220000	73.99	0.79
2066/67	140893000	148132000	74.96	1.31
Total	**677286644**	**732130460**		

(Source: Annual reports of CHPCL, 2062/63-2066/67)

The table shows that the generation from the plant, for last five years, has been fairly higher than the deemed generation. The main equipment has proven to be robust and the whole electro mechanical system design has proven to be effective and equal to the conditional and practices of the Nepalese system. The highest generation of electricity is 148132000 (average load factor is 74.96%) in 2066/67.

Sales of Electricity to NEA

The generated electricity from the power plant is purchased by Nepal electricity Authority (NEA) under the Power Purchase Agreement (PPA). The annual deemed energy saleable to NEA is 132.9 GWh excluding penalty free outage of 36 hours (720 MWh) annually. It does not sales electricity to local consumers.

Table: 4.6
Sales to NEA

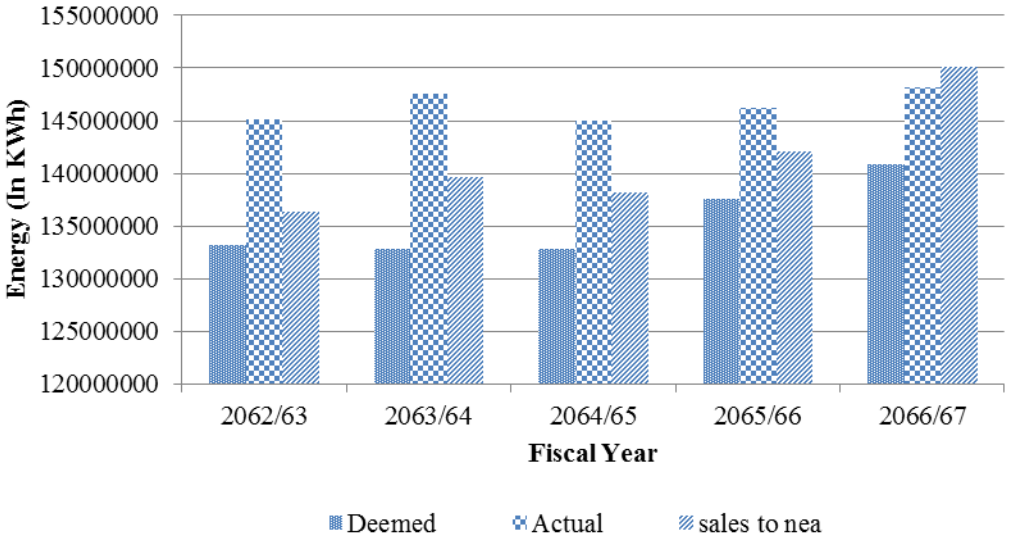
Years	Qty(KWh)	Average rate	Amount (RS.)	% change
2062/63	136328395	5.99	816607088	-
2063/64	139650818	6.47	903540792	10.65
2064/65	138165844	6.30	870014527	-3.71
2065/66	142127000	6.22	883446000	1.54
2066/67	141565200	6.26	886564907	0.35
Total	**697837257**		**4360173314**	

(Source: Annual reports of CHPCL, 2062/63-2066/67)

CHPCL sales electricity to NEA under Power Purchase agreement (PPA). Although the price is set by NEA, the average selling price of CHPCL is 6.26 in 2066/67.

Figure: 4.2

Generation and Sales of CHPCL



The above presented table and figure show that the sale of electricity was only 136328395 KWh in 2062/63. This figure was increasing every year as shown in table except decrease in 2064/65 by 3.71%. The highest sales and revenue up to this date is 142127000 KWh and Rs. 886564907 respectively in 2065/66 and 2066/67.

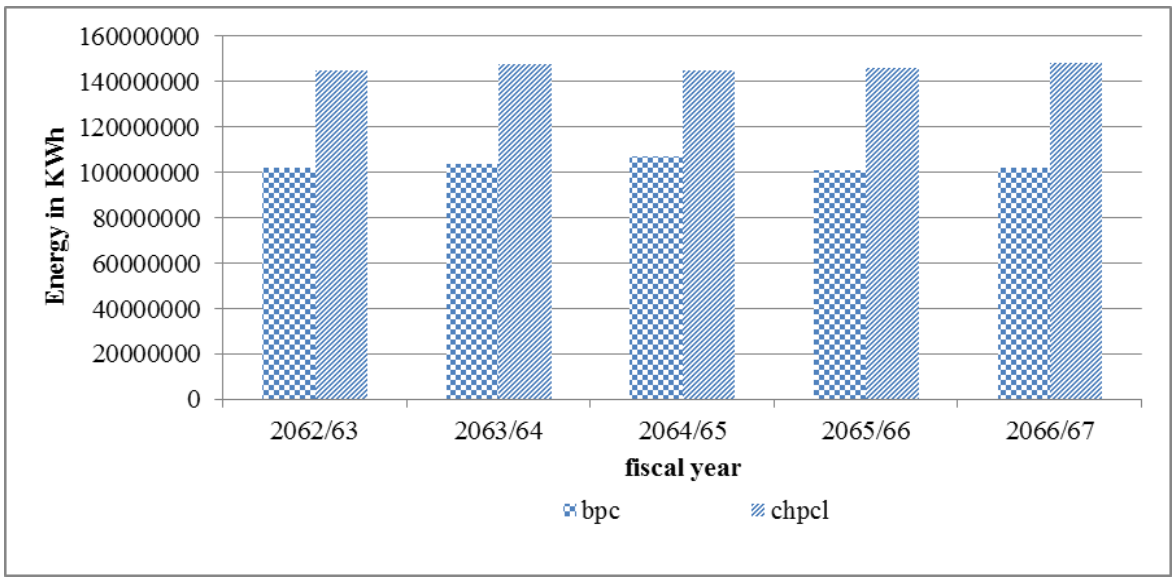
4.1.3 comparison of Generation and sales of BPC and CHPCL

Both the company generate and sales electricity to NEA. The generation of electricity of CHPCL exceeds the generation of BPC. The reason behind this is huge installed capacity of CHPCL. As the generation of CHPCL exceeds, the sales is also greater than BPC. The comparison of generation and sales of both the company can be shown from the following figure.

Table: 4.9
Generation of Electricity

years	Generation of BPC	Generation of CHPCL
2062/63	102080000	145083730
2063/64	103990000	147619730
2064/65	107380000	145075000
2065/66	101210000	146220000
2066/67	101910000	148132000

Figure: 4.3
Generation of BPC and CHPCL



The figure 4.3 shows that generation of both the company. The generation of both company is increasing till 2064/65, the generation of both the company is found decrease in 2065/66, while the generation is increasing in this year 2066/67. The graph also shows that the difference of generation is increasing every year between two companies except in 2065/66.

4.2 Cost structure of BPC and CHPCL

Cost structure refers to the relative proportion of fixed and variable cost in an organization. The main cost of operating a hydropower company comprise the cost of building and maintaining the dam, the steel lined pressure shaft, the power house and the turbines. Moreover, these costs may depend upon the size

of the reservoir, the types of hydropower plants (storage of run of river) as well as on the number of plants operated by a single company. Therefore, an analysis of the cost structure of these companies should take account of the fact that the same quantities of electricity can be produced using several types of plants (storage, pump- storage and run of river). Here, single output is considered in the cost model i.e. electricity. The input consists of capital labor material, machines etc.

Cost structure of the company depends upon cost classification. Generally, cost is classified into fixed, variable & semi-variable which is discuss earlier. Fixes costs in hydropower are those cost which the company perform regardless of the amount of delivered power. They generally include cost of maintenance of fixed cost, salary, royalty, etc. variable costs in hydropower company are those which shall vary depending on the amount of delivered power. They generally, include equipment repairing cost, based on working hour, payroll bonus system, fixed assets depreciation cost can be particularly included into the variable cost based on working hours etc.

After studying the various hydropower companies, it is found cost structure is dominated by fixed cost. The part of variable cost is very small as there is no use of material, fuel, direct labor etc. there is some semi variable cost which needs to be classified. But there is no practice of segregating semi variable cost in Nepalese Hydropower Company. The costs are prescribed in the form of total cost. The generally used method for segregating cost i.e. high low method & least square method do not satisfy the condition for segregating. So, semi-variable cost of BPC and CHPCL are classified into fixed and variable as 60% and 40% respectively based on hypothetical assumptions after studying cost behavior of other hydropower company and verbal information of some professional.

Cost classification of BPC into fixed and variable

The classification of cost into fixed & variable for 2066/67 is given below which is the base for other years.

Table 4.10

Cost classification of BPC for 2066/67

Particulars	Behavior	fixed	Variable cost	
			Amount	Per KWh
1. power plant expenses				
Electricity purchase	variable		11582285	0.0651
staff cost	Fixed	36953330		
Office overhead	Fixed	4087507		
Vehicle Operation & maintenance	Fixed	1332652		
Environment, community & mitigation	Fixed	1103367		
Mitigation (JDMP)	Fixed	2688556		
Power plant Operation & insurance	Fixed	7291623		
Power plant Maintenance	Fixed	14001739		
Deferred expenses-mitigation works	Fixed	5810764		
power plant maintenance	semi-variable	13200739	801000	0.06
T/L repair & maintenance	Fixed	437729		
Royalty	Fixed	52522483		
Office overhead	Fixed	4087507		
2. Distribution expenses				
staff cost	Fixed	25982830		
Office overhead	Fixed	3584199		
Vehicle Operation & maintenance	Fixed	1540369		
T/L maintenance	semi-variable	139299		
D/L network operation	Fixed	13681404		
D/L network repair & maintenance	Fixed	3268620		
subsidy on sales of Meter	Fixed	585900		
Royalty	Fixed	6458030		
Expenses Written off	Fixed	521640		
3. Administrative Exp.				
CEO's remuneration & expenses	Fixed	6594957		
Staff cost	Fixed	42091453		
Office overhead	Fixed	34566094		
4. Depreciation	Fixed	866156662		
5. Interest expenses	Fixed	61350048		
Total	Semi variable	1210039501	12383285	0.1251

(Source: Annual reports of BPC, 2062/63-2066/67)

Cost classification of CHPCL:

The classification of cost of CHPCL into fixed and variable for the year 2066/67 given below:

Table 4.11

Classification of cost of CHPCL for 2066.67

Particulars	Behavior	fixed	Variable cost	
			Amount	Per KWh
1. Cost of Energy sold				
staff cost	Fixed	18767558		
Fuel & Mobil	Variable		1317252	0.0087752
Machine & equipment main.	Semi variable	7961237	525385	0.0035
T/L repair & maintenance	Fixed	362798		
D/L network maintenance	Fixed	264643		
Royalty	Fixed	17700927		
Office overhead	Fixed	3174805		
electricity	Fixed	16132		
consultancy	Fixed	2082795		
other services	Fixed	17165		
vehicle repair and maintenance	Fixed	1547293		
civil repair and maintenance	Fixed	10199644		
house rent	Fixed	13333		
insurance	Fixed	5639009		
social responsibility	Fixed	4508665		
2. Administrative Exp.				
Staff cost	Fixed	11954681		
Office overhead	Fixed	19480678		
Royalty	Fixed	2210000		
consultancy	Fixed	1483234		
Other repair	Semi variable	93593		
3. Depreciation	Fixed	106217660		
Total	Semi variable	191753487	1842637	0.012275

(Source: Annual reports of CHPCL, 2062/63-2066/67)

Fixed and variable cost:

The most of the cost in Hydropower Company are fixed. The proportion of variable cost is very small as show in above table. The fixed and variable costs of BPC and CHPCL for 5 years based on 2066/67 are given in following table.

Fixed and variable cost of BPC

Table 4.12

Fixed and variable cost of BPC

Years	Fixed cost		Variable cost		Variable cost/KWh	
	Amount	% change	Amount	% change	Amount	% change
2062/63	167,877,821.20	-	7,370,904.80	-	0.08	-
2063/64	196,806,215.60	17.23	8,320,506.40	0.13	0.09	13.18
2064/65	243,220,809.00	23.58	9,989,982.00	0.20	0.10	15.48
2065/66	281,065,966.88	15.56	11,310,655.00	0.13	0.11	7.96
2066/67	367,015,939.55	30.58	12,271,145.00	0.08	0.13	16.81

(Source: Appendix I &II)

The fixed cost of BPC is increasing and reached to Rs. 367015939.55 in 2066/67. The highest variable cost of BPC is identified in 2066/67 (Rs. 12271145).

Fixed and variable cost of CHPCL

Table 4.13

Fixed cost and variable cost of CHPCL

Years	Fixed cost		Variable cost		Variable cost/KWh	
	Amount	% change	Amount	% change	Amount	% change
2062/63	303553523		526617.65		0.0038	
2063/64	222288888	-26.77	1140845.64	116.64	0.0079	107.89
2064/65	189527888	-14.73	643455.36	-43.59	0.0046	-41.77
2065/66	174812184	-7.76	831569.534	29.23	0.00585	27.265
2066/67	191753487	9.691	1842637	121.59	0.01227	109.68

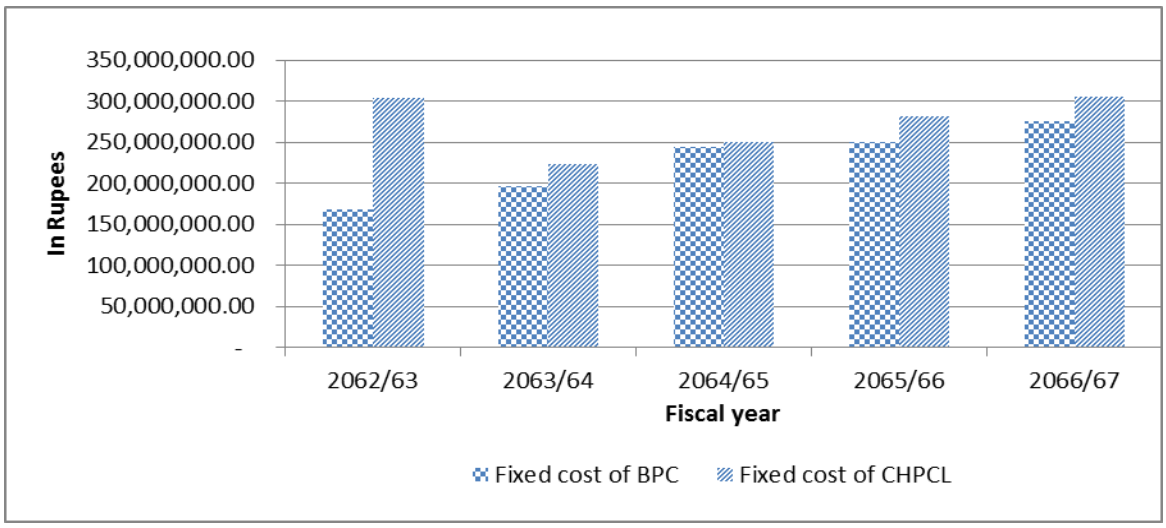
(Source: Appendix II &III)

The highest fixed cost of CHPCL is found in 2062/63 (Rs. 303553523) and is decreasing. The highest variable cost of CHPCL is identified in 2066/67 (Rs. 1842637).

Comparison of Fixes and variable cost of BPC & CHPCL

The major cost of both the company is fixed cost. There is huge difference between fixed and variable cost in both companies. The proportion of variable cost is less than 1% in total cost in both companies. The comparison of fixed and variable cost of BPC and CHPCL is shown from the following figure.

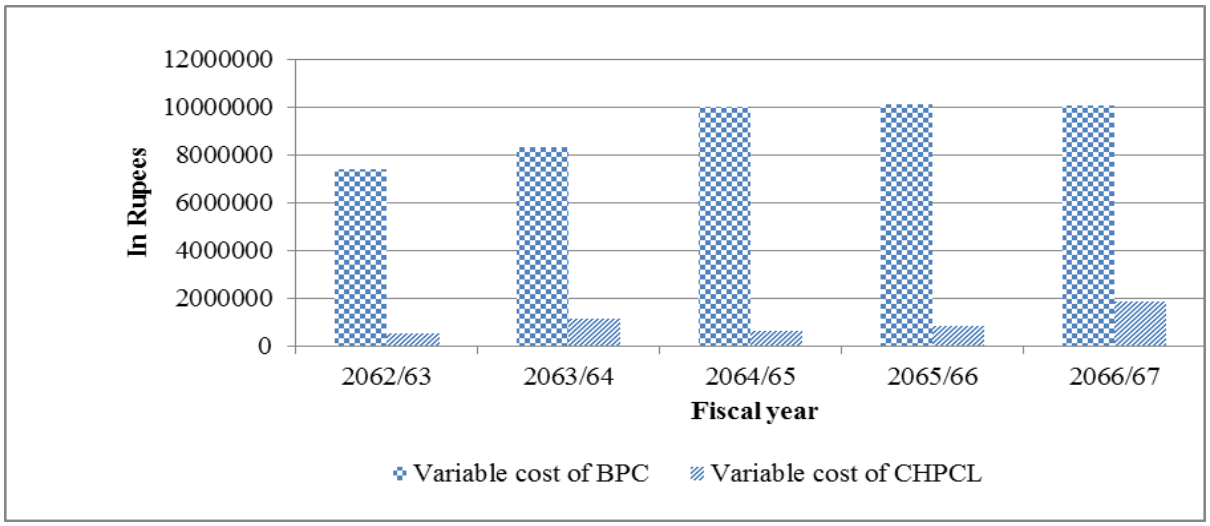
Figure: 4.6
Fixed cost of BPC and CHPCL



The above presented table shows that CHPCL spent huge amount of Fixed cost in comparison to BPC. The fixes cost of BPC is found increasing every year. But the fixed cost of CHPCL is found decreasing in 2063/64.

The fixed cost of CHPCL heavily decreased in 2063/64. The main reason behind this is the improvement in the system, intake trash rack, decanter flushing, reservoir flushing etc. Generally, the fixed cost of CHPCL is higher than BPC.

Figure: 4.7
Variable cost of BPC and CHPCL



The above presented graph shows that BPC spent huge amount of variable cost in comparison of CHPCL. The items of the variable cost are power plant maintenance, fuel expenses, and purchase of electricity for both the company.

There is a huge difference between variable cost of BPC and CHPCL. The variable cost of BPC is about 5% of total cost where as variable cost of CHPCL is less than 1% of total cost. The main reason behind the high variable cost of BPC is purchase of electricity from NEA, where as CHPCL does not make any purchase of electricity. The variable cost has significant impact on contribution margin which affects the Break even analysis.

4.3 Other income and expenses

Though, energy generation and sales are the core business with the main revenue stream of the company, there are many other income and expenses which affect the total income and profit of the company. They may be interest income, consultancy fee, dividend income, profit on sale etc. although their proportion is small, they are significant in total income.

The other income & expenses of BPC and CHPCL from 2062/63 to 2066/67 is given below.

Table 4.14
Other income & expenses of BPC & CHPCL

Particular	2062/63	2063/64	2064/65	2065/66	2066/67
BPC:					
Other income	135291650	137736240	227919004	194109521	193674886
Other expenses	19782849	34514540	16743019	18503453	18233540
Net other income	115508801	103221700	211175985	175606068	175441346
CHPCL:					
Other income	2579188	715444.58	14669916	1127825	1220730
Other expenses	0	0	1553611.5		856856.32
Net other income	**2579188**	**715444.58**	**13116305**	**1127825**	**363873.68**

(Source: Appendix III & VI)

The above table shows that both the company makes huge amount of income from other sources i.e. besides sales. BPC makes more income in comparison to CHPCL. BPC also has more sources than CHPCL. The electricity services, consultancy services, dividend income etc are the main sources of income of BPC. This source helps to maintain the gap of net profit between two companies, i.e. to meet the profit of CHPCL. The highest income of this two company is recorded in 2064/65. There are other expenses which reduces the net income from other sources as shown in table.

4.4 Contribution margin income statement of BPC and CHPCL.

It has been already discussed that contribution margin statement of variable costing shown the contribution margin which plays an important role in Cost-volume-profit analysis. Contribution margin is excess of sales over variable expenses. It showed the amount available for fixed cost and profit.

Contribution margin income statement of BPC and CHPCL from 2062/63 to 2066/67 is given below:

Table 4.15
Contribution margin income statement of BPC

Particular	2062/63	2063/64	2064/65	2065/66	2066/67
Sales in KWh	97,056,352	96,812,869	100,689,723	82,990,000	81,440,000.00
AV. Selling price	3.69	3.93	4.19	4.52	4.76
Sales Revenue	358,419,402	380,852,145	421,688,559	375,103,078	387,896,108.00
Less: V. cost	7,370,904	8,320,506	9,989,983	10,892,256	11,351,739.00
Contribution margin	351,048,497	372,531,638	411,698,576	364,210,822	376,544,369.00
Less: fixed cost	167,877,821	196,806,215	243,220,809	281,065,966	367,015,939.55
Operating profit	183,170,676	175,725,423	168,477,767	83,144,855	9,528,429.45
Add: other income	135,291,650	137,736,240	227,919,004	242,514,215	275,658,896.00
Less: other exp.	19,782,849	34,514,540	16,743,019	35,856,742	28,865,251.00
NPBT	298,679,477	278,947,123	379,653,752	289,802,328	256,322,074.45

(Source: Table 4.2 & 4.3 & Appendix I-III)

The contribution margin the company is increasing due to increase in sales volume and average selling price in comparison to variable cost per unit, except decrease in 2065/66 and 2066/67 of BPC. The highest contribution margin of BPC recorded up to this date is Rs. 411698576.92 in 2064/65 The CMPU is increasing except decrease in CMPU in 2064/65.

Table 4.16
Contribution margin income statement of CHPCL

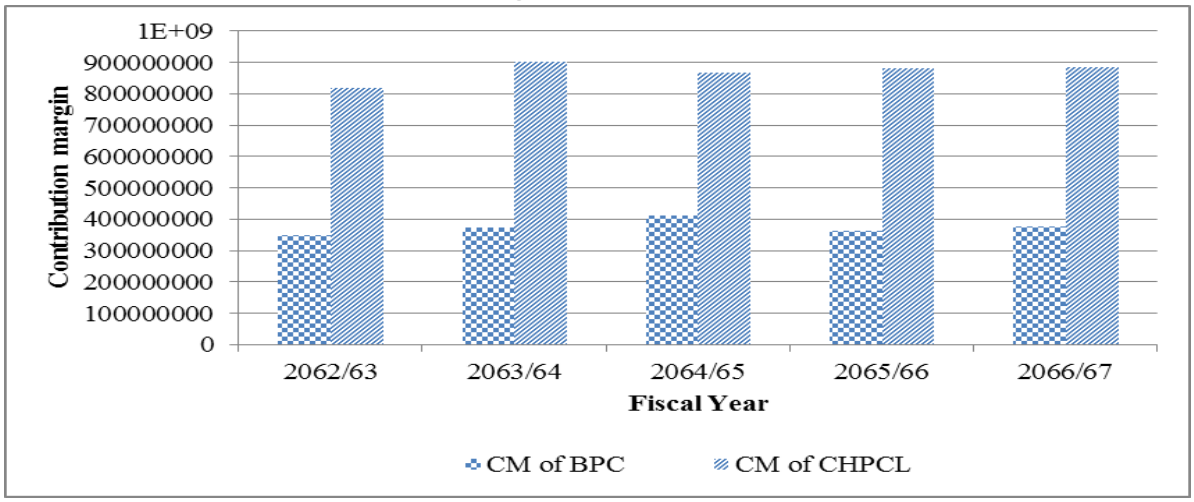
Particular	2062/63	2063/64	2064/65	2065/66	2066/67
Sales in KWh	139,669,800	144,583,070	141,176,000	142,127,000	150,110,000
AV. Selling price	5.87	6.25	6.16	6.22	5.91
Sales Revenue	819,414,782	903,542,979	870,011,217	884,029,940	887,150,100
Less: V. cost	526,617	1,140,845	643,455	865,452	1,024,985
Contribution margin	818,888,164	902,402,133	869,367,762	883,164,487	886,125,115
Less: fixed cost	303,553,523	222,288,888	189,527,887	178,985,256	168,098,248
Operating profit	515,334,641	680,113,245	679,839,874	704,179,231	718,026,867
Add: other income	2,579,187	715,444	14,669,916	171,300	220,730
Less: other exp.	-		1,553,611		
NPBT	517,913,829	680,828,68	692,956,179	704,350,531	718,247,597

(Source: Table 4.8 & Appendix IV-VI)

The contribution margin is increasing due to increase in sales volume and average selling price in comparison to variable cost per unit.The highest contribution margin of CHPCL is 902402133.71 in 2063/64.

The contribution margin of much greater than contribution margin of BPC. The main reason behind high contribution margin of CHPCL is high sales revenue and low variable cost.

Figure: 4.8
Contribution Margin of BPC and CHPCL



The above presented table and figure shows that the contribution margin of both the company is increasing every year. However, the contribution margin of CHPCL is found decreased in 2064/65 due to fall in sales. The contribution margin of CHPCL is almost double of the contribution margin of BPC. The main reason behind the high contribution margin of CHPCL is high sales and low variable cost. BPC has both i.e. sales and variable cost lower thean CHPCL. This contribution margin affects the breakeven point of the organization.

4.5 Contribution margin per unit (CMPU), Contribution margin ratio (CM Ratio), & Variable cost ratio (VC Ratio) of BPC & CHPCL

The contribution margin per unit (CMPU), CM ratio, and variable cost ratio is already discussed. these terms are useful for the break even analysis of the company. The information related to CMPU, CM ratio, and VC of the BPC and CHPCL is given in following table.

Table 4.17

CMPU, CM ratio, & VC ratio of BPC & CHPCL

year	Variable Cost Ratio (%)		CMPU		CM Ratio (%)	
	BPC	CHPCL	BPC	CHPCL	BPC	CHPCL
2062/63	2.0565	0.0643	3.617	5.863	97.9435	99.9357
2063/64	2.1847	0.1263	3.8479	6.2414	97.8153	99.8737
2064/65	2.369	0.074	4.0889	6.1581	97.631	99.926
2065/66	2.356	0.088	4.256	6.982	97.644	99.912
2066/67	2.398	0.102	4.125	7.0145	97.602	99.898

The above presented table shows that BPC has high VC ratio in comparison to CHPCL. High VC ratio means low contribution margin. The CMPU of the BPC is low in comparison to CHPCL and it is increasing every year of both companies. Similarly, CM ratio the CHPCL is also higher than the CM ratio of BPC. About 99% of the sale of the sale amount is contribution margin in CHPCL, whereas about 97% if of BPC. Higher the CMPU and CM ratio will be the breakeven point.

4.6 Break even analysis of BPC and Chilime Hydropower Company Limited (CHPCL)

Break even analysis is an important part of cost volume profit analysis. It is the point at which fixed cost is covered and profit is zero. It helps manager to decide what quantity should be produced and sold to cover all the cost of the organization. The aim of break even analysis is to determine Breakeven point. Breakeven point helps the firm to know the minimum point of operation. The

Breakeven point of any company depends upon the contribution margin and Fixed cost. The company having higher fixed cost and low CMPU has high BEP and vice versa. The derailed information about BEP analysis is given in chapter 2. The different types of Breakeven point of BPC and CHPCL is discussed below.

4.6.1 Operating Break Even Point

Operating BEP is also known as the accounting BEP. It helps firm to know the point at which it should operate to cover the cost. It is the real BEP of the company. The operating BEP of BPC and CHPCL for five years are given below.

Table 4.18
Breakeven point of BPC

year	Breakeven point				BEP Ratio
	In KWh	% change	In Rupees	% change	
2062/63	46,413,553	-	171402718	-	0.4782
2063/64	51,146,395.4	10.2	201201873	17.39	0.5283
2064/65	59,483,188.4	16.3	249122522	23.82	0.5908
2065/66	70,332,922	18.24	313346308	25.78	0.5015
2066/67	87,395,688.8	24.26	407726215	30.12	0.5541

The operating BEP of BPC is found increasing in terms of both KWh and Rupees. The lowest BEP in KWh of BPC is recorded in 2062/63. The operating BEP ratio of BPC is not consistent.

Table 4.19
Breakeven point of CHPCL

year	Breakeven point				BEP Ratio
	In KWh	% change	In Rupees	% change	
2062/63	51,774,436.81	-	303,748,833.50	-	0.37
2063/64	35,615,228.68	(31.21)	222,569,994.20	(25.00)	0.25
2064/65	30,777,007.11	(13.58)	189,668,242.00	(22.00)	0.22
2065/66	31,584,625.00	2.62	196,298,444.38	3.50	0.23
2066/67	34,254,124.12	8.45	216,623,080.93	10.35	0.22

The operating BEP CHPCL is found decreasing in terms of both KWh and Rupees in first three year except decrease in last two years. The lowest operating BEP in KWh of CHPCL is recorded in 2064/65. The operating BEP ratio of CHPCL is consistent in terms of decreasing.

Figure: 4.9

Breakeven point of BPC & CHPCL (In KWh)

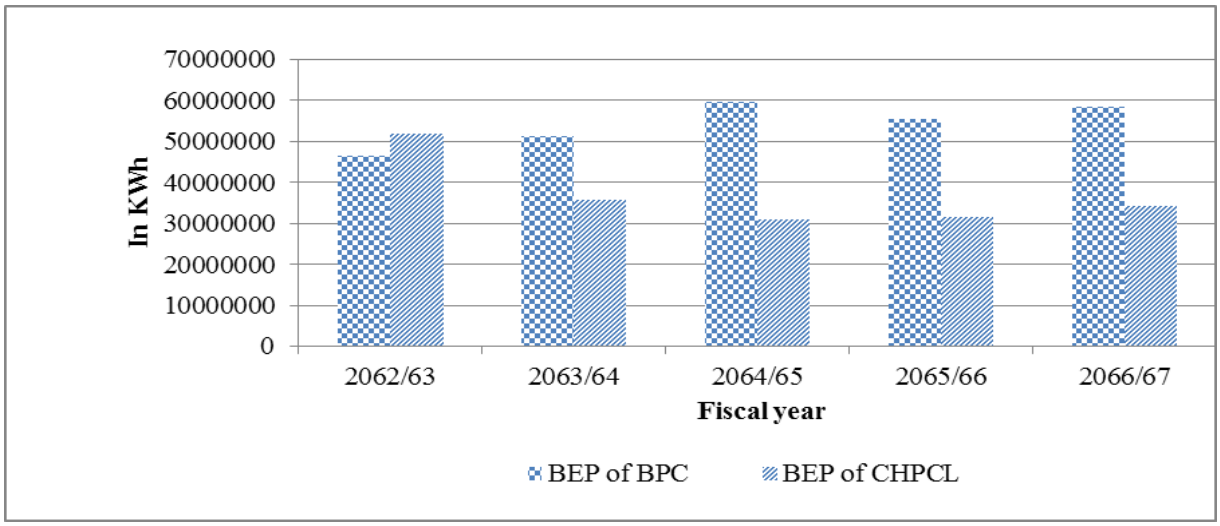
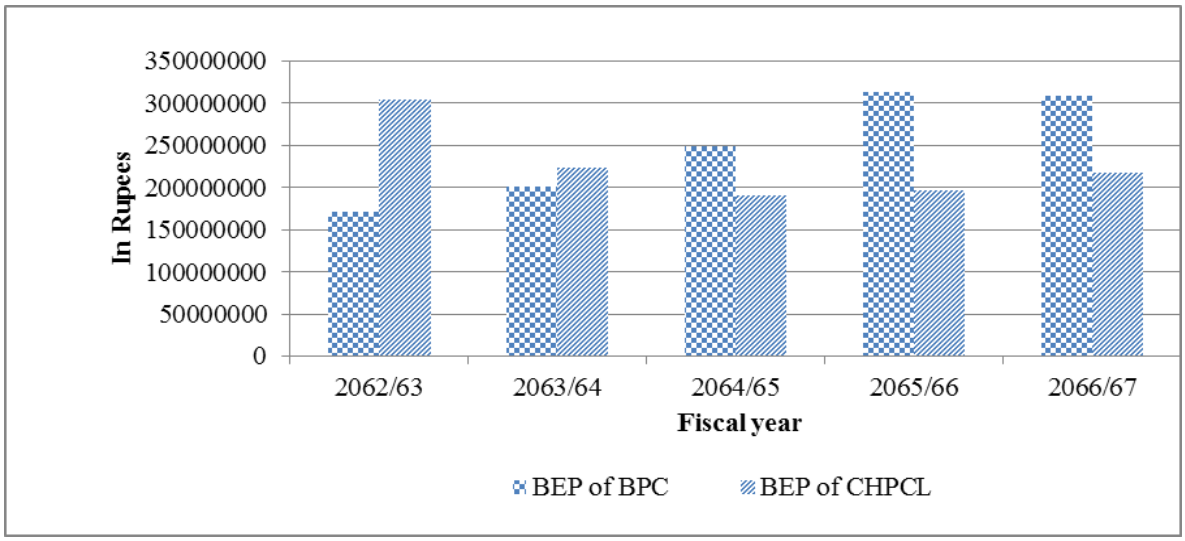


Figure: 4.10
Breakeven point of BPC & CHPCL (In Rupees)



Considering the BEP of the both company, BPC is considered as more profitable in comparison to CHPCL because it has low BEP in most of the years. Low BEP means high margin of safety which generate high profit. But in reality, CHPCL is more profitable considering the BEP ratio and BEP ratio is the real tool for comparison. The BEP ratio of CHPCL is smaller than of BPC. It means the proportion of BEP sales is small in CHPCL whereas high incase of BEC. The BEP ratio of both the company is decreasing except an increase in last year of BPC. It means that the efficiency of CHPCL is increasing every year. Thus, CHPCL more efficient and profitable than BPC incase of operating BEP.

4.6.2 Cash breakeven point of BPC and CHPCL

Cash breakeven point is used to determine the volume of sales required to cover all the cash fixed cost. It is a simple modification of operating breakeven point analysis. It determines the point of no profit / no loss, only including cash fixed cost only. The costs like depreciation, amortization, write off etc are excluded during calculation. The main non cash expenses of BPC and CHPCL are depreciation and write off of power plant expenses and administrative expenses. The cash breakeven point of BPC and CHPCL is given in following table:

Table 4.20
Cash breakeven point of BPC

year	Cash Breakeven point				Cash BEP Ratio
	In KWh	% change	In Rupees	% change	
2062/63	30934690	-	114240120	-	0.3187
2063/64	36489763	17.9574229	143544985	25.65199	0.3769
2064/65	45248215	24.0024921	189504795	32.01771	0.4491
2065/66	51174625	13.0975553	198964218	4.991654	0.4521
2066/67	53652168	4.84135057	211846216	6.47453	0.4351

(Source: Appendix VII)

The above presented table shows that Cash BEP of BPC is lower in terms of KWh and Rupees In 2062/63. The Cash BEP of BPC is increasing every year. BPC has high Cash BEP because of low depreciation cost and low CMPU. Cash BEP ratio of BPC of BPC is 0.4521 in 2065/66.

Table 4.21
Cash breakeven point of CHPCL

year	Cash Breakeven point				Cash BEP Ratio
	In KWh	% change	In Rupees	% change	
2062/63	24772844.4	-	145336638	-	0.1775
2063/64	18779832.6	-24.1918602	117360673	-19.2491	0.1299
2064/65	13721440	-26.9352378	84560577	-27.9481	0.0972
2065/66	11258741	-17.9478174	80146234	-5.22033	0.0812
2066/67	10245689	-8.99791549	76848552	-4.11458	0.0751

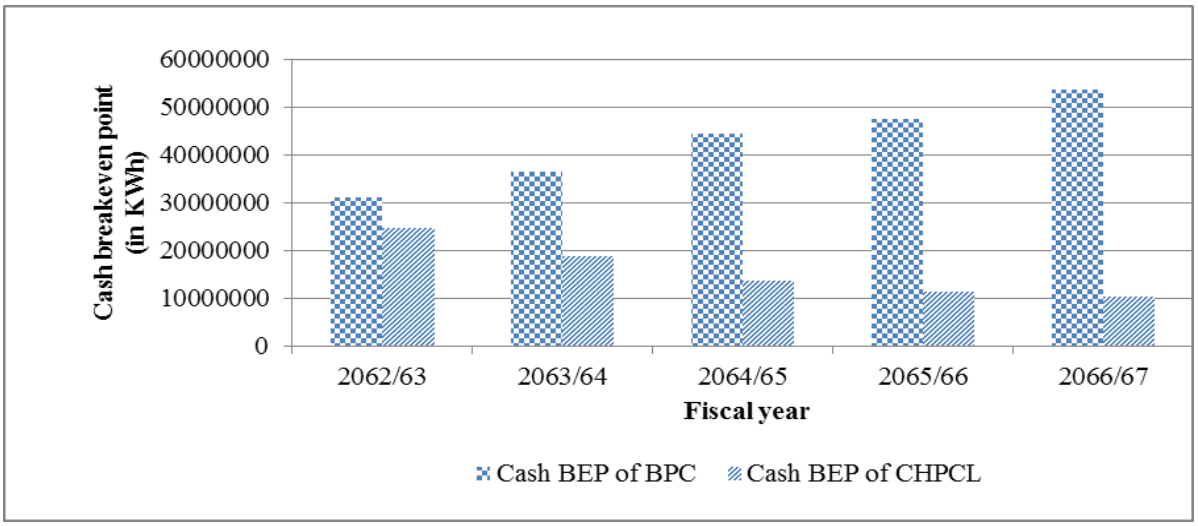
(Source: Appendix VIII)

The above presented table shows that Cash BEP of CHPCL is higher in 2062/63 and decreasing every year. The main reason behind this is high non-cash expenses i.e. high depreciation of CHPCL.

Cash BEP ratio of BPC is much higher than CHPCL. Generally, the company having low cash BEP is considered as more profitable, assuming the selling

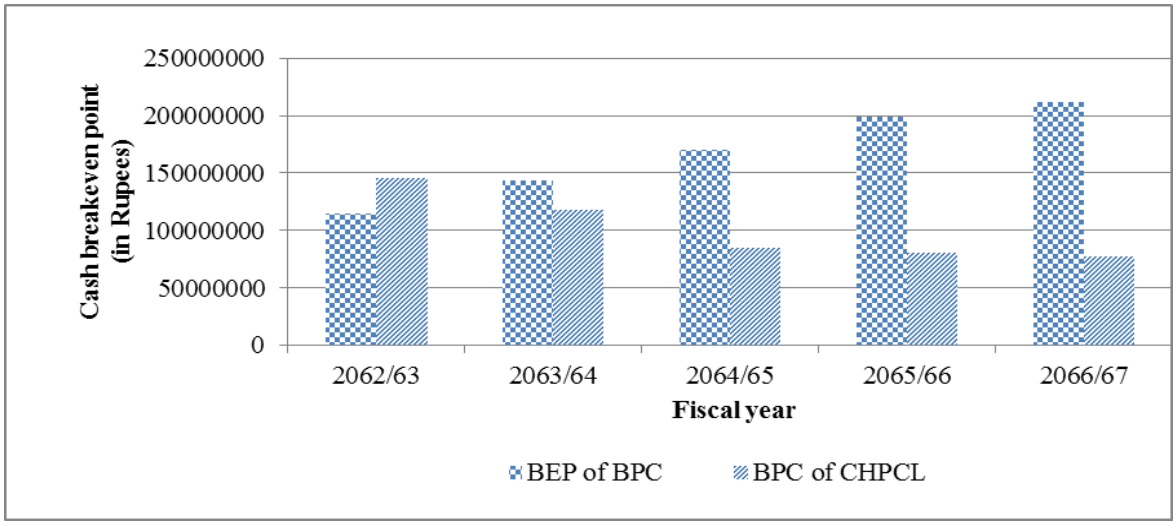
price and sales unit are constant. In case of Cash BEP ratio CHPCL is more profitable as it provide more margin of safety.

Figure 4.11
Cash breakeven point of BPC and CHPCL (In KWh)



The cash breakeven point of BPC in terms of KWh is much greater than CHPCL due to high non cast fixed cost of CHPCL. The cash breakeven point of BPC is found increasing in terms KWh whereas cash breakeven point of CHPCL is found decreasing. The lowest cash breakeven point of BPC in KWh is recorded in 2066/67.

Figure 4.12
Cash breakeven point of BPC and CHPCL (In rupees)



The cash breakeven point of BPC in terms of Rupees is much greater than CHPCL due to high non cast fixed cost of CHPCL. The cash breakeven point of BPC is found increasing in terms Rupees whereas cash breakeven point of CHPCL is found decreasing. The lowest cash breakeven in rupees of BPC is found in 2062/63 whereas of CHPCL in 2066/67.

4.6.3 Breakeven point including other income and other expenses

Breakeven point including other income and other expenses will be different from operating breakeven point. Breakeven point under this may be greater or smaller than operating breakeven point depending upon other income and expenses. It is calculated by making simple modification in operating breakeven point i.e. subtracting other income and adding other expenses in fixed cost. The net other income of BPC reduces the BEP of to great extent in comparison to Chilime Hydropower Company Limited (CHPCL).

The breakeven point including other income and expenses of BPC and CHPCL for five years is given below:

Table 4.22
Breakeven point of BPC including other income and expenses

year	Breakeven point				BEP Ratio
	In KWh	% change	In Rupees	% change	
2062/63	14,478,578.99	-	53,468,602.00	-	0.15
2063/64	24,320,932.35	67.98	95,674,721.23	78.94	0.25
2064/65	7,837,028.05	(67.78)	32,822,386.33	(65.69)	0.08
2065/66	10,548,014.00	34.59	36,524,698.00	11.28	0.10
2066/67	14,321,241.00	35.77	41,852,632.00	14.59	0.13

Table 4.23

Breakeven point of CHPCL including other income and expenses

year	Breakeven point including other income and expenses				BEP Ratio
	In KWh	% change	In Rupees	% change	
2062/63	51,334,527.55	-	301,167,986.00	-	0.37
2063/64	35,500,599.82	(30.84)	221,853,644.90	(26.34)	0.25
2064/65	28,647,079.93	(19.31)	176,542,224.20	(20.42)	0.20
2065/66	30,578,652.00	6.74	195,624,214.00	10.81	0.28
2066/67	29,524,653.00	(3.45)	181,215,628.00	(7.37)	0.21

Figure: 4.13

BEP including other income and expenses of BPC & CHPCL (In KWh)

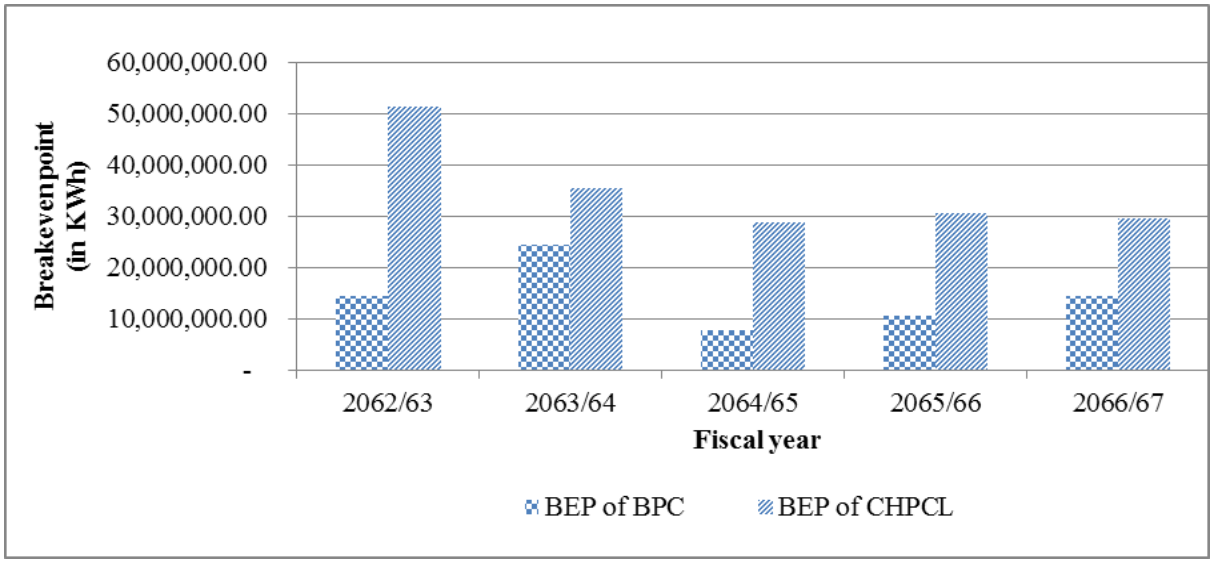
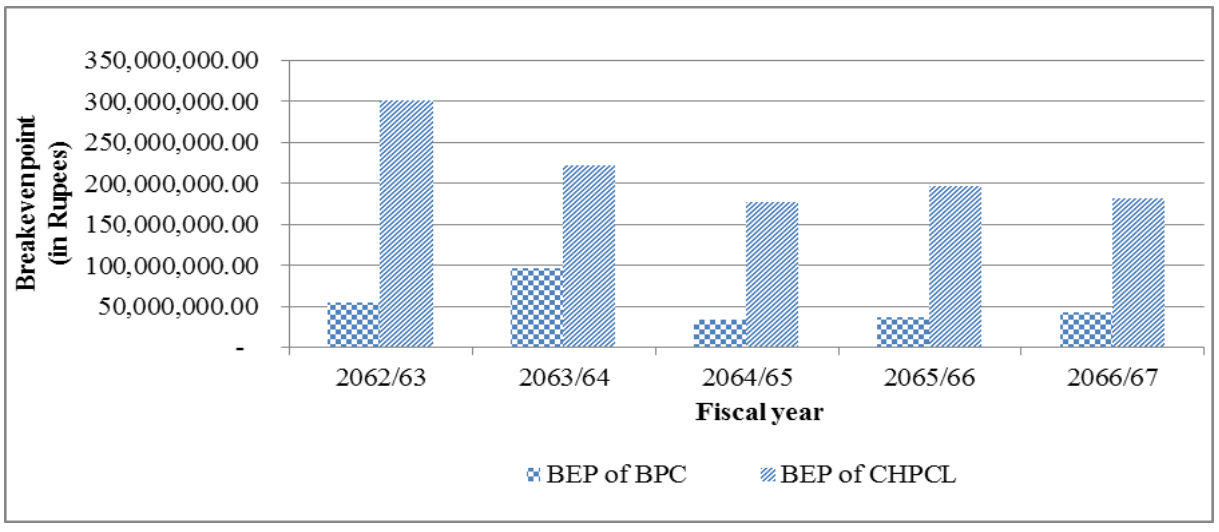


Figure: 4.14

BEP including other income and expenses of BPC & CHPCL (In Rupees)



The above presented table shows that BEP of BPC is far less than BEP of CHPCL in terms of units and rupees. The other income of the company reduces the breakeven point where as the other expenses increase the BEP point. The other net income (difference of other income and other expenses) increases or reduces the BEP under other income and expenses. The BEP of BPC is fluctuating every year due to fluctuating every year due to fluctuation in net income. The other net income of BPC is found much higher than CHPCL. The BPC of CHPCL is found decreasing every year regarding both units and rupees due to decreasing fixed cost and other net income. The company having low BEP under this shows that it has more other net income. The company having low BEP under this shows that it has more other income. The other incomes helps to make up operating loss and reduces BEP points which helps to cover all the cost at smallest sales and these companies are more profitable. In case of BEP ratio, BPC has very low in comparison to CHPCL. It means it has more margins of safety and profit assuming sales unit and selling prices are constant.

Thus, BPC is more profitable than CHPCL in terms of BEP under other income and expenses as it has low BEP points in terms of unit and rupees including BEP ratio. The comparison of BEP of BPC and CHPCL can be seen from the following figure.

4.6.4 Break Even Price

Break even price means price per unit of product where cost per unit of product is equal to selling price. Breakeven price is variable cost per unit plus fixed cost per unit. Break even pricing model helps to determine the minimum price to be set to cover the cost per unit. The remaining value is known as profit per unit. The detailed information about break even price is discussed in chapter two.

The break even price of BPC and CHPCL for five years is given in following table.

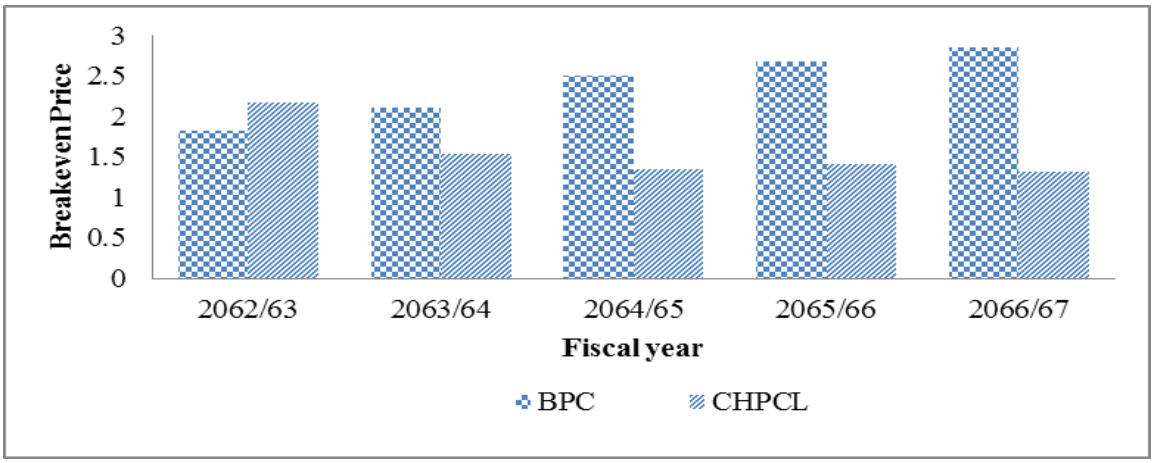
table 4.24
breakeven price & profit per unit

Year	Break even price & Profit per unit (PPU)					
	BPC	% change	PPU	CHPCL	% change	PPU
2062/63	1.83	-	1.89	2.18	-	3.69
2063/64	2.12	17.35	1.82	1.54	29.02	4.70
2064/65	2.51	18.69	1.67	1.35	12.83	4.82
2065/66	2.69	6.78	1.53	1.42	5.52	4.88
2066/67	2.85	6.24	1.43	1.32	(7.39)	4.86

The above table shows that BEP price of BPC is increasing whereas BEP price of CHPCL is found decreasing. In the beginning of the year the BEP price of CHPCL is higher than BPC but other years the BEP price of BPC is higher. Though the BEP price of CHPCL is greater than BPC, it has high PPU because the selling price of CHPCL is far higher than BPC. Considering the selling price as it is, CHPCL is more profitable in comparison to BPC as it make more profit per unit though it has more BEP price. But if we consider the identical selling price of both companies, BPC is more profitable as it has low BEP price which gives more PPU.

The table also shows that profit of CHPCL is almost double of the profit of BPC. The PPU of both company is found increasing every year except fall in last year due to rise in BEP price. The comparison of BEP price of BPC and CHPCL can be seen from the following figure.

Figure: 4.15
BEP price of BPC and CHPCL



2.7 Margin of Safety (MOS)

The margin of safety is the excess of budgeted (actual) sales over the break even sales volume. It defines the amount by which sales can be drop before losses begin to be incurred in an organization. The margin of safety shows the soundness and financial strength of the organization. It is an important indicator of the business vitality. If it is large enough there can be significant falling in sales and company will still able to generate profit. On the other hand, if the margin of safety is small, then any decrease in sales volume may cause a loss to the company. The margin of safety depends upon various factors as discussed in chapter two.

4.7.1 Margin of safety under Operating BEP

The margin of safety is the difference between sales and operating BEP. It is based on operating break even. It shows the operating margin of safety. The operating profit of the company is bases on this margin of safety. The margin of safety based on operating BEP point of BPC and CHPCL is given below.

Table 4.25
Margin of safety of BPC

Year	Margin of safety				Margin of safety Ratio
	In KWh	% change	In Rupees	% change	
2062/63	66,121,662.02	-	244,178,996.70	-	0.68
2063/64	60,323,106.38	(8.77)	37,304,525.10	(2.82)	0.62
2064/65	55,473,635.30	(8.04)	232,317,251.00	(2.10)	0.55
2065/66	54,625,859.00	(1.53)	229,365,425.00	(1.27)	0.54
2066/67	51,548,256.00	(5.63)	228,625,895.00	(0.32)	0.52

Table 4.26
Margin of safety of CHPCL

Year	Margin of safety				Margin of safety Ratio
	In KWh	% change	In Rupees	% change	
2062/63	87895363.19	-	673,987,978.50	-	0.8226
2063/64	108967841.3	9.49	786,180,119.00	16.65	0.8701
2064/65	110398992.9	1.31	785,453,949.50	(0.09)	0.9028
2065/66	101235251.5	2.41	788,655,289.00	0.41	0.9115
2066/67	95263548	1.53	92,548,725.00	0.49	0.9256

The comparison of MOS under cash breakeven of BPC and CHPCL can be seen from the following figure:

Figure: 4.18
Margin of Safety under Operating BEP of BPC and CHPCL (In KWh)

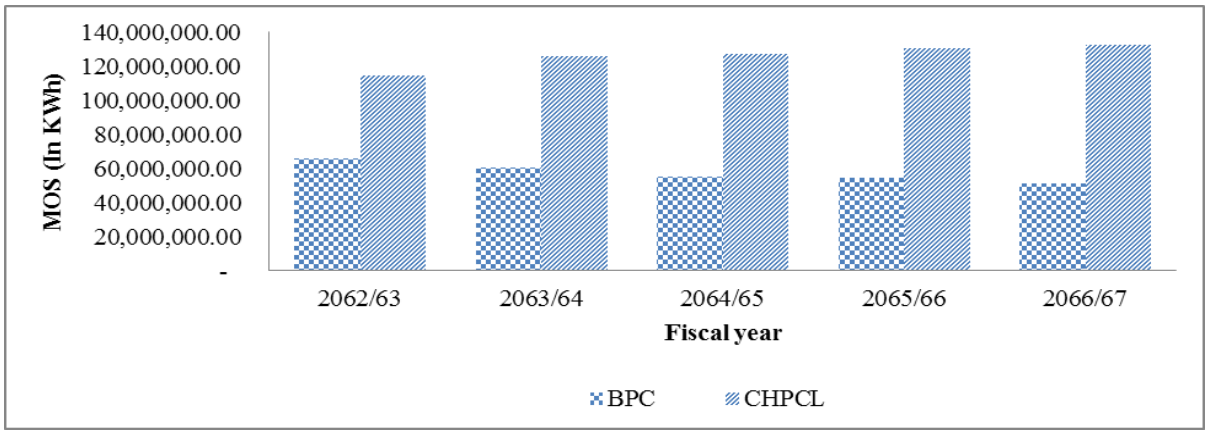
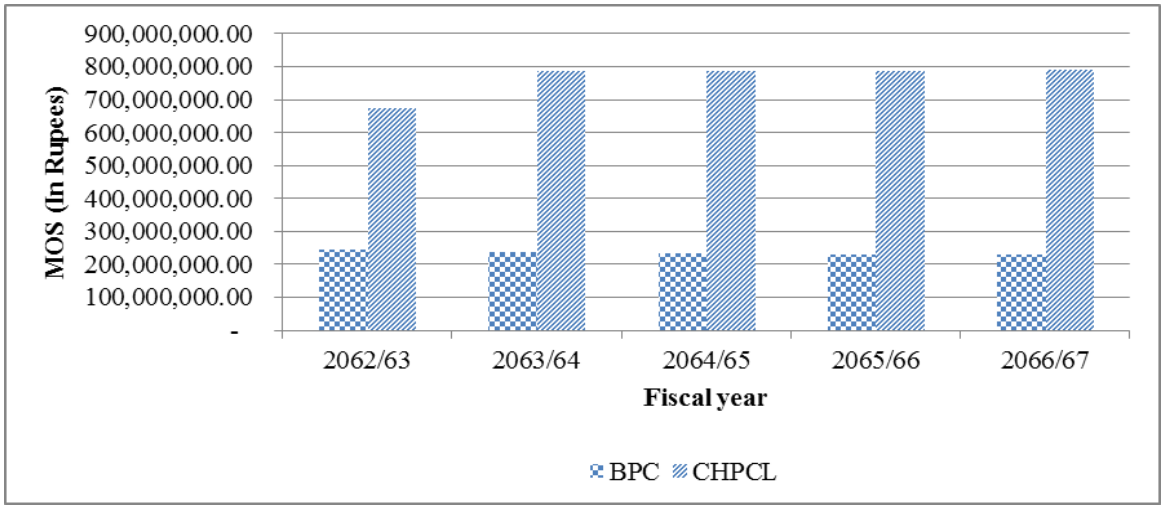


Figure: 4.19

Margin of Safety under Operating BEP Of BPC and CHPCL (In Rupees)



The above presented table and figure show that MOS of CHPCL is much higher than MOS of BPC. It is higher than in case of MOS under operating BEP. The MOS of CHPCL is found increasing. The fluctuation in cash break even causes fluctuation in MOS. The highest MOS of BPC is 66,121,662.02 KWh in 2062/63 where cash breakeven is minimum. The margin of safety ratio of BPC is almost greater than 52%. Similarly, MOS of CHPCL is increasing every year due to decrease in cash breakeven. The highest MOS recorded up to this date is 132522544.00 KWh in 2066/67 where cash breakeven is minimum. The Margin of safety ratio of CHPCL has reached to 92.56% which saves large amount of profit for the organization. Generally, the company having lager MOS under cash breakeven is considered more profitable. The MOS of CHPCL is higher than BPC in terms of unit, rupees and ratio so it is more profitable. But, the having high MOS in units may not generate high profit. There is also need of high selling price. CHPCL also high average selling price which in terms increase the MOS in rupees and generate more profit. Although this MOS helps to find out the profit of the company, it shows the real profit of the company because non-cash expenses are not included.

4.7.3 Margin of safety under other income and expenses

This margin of safety is determined to know the margin of safety including total income and expenses. It depends upon other income and expenses. The other income helps to reduce the quantity to the breakeven point which increases the margin of safety, whereas, other expenses increase the quantity to reach the break even point which decreases the margin of safety. The company having greatest net other income (other income- other expenses) will have low BEP and high margin of safety.

The margin of safety under other income and expenses is given in following table:

Table 4.30

Margin of safety of BPC

Year	Margin of safety				Margin of safety Ratio
	In KWh	% change	In Rupees	% change	
2062/63	82,577,773.01	-	304,950,514.00	-	0.8508
2063/64	72,491,936.65	(12.21)	285,174,788.80	(6.48)	0.7488
2064/65	92,852,694.95	28.09	388,865,106.70	36.36	0.9222
2065/66	96,854,265.00	4.31	392,124,586.00	0.84	0.8725
2066/67	104,215,362.00	7.60	409,280,645.45	4.38	0.8256

Table 4.31

Margin of safety of CHPCL

Year	Margin of safety				Margin of safety Ratio
	In KWh	% change	In Rupees	% change	
2062/63	88,335,272.45	-	518,246,853.60	-	0.6325
2063/64	109,082,470.20	23.49	681,687,147.60	31.54	0.7545
2064/65	112,528,920.10	3.16	693,472,302.80	1.73	0.7971
2065/66	114,528,642.00	1.78	701,248,741.00	1.12	0.8125
2066/67	115,625,846.23	0.96	709,128,459.00	1.12	0.8362

Figure: 4.20

MOS of BPC and CHPCL in KWh

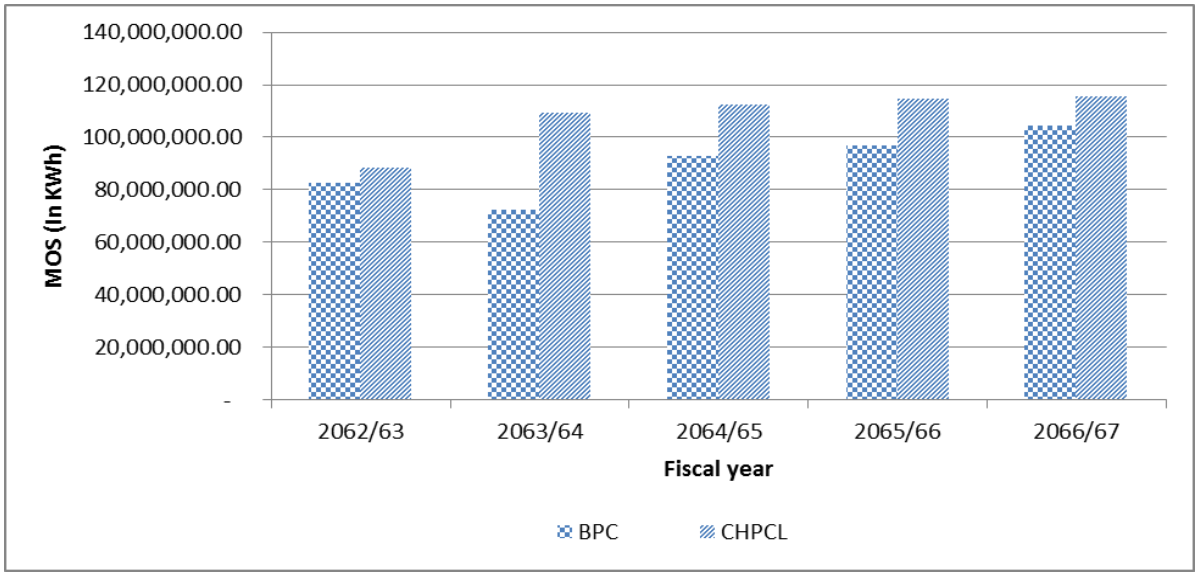
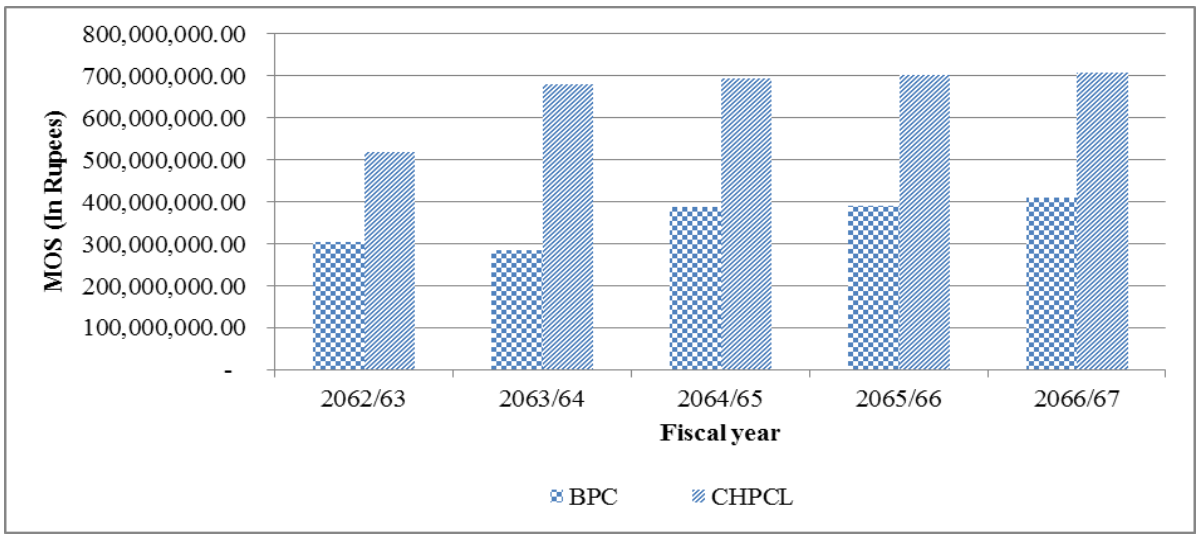


Figure: 4.21

MOS of BPC and CHPCL in Rupees



The above presented table and figure show that there is no much difference between Margin of safety under other income and expenses of BPC and CHPCL as in case of other margin of safety. The net other income reduces BEP which increases MOS and simultaneously profit will be increases. The highest MOS of BPC is found in 2066/67 due to high net other income. The MOS in rupees is found highest in this year. The MOS ratio of BPC is higher in

2064/65. The MOS of CHPCL is similar to the MOS under operating BEP and less than MOS under cash break even. The highest MOS in KWh of CHPCL is found in 2066/67, where the MOS in rupees is also highest. The MOS of CHPCL is greater than BPC every year. Although the MOS ratio of CHPCL is less than BPC. It has high MOS is term os both units and rupees. The reason is high sales units and selling price. If we compare the MOS with same sales unit, the MOS of BPC will be greater than CHPCL in terms of KWh due to high MOS ratio but it is less in terms of rupees because of high selling price of CHPCL. Similarly, if we compare the MOS with same sales unit and selling price, the MOS of BPC will be greater than CHPCL in terms both KWh and Rupees. Thus, CHPCL is more profitable then BPC in terms of MOS under other income and expenses though the net other income of BPC is much greater than CHPCL.

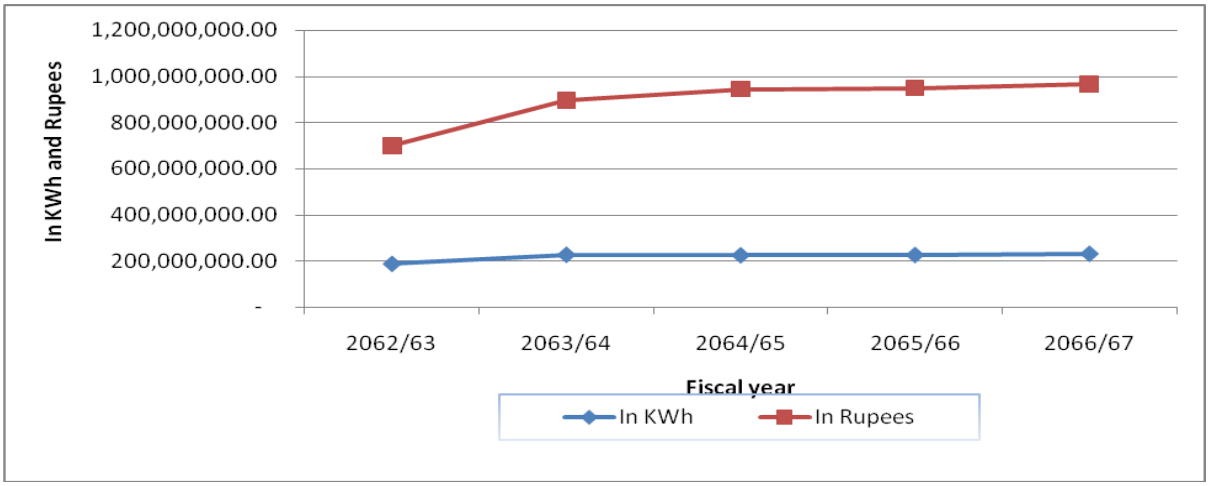
4.8 Target operating profit analysis of BPC and CHPCL

Target profit is the amount of net operating income that management desires to achieve in the operation of business. CVP analysis is used to determine the sales volume required to meet a target operating profit. CVP equation and formulas can be used for the determination of target profit as shown in chapter two. It shows what quantity of sales to be made to meet the required profit. As we know that table 4.13 and 4.14 shows more operating profit of CHPCL than BPC. The reasons for low operating profit of BPC are low generation capacity, sales and selling price. So, here we determine the target sales in units and rupees of BPC to meet the profit of CHPCL . the target of required sales for BPC to meet the operating profit of CHPCL for 5 years are given below:

Table 4.32
Required sale of BPC to meet operating profit of CHPCL

Year	Required sale of BPC to meet operating profit of CHPCL			
	In KWh	% change	In Rupees	% change
2062/63	188,889,278.50	-	697,557,796.30	-
2063/64	227,895,026.90	20.65	896,503,179.10	28.52
2064/65	225,748,732.70	(0.94)	945,461,987.50	5.46
2065/66	226,852,428.00	0.49	951,128,632.00	0.60
2066/67	232,254,415.00	2.38	968,256,358.00	1.80

Figure:4.22
Required sale of BPC to meet operating profit of CHPCL



As we know that the operating profit of BPC is much less than the operating profit of CHPCL so, required sales in units and rupees of BPC is determined to obtain the profit of CHPCL. The operating profit of CHPCL is much higher than BPC because of high sales unit and selling price. BPC needs to sales large amount of unit to make the profit of CHPCL as shown in above table. The reason in low contribution margin and high profit of CHPCL. The required sales of BPC to make a profit of CHPCL is more than 140% of present sales of BPC and more than 115% of present sales of CHPCL. The required sale in KWh is found increasing every year except in 2054/65. The reason of decreased required sales in 2064/65 is low profit of CHPCL and high contribution margin of BPC.

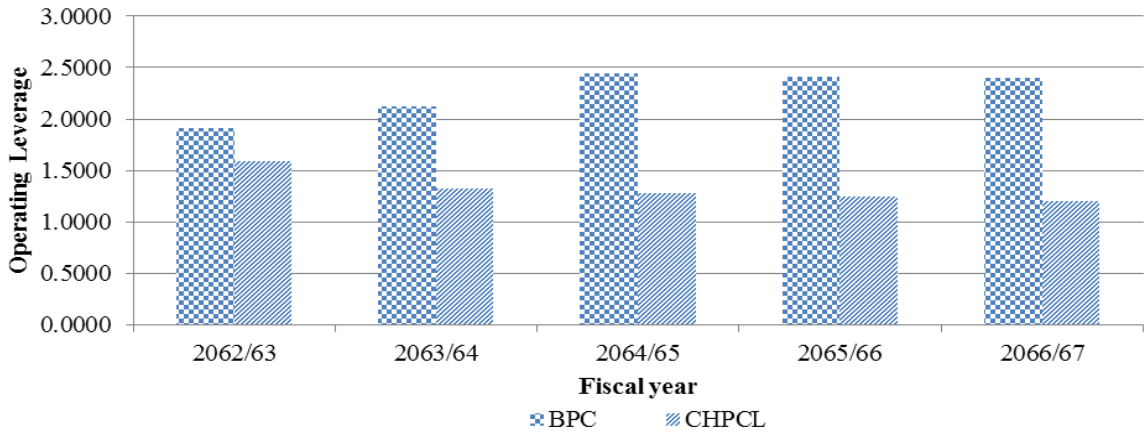
4.9 Operating leverage of BPC and CHPCL

Operating leverage results from the existence of fixed operating cost in the firm's income statement which is discussed earlier. It shows the potential use of fixed operating cost to magnify effects of changes in sales on the firm's operating income. It is a measure of risk and opportunity. Higher the degree of operating leverage also magnifies the risk of large losses with a decrease in sales. The operating leverage of BPC and CHPCL for five years is given below:

Table 4.33
Operating leverage of BPC and CHPCL

Year	Degree of operating leverage			
	BPC	% change	CHPCL	% change
2062/63	1.9165	-	1.5890	-
2063/64	2.1200	10.62	1.3268	(16.50)
2064/65	2.4436	15.26	1.2788	(3.62)
2065/66	2.4125	(1.27)	1.2465	(2.53)
2066/67	2.3968	(0.65)	1.1985	(3.85)

Figure: 4.23
Operating leverage of BPC and CHPCL



The above presented table shows that DOL of BPC is higher than DOL of CHPCL. Although the CHPCL has high sales it has low DOL due to high profit than BPC. The DOL fo BPC is fluctuating due to fluctuation in CM and Profit but the DOL of CHPCL is decreasing from 2064/65 due to decrease in both CM and fixed cost. The highest DOL of BPC is found in 2064/65 where the contribution margin is highest. Similarly highest SPL of CHPCL is found in 2064/65 where it has lowest profit. However CHPCL has lowest DOL in 2066/67 due to reduced contribution margin and fixed cost. As we know that the company having more DOL is considered more profitable. So, BPC is more profitable than CHPCL as its DOL is higher every year. But CHPCL is more profitable in terms of normal profit.

4.10 Sensitivity analysis

Economic Entities may use the CVP analysis ratio to estimate the business environment of the future management period and control their operations. These estimates includes changes of the sales price, the amount of the manufactured and sold goods, the variable production cost, the variable sales sales costs, the fixed sales and administration cost as well as their implication will be analyzed by the company manager. Sensitivity analysis is " What if" technique that manager uses to examine how a result will change if the original predicted data are not achieved or if an underlying assumption changes . in the context of CVP analysis, sensitivity analysis examines how operating income (or the breakeven point) changes if the predicted data for selling price, variable cost per unit, fixed cost of unit sold are altered.

Margin of safety, degree of operating leverage & what if analysis are the important aspects of sensitivity analysis. Margin of safety & degree of operating leverage are already discussed before. The "what if analysis" of BPC and CHPCL is discussed below. Today electronic spreadsheets are widely used to find the sensitivity of profit with CVP variable.

There are many questions relating to sensitivity analysis like

- What will be the effect on profit if the sales increase of decrease by 10%?
- What will be effect on profit if the variable cost increases by 10%?
- What will be the effect on operating profit if the fixed cost increases of decreases by 10%.
- What will be the effect on operating profit if both fixed and variable cost are reduced of increased at a time?
- These are some general questions about the company which can be easily solved by using spreadsheet. Some of the important sensitivity analysis of the company is given below
- What will be the effect on operating profit, BEP & MOS of BPC if the averages selling price fo BPC is equal to the price of CHPCL?
- What will be effect on operating profit, BEP & MOS of both companies if they are able to utilize their installed capacity?
- What will be the effect on operating profit, BEP & MOS of BPC if the variable cost per unit of BPC is reduced to the cost of CHPCL?
- What will be the effect on operating profit, BEP & MOS of Chilime Hydropower Company Limited (CHPCL) if the fixed cost of Chilime Hydropower Company Limited (CHPCL) is reduced to the level of BPC based on installed capacity?

Result of above questions

- If average selling price of BPC is equal to Chilime Hydropower Company Limited (CHPCL), the operating profit of BPC will increase by 97%, 107%, 106%, 139%, 163% in five years respectively. But this profit is still less than the profit of CHPCL due to high sales unit of CHPCL. The BEP in units decrease by 38%, 38%, 33%, 32% and 31% in five year respectively due to increase in selling price. However the MOS in Units increases by 34%, 42%, 47%, 48% and 50% in five years respectively.

- If the BPC is able to utilize its installed capacity (excluding internal consumption and transit loss), the operating profit of the company increases by 97%, 107%, 106%, 105%, 108% in tha five years respectively. There will be no changes in BEP of the company. However. The MOS in units of the company increases in the same operating profit of the company increases. In case of CHPCL the operating profit of the company increases by 63%, 47%, 50%, 50% and 41% in five years respectively. There are no changes in BEP in units of the company but the MOS in units of the company increases in same ratio as operating profit of the company increases.

- If the variable cost of BPC reduced is to the variable cost of CHPCL the operating profit of BPC increases by 4%, 4%, 4%, 5% and 5% in five years respectively. Although the variable cost is reduced, the profit is still less than CHPCL. The BEP of the company reduces by 2%, 2%, 2%, 14% and 30% in five year respectively. However, the MOS in units of the company increases by 2%, 2%, 3%, 26% and 22% in five year respectively.

- If the fixed cost of CHPCL is reduced to the level of BPC based on installed capacity the operating profit of the company in increases by 16% in first year. However the operating profit is found decrease in other year by 5%, 19%, 11% and 11% respectively. The BEP in units of the company decreases by 27%. However, it increases by 17%, 69%, 71% and 63% respectively in second, third, forth and fifth year respectively. The MOS in units of the the company increases and decreases in the same ratio as the operating profit fluctuates.

(source: Appendix IX)

The above presented questions focus on what will be the effect on operating profit, BEP in units & MOS in units of the company if there is a change in related CVP variables of both the companies.

4.11 Major Findings

The major findings of the study are listed below:

- The generation of electricity from the both company is found increases every year during five years of operation. This shows the CHPCL is more effective in terms of capacity utilization.
- BPC and CHPCL sales electricity to NEA under Power Purchase agreement (PPA). However, BPC also sales electricity to local consumer. The sales of CHPCL is far greater than sales of BPC i.e. greater than 38328153 KWh in 2062/63 and difference is increasing every year. Even in total sle the sales of CHPCL is far greater. The sales revenue of CHPCL is almost double in five years of operation. The BPC is only able to meet the target sales of 85 KWh in 2064.65 where CHPCL is meet the targeted sales. Although the price is set by NEA, the average selling price of CHPCL is far greater than BPC.
- The fixed cost of CHPCL is much greater than BPC. The highest fixed cost of CHPCL is found in 2062/63 and is decreasing. Similarly the fixed cost of BPC is increasing and reached to Rs. 367015939.55 in 2066/67. The variable cost of BPC is much higher than of CHPCL. The highest variable cost of BPC and CHPCL is identified in 2066/67. In terms of total cost, the cost of CHPCL is much higher than BPC.
- The contribution margin of both the company is increasing due to increase in sales volume and average selling price in comparison to variable cost per unit, except decrease in 2065/66 and 2066/67 of BPC. The contribution margin of CHPCL is almost double of more than that of BPC. The CM ratio of BPC is about 97% whereas of CHPCL is 99%.
- Although, the fixed cost of CHPCL is much higher than BPC it has high operating profit due to high sales unit and average selling price. The operating profit of BPC is found decreasing during the operating year due to increase in Fixed cost. The operating profit of CHPCL is found

increasing except decrease in 2064/65 due to decrease in sales unit and average selling price.

- The net profit of both the company is higher than operating profits due to net other income. There is not much difference between net profits between two companies in comparison to operating profit as BPC has high net other income than CHPCL. The net profit of BPC is fluctuating due to fluctuation in net other income and reached to Rs. 256322074.45 in 2066/67 whereas the net profit of CHPCL is increasing and reached to Rs. 718247597.00 in 2066/67.
- The operating BEP of BPC is found increasing in terms of both KWh and Rupees whereas the operating BEP of CHPCL is found decreasing in terms of both KWh and Rupees in first three year except decrease in last two years. The lowest BEP in KWh of BPC is recorded in 2062/63 where the operating profit is maximum. Similarly, the lowest operating BEP in KWh of CHPCL is recorded in 2064/65 where the operating profit is maximum. The operating BEP ratio of BPC is not consistent whereas the Operating BEP ratio of CHPCL is consistent in terms of decreasing.
- The cash breakeven point of BPC in terms of KWh is much greater than CHPCL due to high non cast fixed cost of CHPCL. The cash breakeven point of BPC is found increasing in terms both KWh and Rupees whereas cash breakeven point of CHPCL is found decreasing. The lowest cash breakeven point of BPC in KWh is recorded in 2066/67 where the operating profit is maximum whereas the lowest cash breakeven point of CHPCL is found in 2066/67 where the operating profit is maximum. Similarly, the lowest cash breakeven in rupees of BPC is found in 2062/63 whereas of CHPCL in 2066/67 but operating profit of both the company is not maximum at this point. The cash breakeven ratio of BPC is not consistent whereas cash break even ratio of CHPCL is consistent in terms of decreasing.

- The breakeven point of BPC including other income & expenses is far less than the breakeven point of CHPCL in comparison to other BEP as it has high net other income which reduces the operating BEP. The BEP under other income & expenses of BPC in KWh is fluctuating whereas of CHPCL is decreasing. The lowest BEP of BPC in KWh & Rupees is found in 2062/63 but the net profit if not maximum at this point whereas the lowest BEP in KWh and Rupees of CHPCL is found in 2066/67 where the net profit is maximum. The BEP ratio of BPC in not consistent whereas of BEP ratio of CHPCL is consistent in terms of decreasing.
- The breakeven price of BPC is found increasing due to increase in fixed cost per unit. However, the breakeven price of CHPCL is found decreasing due to decrease in fixed cost per unit. The breakeven price of BPC is greater then CHPCL in last two years of operation due to high fixed cost per unit of BPC. BPC has high operating profit where the breakeven price is minimum but operating profit of CHPCL is not high at this point.
- The MOS under operating BEP of BPC is found decreasing in both KWh and Rupees whereas of CHPCL is found increasing in terms of both KWh and Rupees except decrease in last two years. The highest MOS of BPC is found in 2062/63 (66121662.02 KWh and Rs. 244178996.70). Similarly, the highest MOS of CHPCL is found in 2064/65 (101235251.50 KWh) but MOS in terms of rupees is highest in 2066/67 (Rs. 792548725.00) due to high average selling price and sales volume.
- The MOS under Cash BEP of both companies is far greater MOS under Operating BEP due to high non-cash expenses. The MOS under cash BEP of CHPCL dominates the BPC. The highest MOS under cash BEP of BPC is recorded in 2062/63 (66121662.02 KWh and Rs. 244178996.70) whereas of CHPCL is 132124859 KWh and Rs. 795925415.00 in 2066/67.

- The MOS under other income & expenses of CHPCL is also found greater than BPC besides high net other income of BPC. The MOS under other income of BPC is fluctuating due to fluctuation in net other income and reaches to 50152426.00 KWh in 2066/67. Similarly, the MOS under net other income is increasing & reach to 132124859.00 KWh in 2066/67 as highest. The net profit of both company is highest at this point.
- As the operating profit of CHPCL is found greater than BPC. So, a required sales of BPC is determined to reach the operating profit of CHPCL. The required sales in KWh & Rupees in found increasing due to increase in fixed cost and operating profit of CHPCL. However it is decrease in terms of KWh in 2064/65 due to decrease in operating profit of CHPCL & increase in contribution margin per unit of BPC.
- Operating leverage of both companies is determined to identify the sensitivity of profit with sales. The operating leverage of BPC is found greater than CHPCL. It means that operating profit of BPC is more sensitive towards sales than CHPCL. The operating leverage of BPC is fluctuating but it is still more than 2 whereas of CHPCL is found decreasing due to increase in operating profit more than contribution. The operating leverage of BPC is recorded in 2066/67 (2.3968). However, in terms of Net profit the operating leverage of CHPCL is greater than BPC due to high net other income of BPC. Although the operating leverage is decreasing is decreasing, but it is still greater than BPC.
- Lastly, 'What-if analysis' of both the company is done to identify the sensitivity of profit with various changes in CVP variables like fixed cost, variable cost, selling price, sales volume and their effect on profit. It shows that there is positive correlation between cost and BEP and negative with MOS. It identifies negative correlation between selling price and BEP and positive with MOS. There is positive relation between sales and BEP and MOS depending upon BEP ratio and MOS ratio. It is discussed under topic sensitivity analysis.

CHAPTER V
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

Nepal is predominantly an agricultural country and about 80% of economically active population is engaged in agriculture. Still about 80% of energy need of the country is meet by the traditional energy sources as fuel wood, agro residue and animal dung, although it is second richest country in water resources in the world. It is estimated that only 40% of the total population has access to electricity through different sources like national grid, isolated small and hydropower system as well as solar home system so far. Although, Nepal has 43000 MW of economically feasible hydropower potential, it has only 750 MW of installed capacity in it Integrated Nepal Power System (INPS). Nepal Electricity sector is dominated by public sector, Nepal Electricity Authority (NEA) which is monopoly buyer of electricity of electricity. However, the New Hydropower policy 2001 seeks to promote private sector investment in the sector of hydropower development and aims to expand the electrification within the country and export. Among the various private hydropower, CHPCL and BPC are two huge hydropower on which the study is confined.

Profit making is the main drive for the operation of business organization which is not an easy task. Profit is a result of proper planning and effective used of available resources. Profit planning & control is an important tool in management accounting to plan the profit. Without planning the cost, volume, price and profit, the estimation of profit is not possible. Cost volume profit analysis is a useful forecasting as well as managerial control tool under profit planning and control to study interrelationship among cost, volume and profit. The key factor involved in CVP analysis include the revenues derived from the sales price charged for goods and services, the fixed and variable cost, the sales volume, the mix of products, the speed and quantity of production and the

resulting profits. The techniques express interrelationship of the key variables in CVP analysis which provides a general economic activity model which may be used by managers to make short term forecasting to access company performance and to analyze decision making alternatively. The main objective of this research is to examine the use of cost volume profit analysis in Hydropower Company representing CHPCL and BPC. The focus of the study is to identify cost structure, sales volume, selling price, and their relation including break even analysis & margin of safety analysis for profit planning. The study is mainly based on secondary source of dater from 2062/63 to 2066/67 for analysis. The descriptive and analytical approaches were used through the study. The whole study is divided into five chapters including introduction, review of Literature, Research Methodology, Data presentation and analysis and summery, Conclusion and Recommendation.

CVP analysis under this study aims to determine sales, cost structure, contribution margin, effect of other income & expenses, operating Breakeven point, cash breakeven point, cost breakeven point, Margin of safety under income and expenses, operating leverage and Sensitivity analysis. The research study shows that generation and sales of both CHPCL and BPC is increasing. Although the fixed cost of CHPCL is far greater then BPC, it has low variable cost. Both the company is unable to utilize their full installed capacity due to various technical and policy problem. The contribution margin of CHPCL is far greater than BPC due to high sales volume and average selling price which is the main element in CVP analysis ofr planning profit. Hence, CHPCL make huge operating profit than BPC in spite of high fixed cost. Besides, the sales business BPC make huge amount of income from other source which are sometimes greater than operating profit and huge contribution to net profit. CHPCL also generate income from other sources but not as BPC. Although the other income of BPC is far greater than CHPCL it has low net profit. As the proportion of fixed cost is very high in Hydropower Company it requires a huge quantity to cover their cost. The operating breakeven point of BPC in

KWh and Rupees is increasing due to increase in fixed cost whereas breakeven point of CHPCL is decreasing due to decrease in fixed cost. This shows that operating margin of safety os safety of BPC is decreasing whereas of CHPCL is increasing. However, the huge net other income of BPC has reduced BEP to great extent which increases margin of safety and thus profit increases. The operating profit of BPC is more sensitive to sales as shown by operating leverage but the net profit of CHPCL is more sensitive. The sensitive test of cost volume profit shows that there is positive correlation between cost and BEP and negative correlation between selling price and BEP and just opposite relation with Margin of safety. Similarly various tests have been done regarding changes in cost, volume, price & profit on BEP, MOS & profit.

5.2 Conclusions

To conclude, with separating fixed and variable cost helps gathering relevant cost related information useful in short term dicision making, such as for instance profit estimate for following 'time interval'. But such practices of segregating cost has not found in CHPCL and BPC. It is concluded that the prognostic production, sales and administration costs and of the future income of the various business units of the company as well as the use of decision making techniques based on relevant cost are possible only a variable costing system approach, since profit is often inaccurately shown in full costing system. As we know that variable costing approach is base for CVP analysis which is not found in both companies. For the research study cost has been segregated into fixed and variable cost under certain assumption based on other hydropower company. No any scientific measures are used to segregate cost. Although there is no formal application of CVP analysis in both companies, the research study aims to use CVP tools in decision making and planning regarding sales volume, prices, cost and profit.

The product of hydropower is energy which is not freely available in the market. It is generated at one place and transmitted to other through national

grid. Their prices are not determined as other produce by demand and supply situation. Its price and production is highly influenced by government. Nepal Electricity Authority (NEA) is a monopoly buyer in Nepal and effect the pricing of the product through Power Purchase Agreement (PPA). Thus, there is problem regarding the use of CVP analysis. However, after using and analyzing the tools of CVP analysis in CHPCL and BPC following information has been concluded based on major findings.

- There is no practice of classifying cost into fixed and variable. Both the companies are not preparing direct costing. However, after classifying cost under certain assumption, fixed cost of CHPCL is higher than BPC whereas Variable cost of BPC is higher than CHPCL.
- Although the generation and sales of both companies are increasing, they are unable to meet their installed capacity. This shows that there is improvement regarding capacity utilization. The generation and sales of CHPCL is far greater than BPC.
- The average selling price of CHPCL is found greater than BPC. CHPCL has been awarded extraordinary purchases rate. This shows that the process of PPA lacks transparency.
- The Contribution margin per unit and CM ratio of CHPCL is in increasing trend whereas of BPC is fluctuating. The CMPU and CM ratio of BPC is less than CHPCL due to low average selling price and high variable cost per unit.
- The cash breakeven point of BPC is increasing whereas of CHPCL is decreasing due to increase in non cash expenses of CHPCL. CHPCL can cover it cash expenses only by selling small portion of sale volume. This shows that CHPCL is more efficient in terms of cash cost coverage.
- Due to net other income, BEP of both the company is reduced. But BEP of BPC is reduced to great extent because of huge net other income. This shows that BPC can easily cover its fixed cost even if there is major break down in the operation with other income.

- The breakeven price of CHPCL is found decreasing whereas of BPC is increasing. Similarly, the profit per unit of BPC is fluctuating but far less than CHPCL, where its PPU is increasing. This shows that CHPCL can achieve more competitive edge in terms of pricing.
- The margin of safety under operating BEP of CHPCL is far greater than BPC and is in increasing trend. The MOS ratio of BPC is nearest to 50% whereas of CHPCL is more than 50%. This illustrate that CHPCL has more units to generate profit and is more efficient.
- The MOS under cash BEP of BPC and CHPCL is far greater than MOS under operating BEP due to high non cash expenses. But MOS of CHPCL is about double of the BPC due to high non cash expenses than BPC.
- The net other income of both company has sufficiently increases the MOS of both company. But MOS of BPC is highly increased than CHPCL. This shows that both companies may still have MOS even if there is hindrance in generation with other income but not in comparison to BPC.
- Required sales to meet the operating profit of CHPCL shows the BPC requires to generate and sales huge quantity to reach its profit level. Required quantity cannot be achieved even if the company is at the full utilization. But required sales are highly decreased if net profit is to be achieving due to high net other income.
- The study concluded that the operating profit of BPC if more sensitive towards sales than CHPCL i.e. more than double. But the net profit of CHPCL is more sensitive towards sales. Hence, considering the same level BPC is more efficient in terms of operating leverage whereas CHPCL is more efficient for leveraging net profit.
- The sensitivity analysis effect on Breakeven and Margin of safety proves that if selling price increase BEP decreases whereas MOS increases for both companies and vice versa. Similarly, if variable and

fixed cost decreases BEP decreases and MOS increases for both company and Vice versa. Sales volume has positive effect on BEP and MOS analysis depending upon BEP ratio and MOS ratio.

5.3 Recommendations

If there is one sector that can solve all the burning problem of the country unemployment, poor economy, poor relation with neighbor, it could be hydropower development in which Nepal has a huge potential. Currently, the only reason Nepal is sinking into poverty is political instability and poor governance. Nepal is unable to identify its potential that is why it is facing the present situation. Instead it was trying to move up in the field of garment, vegetable oil, carpet export, which all led to its failure. Any country for its development should focus on the sector in which it has immense potential. Like the gulf country can never hope to develop water resources but petroleum.

Hydropower is Nepal's finest resources in terms of social, infrastructural, economic and overall development of the country. It is a real solution to unemployment and poverty in the country. 1 MW power plants nearly employs 3500 people. Nepal has more capability. Bigger market and it's HP is internationally more sale salable. Nepal has more opportunities but they have no materialized due to failure execution. The local people and other stakeholders are equally responsible for aggravating the energy crisis in the country along with the government. HP being a commercially viable sector, the government should just focus on making encouraging policies. If the policies are good, the HP sector will automatically flood.

The immediate step that needs to be undertaken are to revise the present policy and issue the policy which are more encouraging for private sector investment for hydropower sector because this sector will be limited with the rise of other renewable energy sources like solar power. Nepal Electricity Authority (NEA) which has three mandates to build transmission lines, distribute electricity to the consumer and generate electricity is not fulfilling its mandate which is the

hindrance in development of Hydropower sector. Hence its responsibility should be divided regarding transmission, distribution and generation. Although there are many hydropower company in operation but this sector is not developed as it should be due to various policy problem which needs to be revised.

In regard of Hydropower industry Chilime Hydropower and Butwal Power Company are two giant companies on which study in focused. The study performs the Cost Volume Profit analysis in these two companies and drawn the various conclusions as discussed above. On the basis of conclusion following suggestion and recommendation are outlined.

- The first and most important recommendation regarding this study is to practice CVP analysis as profit planning tool by every hydropower company to accelerate profit.
- The company should prepare direct costing which is based on those cost that are closely and directly connected to the operation volume. This method is more than a cost calculation. It is short term earning calculation method, which makes these cost a useful company management tools.
- The average load factor of both companies is far less i.e. about 30% installed capacity is unutilized. Both the company should control the major break down to utilize their maximum capacity.
- The internal consumption and transit loss of BPC is higher than CHPL. BPC should have control over such loses in order to reduce the difference of sales with CHPCL. This also helps to achieve the targeted sales to NEA.
- The average selling price of CHPCL is far greater than BPC. This shows that PPA is more in favor of CHPCL. The PPA procedure should be transparent and time bound. So that developers should not have to wait for the conclusion of PPA process for month.

- The aveerage selling price of BPC with NEA is greater than local consumer. So, BPC should focus on selling to NEA.
- As per the comparative analysis of cost, BPC has increasing cost trend which should be reduced to achieve higher profit in upcoming years, especially fixed cost which are in huge amount and increasing. Although the total cost of CHPCL is far greater than BPC it is decreasing. Effective cost control techniques should be practiced by both companies.
- BPC make huge amount of income of income from other sources which reduce the gap of profit with CHPCL to great extent. Thus, CHPCL should focus on increasing other income whereas BPC should focus on generation and sales business.
- BPC supplies excess energy to grid which should be reduced as it increases the sales of the company.
- BEP analysis shows that BEP of BPC is not satisfactory as it is in increasing trend but CHPCL is decreasing. It is highly recommended to BPC to operate at the BEP level of 46413553 KWh (2062/63) which is the lowest and operating profit is higher at this point. Similarly, CHPCL should maintain the BEP level of 30777007.11 KWh (2066/67) which is lowest and operating profit is highest at this point. BEP ratio of BPC should be reduced which is more than 50% and is increasing as it increases the risk level.
- The BEP price os CHPCL is more satisfactory than BPC as it is decreasing whereas of BPC is increasing. Low BEP price increases profit per unit of the company. BPC should focus on reducing BEP price as it affects the pricing strategy. BEP price highly reliance on fixed cost per unit which should be emphasized on minimizing.
- Operating margin of safety of BPC in not satisfactory as the MOS ratio is less then 50% which is the reason for low operating profit. Thus, the

BEP ratio should be reduced to increase the MOS ratio which increases the operating profit.

- MOS under other income and expenses of both companies is satisfactory as MOS ratio is more than 50%. Since the MOS ratio of BPC is greater than CHPCL, it is recommended to BPC to focus on other income source which helps to achieve the profit level of CHPCL without increasing the installed capacity.
- As the portion of fixed cost is very high in Hydropower Company, CHPCL can leverage the operating profit more than present situation by revising the cost structure. Similarly, BPC can leverage the net profit by changing cost structure.
- Both company has many project in pipeline which should be bring in operation as fast as possible because in the next 10-15 years, the value of hydropower will be lessen with rise of other renewable energy sources like solar power, nuclear plant etc.
- Both the companies suffer largely from repair and maintenance problem which cause frequent breakdown of machine and reduces the average load factor. Such problem should be reduced by hiring expertise from right country.
- These companies are also recommended to focus on storage type project which reduces the power shortage during the dry season as Nepal suffers high load shedding during this season. There is only one dry season project which cannot meet the demand. This increases the sales and boosts the profit.
- Hydropower Policy should be frequently revised which provides more flexibility to private investors. The electricity should be brought under the open market system and the module of single buyer be eliminated. Free economic policy and free market policy of electricity tariff which gets fixed in the stock exchange as per demand are major reason that

India took more ahead in the energy sector besides HP development started later than Nepal.

- NEA's three mandate- generation unit, transmission unit and distribution unit and distribution unit should be divided or should undergo complete reform. Government should create autonomous organization for planning and operation of national and regional transmission grids to facilitate wheeling of energy.
- Nepal Rastra Bank should amend its policies to render hydropower sector to be priority sector with preferential treatment in terms of interest, pay-back periods etc. it should create environment for incremental domestic capital market and foreign capital for hydropower development. Securities should be provided at nominal cost.
- Government should create opportunities and condition for enhancing the technical and management capabilities related to hydropower in banks and also in private developers.

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APPENDICES

Appendix-III

Other income and Expenses of BPC and CHPCL from 2062/63 to 2066/2067

Particulars	**2062/63**	**2063/64**	**2064/65**	**2065/66**	**2066/67**
consultancy services	11498493	9534939	18893719	19502547	17465495
Electricity Services	5353062	3634632	6150567	6245689	7356652
Interest Income	13639148	15364708	16495059	17520326	18765256
Foreign currency exchange gain	7482601		18217263		30809400
Dividend Received	88036169	97981800	156894170	137802992	104842701
Gain on sale of Assets & Scrap Material			142834	601916	
Financial Support for training & technology transfer		2794454	3867516	3975245	4325652
depreciation being reserve portion of grant aid	6833272	6964097	5276103	6762468	7213652
KHP-I Preparation fee in share Income in share from Khudi Hydropower Ltd					
Other income	2448905	1461610	1981773	1698338	2896078
Total	135291650	137736240	227919004	194109521	193674886
Other expenses:					
consultancy services expenses	13692189	8774442	16743019	14852217	17625801
Foreign currency exchange loss		25740098		3651236	
Loss on sale of assets	6090660				607739
Total	19782849	34514540	16743019	18503453	18233540
Net other income	115508801	103221700	211175985	175606068	175441346

Appendix-IV

Fixed Cost of CHPCL from 2062/63 to 2066/2067

Year	2062/63	2063/64	2064/65	2065/66	2066/67
1. Cost Of Energy Sold					
Staff cost	9460674	11042781	16562253	17693382	18732027
Fuel & Mobil			112575	117918	177510
Machine & equipment main.	565075	1524137	984561	1085380	1641353
T/L repair & maintenance	17931	39278	40165	42185	153825
D/L network maitenance	74482	46237	102856	177894	264643
Royalty	17075676	19096554	17165255	17831788	17700927
Office overhead	13304993	21198930	20526051	24293038	23570986
2. Administrative Exp.					
Staff cost	2225120	3447211	5053527	6028247	10213450
Office overhead	18745879	13582097	15008952	15207734	22798736
Royalty	2210000	2210000	2210000	2210000	2210000
expenses W/O	55490701	1289877			
3. Depreciation	102819635	103786564	103567870	104732090	106217660
4. Interest expenses	81563356	45025223	0	0	0
Total	303553523	222288888	181334066	189419656	203681118

Appendix-V

Variable Cost of CHPCL from 2062/63 to 2066/2067

Year	2062/63	2063/64	2064/65	2065/66	2066/67
Fuel & mobile	149,900.80	124,754.44	135,856.45	143,574.32	158,267.28
Machine & equipment main.	376,716.85	1,016,091.19	986,524.25	1,125,265.28	1,355,528.78
Total	526,617.65	1,140,845.63	1,122,380.70	1,268,839.60	1,513,796.06

Appendix-VI

Variable Cost of CHPCL from 2062/63 to 2066/2067

particulars	2062/63	2063/64	2064/65	2065/66	2066/67
Other Income:					
Other Income	2,579,187.97	715,444.58	14,669,916.00	171,300.00	220,730.00
Gain on sale of assets				956,525.00	
Total	2,579,187.97	715,444.58	14,669,916.00	1,127,825.00	220,730.00
Other Expenses:					
Loss on sale of assets			1,553,612.00		856,856.32
Net Other income	2,579,187.97	715,444.58	13,116,304.00	1,127,825.00	(636,126.32)

Appendix-VII

Cash Break even Point of BPC

particulars	2062/63	2063/64	2064/65	2065/66	2066/67
Defferd expenses-miti. Work	5561309	2484860	2341804	2315256	2541679
Power plant expenses W/O	199921	1299815		1500279	1630428
Distribution expenses W/O	266939	600732	162862	312065	441685
Administrative expenses W/O		98034	597778	765298	985625
Depreciation	49958880	51923817	55102939	58365124	63528658
Total fixed cost (TFC)	167877821.2	196806215.6	243220809	265154624	284265264
Cash fixed cost	111890772.2	140408957.6	185015426	190265852	202652124
cash BEP in KWh	30934689.58	36489762.62	45248215	51174625	53652168
Cash BEP in Rupees	114240120.3	143544984.9	189504795	198964218	211846216

Appendix-VIII

Cash Break even Point of CHPCL

particulars	2062/63	2063/64	2064/65	2065/66	2066/67
Administrative W/O	55,490,700	1,289,877	1,289,877	1,289,877	1,289,877
Depreciation	102,819,635	103,786,564	103,740,008	103,250,125	103,325,165
Total fixed cost	303,553,523	222,288,888	189,527,888	177,854,268	172,689,346
Cash Fixes cost	145,243,187	117,212,446	84,498,003	75,689,146	71,248,587
Cash BEP in KWh	24,772,844	18,779,832	13,721,440	11,258,741	10,245,689
Cash BEP in Rupees	145,336,638	117,360,673	84,560,577	80,146,234	76,848,55

Sensitivity Analysis

Appendix-IX

1) if Average selling price of BPC is equal to CHPCL

particular	2062/63	2063/64	2064/65	2065/66	2066/67
AV SP of CHPCL	5.99	6.47	6.30	6.22	5.91
Sales volume	97,056,352	96,812,869	100,689,723	101,258,632	103,215,628.00
Sales Revenue	569,410,205	605,012,662	620,510,487	635,218,542	638,256,988.00
Variable cost	7,366,577	8,316,225	9,988,420	10,102,562	11,325,625.00
Fixed cost	167,877,821	196,806,215	243,220,809	250,154,216	252,124,325.00
New Operating profit	394,165,807	399,890,221	367,301,257	374,961,764	374,807,038.00
Old Operating profit	183,170,391	175,722,788	168,476,701	165,235,927	164,698,977.00
Difference	210,995,416	224,167,433	198,824,556	209,725,837	210,108,061.00
% change	115.19	127.57	118.01	126.93	127.57
CMPU	5.86	6.24	6.16	6.26	6.27
New BEP	28,989,936	31,931,436	40,112,941	42,152,135	43,625,899.00
Old BEP	46,413,553	51,146,395	59,483,188	61,254,214	63,582,956.00
Difference	1,742,361	19,214,958	19,370,246	19,102,079	19,957,057.00
% change	37.54	37.57	32.56	31.18	31.39
New MOS	68,066,415	64,881,432	60,576,781	58,625,124	57,325,668.00
Old Mos	50,642,799	45,666,473	41,206,534	40,152,958	39,652,658.00
Difference	17,423,616	19,214,958	19,370,246	18,472,166	17,673,010.00
% change	34.40	42.08	47.01	46.00	44.57

2) if both company is abler to utilize their installed capacity

i) If BPC is able to utilize its installed capacity.

particular	2062/63	2063/64	2064/65	2065/66	2066/67
Installed capacity	149796000	149796000	149796000	149796000	149796000
Internal Consumption	3588739	4320328	5291209	5365985	5401258
Sales volume	146207261	145475672	144504791	144412524	143215262
AV SP of BPC	3.69	3.93	4.19	4.61	4.92
Sales Revenue	539928794	572286746	605186065	665741736	704619089
Variable cost	11097131	12496360	14334875	15625325	16687725
Fixed cost	167877821	196806216	243220809	255377961	256877114
New Operating profit	360953842	362984170	347630380	394738450	431054250
Old Operating profit	183170391	175722788	168476701	165235741	163885997
Difference	177783451	187261382	179153679	229502709	267168253
% change	97.06	106.57	106.34	138.89	163.02
New MOS	99793708	94329277	85021603	83215432	81658921
Old MOS	50642799	45666474	41206535	38985246	36562143
Difference	49150909	48662803	43815068	44230186	45096778
% change	97.05	106.56	106.33	113.45	123.34

ii) If CHPCL is able to utilize its installed capacity.

particular	2062/63	2063/64	2064/65	2065/66	2066/67
Installed capacity	197625600	197625600	197625600	197625600	197625600
Internal Consumption	2348660	2119940	1619000	1628599	1601433
Sales volume	195276940	195505660	196006600	196005100	196112251
AV SP of CHPCL	5.87	6.25	6.16	6.12	5.72
Sales Revenue	1145650752	1221773521	1207910273	1199551212	1121762076
Variable cost	742052	1544495	901630	1256125	1524113
Fixed cost	303553523	222288888	189527888	175985754	171625854
New Operating profit	841355176	997940138	1017480755	1022309333	948612109
Old Operating profit	515334699	680111059	679843184	682628997	675112524
Difference	326020477	317829080	337637571	339680336	273499585
% change	63.26	46.73	49.66	49.76	40.51
New MOS	143502503	159890431	165229593	168332658	172448579
Old MOS	87895363	108967841	110398993	130524625	132522544
Difference	55607140	50922590	54830600	37808033	39926035
% change	63.27	46.73	49.67	28.97	30.13

3) If Variable cost of BPC is reduced to the level of CHPCL

particular	**2062/63**	**2063/64**	**2064/65**	**2065/66**	**2066/67**
AV SP of BPC	3.6929	3.9339	4.1880	4.5190	4.7629
VC/ Unit of CHPCL	0.0038	0.0079	0.0046	0.0058	0.0123
Sales volume	97056352	96812869	100689723	82990000	81440000
Sales Revenue	358419402	380852145	421688560	415852698	420825714
Variable cost	368814	764822	463173	453269	461258
Fixed cost	167877821	196806216	243220809	251065967	36701594
New Operating profit	190172767	183281108	178004578	164333462	383662863
Old Operating profit	183170676	175725423	168477768	162708666	344088182
Difference	7002091	7555685	9526810	1624796	39574681
% change	3.8229	4.3013	5.6553	0.9986	11.5013
CMPU	3.6891	3.9260	4.1834	4.2100	4.2000
New BEP	45506444	50128939	58139506	59875258	61255663
Old BEP	46413553	51146395	59483188	70332922	87395689
Difference	907109	1017456	1343682	10457664	26140026
% change	1.954	1.989	2.259	14.869	29.910
New MOS	51549908	46683930	42550217	40265885	40009258
Old MOS	50642799	45666474	41206535	54625859	51548256
Difference	907109	1017456	1343682	14359974	11538998
% change	1.7912	2.2280	3.2608	26.2879	22.3848

4) If Fixed cost of CHPCL is reduced to the level of BPC based on Installed capacity

particular	2062/63	2063/64	2064/65	2065/66	2066/67
AV SP of CHPCL	5.9900	6.4700	6.3000	6.2200	5.9100
VC/ Unit of CHPCL	0.0038	0.0079	0.0046	0.0059	0.0123
Fixed cost of BPC	167877821	196806216	243220809	281065967	367015940
Installed capacity of BPC	149796000	149796000	149796000	149796000	149796000
Installed capacity of CHPCL	197625600	197625600	197625600	197625600	197625600
FC of CHPCL based on Installed capacity of BPC	221480915	259646095	320880787	325625878	335221445
Sales volume	136328395	139650818	138165844	142127000	150110000
New Operating profit	597403122	642754678	548481021	621452154	615265481
Old Operating profit	515334699	680111059	679843184	682628997	675112524
Difference	82068423	37356380	131362163	61176843	59847043
% change	15.9253	-5.4927	-19.3224	-8.9600	-8.8600
CMPU	5.8630	6.2414	6.1581	6.2623	6.2745
New BEP	37776039	41600618	52107109	54114298	55889652
Old BEP	51774437	35615229	30777007	31584625	34254124
Difference	13998398	-5985389	-21330102	-22529673	-21635528
% change	27.037	-16.806	-69.305	-71.331	-63.162
New MOS	101893761	102982452	89068891	90524159	85253856
Old MOS	87895363	108967841	110398993	101235252	95263548
Difference	13998398	-5985389	21330102	-10711093	-10009692
% change	15.926	-5.493	-19.321	-10.580	-10.507