

CHAPTER - I

INTRODUCTION

1.1 General Background

Every business organization has limited resources. The main problem lies in better utilization of available resources so that competitive advantages can be achieved. Among the various tools and techniques, management accounting tools have proved beneficial in every aspect of management activities from planning to decision making. Cost volume Profit is most important management accounting tool that have been developed to facilitate effective performance of the management process. It is function of analyzing relationship between cost-volume and profit to explore realistic result and decision. PPC is an advance decision of expected achievement based on the most efficient operating standard in effect or in prospect at the time it is established against which actual accomplishment is regularly compared.

CVP analysis is a systematic method of examining the relationship between changes in activity (i.e. output) and changes in total sales revenues expenses and net profit. As a model of these relationships CVP analysis simplifies the real world condition that a firm will face. Like most model, which are abstractions from reality, CVP analysis is subject to a number of underlying assumptions and limitations. Nevertheless, it is a powerful tool for decision making, in certain situations (*Drury, 2000:235*).

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. The alternative energy resources including hydropower have some important advantage such as being sustainable, renewable, environmentally friendly and clean resources. Hydropower or 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 greenhouse gases (GHG) emissions, other pollutants or wastes associated with fossil fuel or 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 or European 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 hydro power is cheap as once a dam has built and the equipment installed, the energy source flowing water is free. Hydropower plants are long loved and their maintenance cost is low as compared to coal or nuclear plant.

Hydropower's low costs, near zero emission and ability to be dispatched quickly to meet peak electricity demand have 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 or under consumption around the world. Energy information administration (EIA), office of energy market (2007-09) 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 billion 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 hydroelectric power 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 gas, 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 term of water resources after Brazil on global scenario. Nepal has more than 6000 rivers and rivulets with the total length of about 45000km. 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 43000MW is economically exploitable. According Nepal Electricity Authority (NEA), the current installed capacity of hydropower is 652 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 1% 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 500KW Pharphing power plants in 1911. In 1936 the 640 KW Sundarijal Hydropower plant was commissioned and in 1965 the 2.4 Mw Panouti Hydropower plant was installed. The 92 MW Kulekhani Hydropower plant (I& II) commissioned in 1982 is the only project offering seasonal water storage in Nepal. The 144 MW Kaligandaki-A, hydropower project, commissioned in 2003 is the biggest hydropower project in Nepal so far. The 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 (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 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 resources Act 1992/Regulation 1993, Electricity Act 1992/Regulation 1993. The Hydropower policy 1992 and other related Act provide excellent

incentives to develop 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 decades, on October 2001, new Hydropower Policy 2001 came into existence. This 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 12.3MW Jhimruk Project in 1994. Today, there are many Independent Power producers (IPPs) under domestic and foreign investment. Himal Power Limited, Bhotekoshi Power Company, Butwal Power Company, Syange Vidyut Company, 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 West Seti Project intended to export power to India. The Butwal Power Company is first Independent Power Producer preceding to 1992 Hydropower Development Policy.

Two types of market are available for the sales of generated electricity, domestic and export. NES 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 for technically and financially viable power projects. This department also coordinates the power exchange and trade with India, monitors, and proceeds 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 is 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 budget 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 provide advices 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, Ehile 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. Coat 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. are condensed under one discipline called management accounting. Management accounting is defined as the process of identifying, measuring, accumulation, 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 emphasis shifting from a cost determination and financial control focus to the provision of advice that result in addition or creation of value. It provides accounting information that is useful in

planning, controlling, and evaluating an organization. It summarizes the information from financial and cost accounting 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 cost 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 market or miss the opportunity to increase out profit. Hence, to manage any kinds of business one must understand how respond t cost changes in sales volume and the effect of costs and revenues on profit. Management must make many critical operating decision regarding cost, volume, and 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.

1.1.1 Cost

Cost is the amount of expenditure (actual or notional) incurred on or attributable to a given thing. Cost as a verb can be the process of ascertaining cost of a given thing. It is the key players of every management decision.

1.1.2 Volume

Volume is the level of production or scale of production. Although the maximum a manufacturing firm can produce is almost predetermined and fixed the level of production below it can be decided by the management based on the requirement. Parameter for volume selection could be capacity of the plant i.e. how much a plant installed can produce, availability of raw material i.e. are sufficient amount of raw material available for the production of given level of output of finished product, presence of manpower i.e. skilled manpower required to perform various skilled jobs like machine handling, raw material mixing, processing, managing, marketing etc and non skilled manpower for the purpose of loading unloading, carrying, lifting and

dropping, guarding, helping the skilled ones etc. Other important requirements are power and fuel, infrastructure for automation and high technology implementation, government quota, demand and supply in the market etc.

1.1.3 Profit

It is the premium for the Producers for the act of producing the required goods to the consumer. In other words it's the incentive to produce. The difference between the sales proceed and cost of production for that goods sold is the profit

i.e.; Profit = Sales – Cost.

Every producer produces to earn and he selects the best possible way to produce in least cost and earn best profit out of it.

1.1.4 Cost-Volume-Profit Interrelation

It is the analysis of three variables, viz., cost, volume and profit, which explores the relationship existing amongst costs, revenue, activity levels and the resulting profit. Profit, as a variable, is the reflection of a number of internal and external conditions, which exert their influence on sales revenue and costs. Revenue depends upon selling prices, costs, volume of sales, demand, competition, etc. Although none of these can be singled out as the most important, the volume is considered to be a dominant factor. This is probably because changes in volume are more frequent, takes place rapidly and is outside the purview of management control. Further costs rarely vary in direct proportionate effect on profits than the other factors outlined above. It is thus, the volume which is perhaps the largest single factor which influences costs. As such, an intimate relationship exists amongst costs, volume and profit.

The cost-volume-profit analysis is an extension of marginal costing. It makes use of the principles of marginal costing. It is an important tool of short term planning and is more relevant where the proposed changes in the level of activity are relatively small. It is useful in making short-run decisions.

Objectives of cost-volume-profit analysis are as below:-

1. It aims at measuring variations in cost with volume
2. It enables business managers to fulfill the objectives of profit planning

3. It facilitates in making short run tactical decisions such as acceptance of special order; shift working; choice of sales mix etc.

1.2 Company Profile

Butwal Power Company limited (BPC) was established in 29 December, 1965 (2022/14 B.S.) as a private limited company under Company Act 2021 of Nepal by the promoters- United Mission to Nepal Government of Nepal (GON), Nepal Electricity Authority (NEA) & Nepal Industrial Development corporation (NIDC) with an objective to develop the hydropower project using appropriate training and technology transfer and human resource as well. BPC was converted into Public Limited Company in 2049(1993) and it was privatized in 2059(2003). Its main shareholders now are Shangri-la Energy Limited (68.95%), General Public (10%), Government of Nepal (9.09%), Interpret Nepal As (6.05%), United Mission to Nepal (2.79%), Employees (2%), Nepal Electricity Authority (1.065%) and Nepal Development Corporation (0.06%).

The core businesses 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 12 MW Jhimruk Hydropower Plant and 5.1MW AndhiKhola Hydropower Plant and developed the 4 MW 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 AndhiKhola and the 12MW Jhimruk. The generated electricity is sold to NEA under Power Purchased 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 & Electric Limited, Khudi Hydropower Limited, BPC services Limited, Nyadi Hydropower Limited, Keton Hydropower Limited, Jhimruk Industrial development Centre (p) Limited &Hydro Lab Private Limited.

BPC has aggressive plant 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 (20 MW), Andhi Khola upgrading project (Upgraded to 9.4 MW), Bhim Khola Hydropower Project (9MW), and Marsyangadi III Hydropower Project (42MW).

Mission of BPC

- To be a competitive hydropower and an electric utility.
- To provide innovative engineering solution and management services.
- To be committed to project the environment.
- To practice corporate social responsibility by serving the communities where we do business.
- To provide a safe, healthy and fulfilling work environment for our employees.
- To maximize value for all stakeholders.

Vision of BPC

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.

1.3 Statement of the Problems

Every commercial organization's mission is to earn profit. Hence, the said entity should be clear from the very beginning regarding their way of operation. They should be clear about their production capacity, cost of raw material, direct labor, indirect labor, production overhead, other cost aspect etc; the level of production at which they will be paid off, when they will enjoy profit, measures of deduction of cost of production etc.

Segregation between the cost of fixed nature and variable nature is must for the study of Cost Volume and Profit of any organization. So, primarily the BPC should be able to allocate its cost components into different categories based on their categories.

The problem situation in this case is the separation of various cost components and analysis of outcomes. This studies deals with:

- Whether the major hydropower projects generate electricity as per installed capacity or not?
- Whether the BPC generate electricity as per installed capacity or not?
- Whether BPC practices the tools and technique of CVP analysis in planning and decision making or not?
- What are the major problem regarding the use of CVP analysis?
- What is the impact of cost volume and profit on Profitability?

Therefore, the present study has made an effort to highlight the problems, role of profit plan to improve the financial performance using break-even analysis and cost-volume- profit approach and recommend possible suggestion to them.

1.4 Objectives of the Study

The main objective of the study is to examine the use of CVP analysis to plan the profit in Butwal Power Company Ltd. The others specific objectives of this study are:

- To analyze electricity generated by the projects as well as their full capacity.
- To examine whether company is generating electricity as on its installed capacity or not.
- To analyze CVP of the Company with various tools and its impact in profit planning & decision making.
- To provides suitable recommendation and suggestions.

1.5 Significance of the Study

This study is concerned with the CVP analysis of Butwal Power Company Ltd. as a part of the study of the MBS. This study tries to bridge the gap between the comprehensive CVP literature and its practices in the organization. This study will be useful to the students, academicians and lectures, particularly to those of management and accounting.

1.6 Limitations of the Study

No doubt, CVP analysis is a useful tool in the management process but it has some limitations. Every managers and analyst should know about it while using it. Because of the changing marketing environment, great uncertainties and change in fixed cost has created limitations in conducting CVP analysis. Some of the limitations are: -

- This study covers only last five years (i.e. from fiscal year 2063/64 to 2067/68 trend and data are analyzed.
- The comprehensibility and the accuracy of this study is based on the data provided by BPC management and published financial documents, planning documents, annual report of BPC and budget book of BPC.
- The analysis is concentrated in accounting and financial aspect of the organization. It does not cover all the areas of the enterprise.
- All the information was based on secondary data.
- This study focuses only some parts of CVP which is not enough for analyze.
- This study includes installed capacity and their production of major projects in Nepal rather than only BPC.

Since, Dissertation is submitted in partial fulfillment of required of MBS Degree, so due to constraints of time anti it was not possible to carry out a detailed research in the subjective area.

1.7 Design of the Study

Every research work is carried in a certain procedure. It should be organized in certain steps. This is known as the organization of the study. In this research, the study is carried out at different stage & procedure as needed. The aim of this research work is to explain the use of CVP analysis in Hydropower Company and it is explained by dividing whole study into five chapters. Each chapter is devoted to some aspect of the study.

The major chapters of the study are as follows:

Chapter one: Introduction

This chapter deals with general background of the study, company profile, statement of the problems, objectives of the studies, significance of the study and limitations of the study.

Chapter Two: Conceptual Framework and Literature Review

The second chapter "Conceptual Framework and Literature Review" deals with the review of related literatures and available studies written and conducted by different experts and researchers in the field of working capital.

Chapter Three: Research Methodology

The third chapter "Research Methodology" presents the methodology used in this study. It deals with research design, sources of data, procedures employed and financial and statistical tools used for the study.

Chapter Four: Presentation and analysis of data

The fourth chapter fulfils the objective of the study by presenting the data and analyzing them with the help of various statistical tools followed by methodology.

Chapter Five: Summary Conclusion and Recommendations

The final chapter of the study covers summary, conclusion and recommendation of the study. The whole subject matter of the study is summarized in this chapter. The suggestion for further improvement is included in this chapter.

Besides these, recommendation sheet, viva voce sheet, declaration, table of contents, list of tables, list of figures and abbreviation are included at the beginning whereas bibliography and appendices are included at the end

CHAPTER-II

Conceptual Framework and Literature Review

2.1 Conceptual Framework

In this chapter the researcher has been reviewed the related literature from different books, journals, previous studies and other reliable sources. As per this study concern, journals of account, previous thesis, related books, reports and related research works has been reviewed briefly.

Planning and controlling are the primary function of business. A business can't success or live a minute in competitive or global environment without it. In most cases, cost volume profit analysis provides the management decision about effective budgeting of a company and best on those decisions. It is an organize approach for planning an appraisal or coordination and control.

2.1.1 Concept of CVP Analysis

Cost volume profit analysis is a management accounting tool to show the relationship between the ingredients of profit planning. Profit planning is the function of selling price of the function of selling price of the product, the variable cost and the volume to be sold. The entire scope of p profit planning associated with CVP interrelationships. A wisely used technique to study CVP relationship is break-even analysis. Breakeven analysis is concerned with the study of revenues and costs in relation to sales at which the firm's revenue and total costs will be exactly equal or net income is zero. Thus the break-even-point (BEP) may be defined a point at which the firm's total revenues are exactly equal to total costs, yielding zero income. The 'no profit no loss' is a break-even-point or a point at which losses ceases and profit begins (*Khan and Jain; 2008:456*).

In dictionary we find that cost is price paid to acquire, produce, accomplish or maintain anything volume in mass or quantity of something or amount, profit is the ratio of such pecuniary gain to the amount of capital invested and analysis is resolution, separation or breaking into parts. In facts, CVP analysis is an analytical tool for studying the relationship between volume, cost, price, and profit. Basically

CVP analysis is the technique involves finding the most favorable combination of different types of costs. CVP analysis provides the managers with a powerful tool for identifying those courses of action that will or will not increase profitability. CVP analysis is the technique that explores the relationship, which exists, between cost, revenue, output level and resulting profit. CVP analysis can be extended to cover the effects on profit of changes in the selling prices or service fees, cost, income tax rate, total cost, total revenue, and profit at various sales volumes. CVP analysis provides the management with a comprehensive overview of the effects on revenue and costs of all kinds of short-run financial changes. It is related to profit, sales volume and costs. CVP analysis provides information regarding (*Munakarmi; 2003:4.01*).

People invest huge amount of money in the business to earn profit. But to make profit is not a joke. Profit planning is the function of the selling price of product and units sold. The entire amount of profit planning is associated with CVP interrelationships. CVP analysis is the technique has explores the relationship which exist between costs, revenue and output by showing the effects on profit of changes in selling prize or services fees, costs, income tax rate and product mix.CVP analysis provides the management with a comprehensive overview of the effect on revenue and costs of all kind of short-term financial changes.

CVP analysis is a systematic method of examining the relationship between changes in activity and change in total sales revenue, expenses and net profit. As a model of this relationship. CVP is powerful and helpful tool for managerial decision making cost control and profit planning in certain situation. Profit planning is function of selling price of product, demand, variable cost, taxes. Management plans future operation by using CVP analysis of estimation of selling price per unit, variable cost, fixed cost and sales volume. CVP analysis helps manager to see in advance to set different strategies and decision of business activities. The aim of CVP analysis is to have correct estimate of fixed cost, total revenue and profit.

CVP analysis helps manager to understand the interrelationship between cost, volume and profit in an organization by focusing the following four elements.

- Price of a product.
- Volume or level of activity.

- Per unit variable cost.
- Total fixed cost mixed product sold

Generally CVP analysis provides the answer to the question such as:

What sales volume needed to earn desired profit?

- What sales volume needed avoid losses?
- What will be the effect of change in price?
- Which product or operation of a plant should be discontinued as soon?
- What sales volume is required meet the additional fixed charges arising from an advertising campaign?
- What will be the new break-even point when there is changing prices, cost, volume and sales mix?
- Which product or product mix is most profitable?

The aim of CVP analysis is to have correct estimate of.

- Total cost
- Total revenue
- Profit at various sales volume

Cost-volume-profit analysis provides attention-direction and problem solving background for important planning decisions such as selecting distribution channel, pricing, special promotions and personnel hiring. “Know your cost” is an essential theme for any manager. And cost-volume-profit analysis helps to direct managerial attention to important problems and paves the way to their solution. (*Hongren, Charles T: 1998*)

Managers often classify costs as fixed or variables when making decision about how many units of a product to produce in the coming year. Managers realize that many factors in addition to the volume of output will affect costs. Yet, a useful starting point in their decision process is to predict how the choice of production level will affect costs.

The managers of profit-seeking organizations usually study the effect of output volume on revenue, expenses and net income. We call this study cost-volume-profit analysis. The manager of none profit organizations also benefit from the study of CVP relationships. Why? No organization has unlimited resources, and knowledge of how costs fluctuate with change in volume helps managers to understand how to control

costs. For example, administrators of none profit hospitals are concerned about the behavior of cost as the volume of patients fluctuate. (*Horgren,Sundem, Stratton, Burgstahler and Schatzberg, 2008:53*)

CVP analysis is based on the relationship between volume and sales revenue, cost and profit in the short-run, the short run normally being a period of one year, or less, in which the output of a firm is restricted to that available from the current operating capacity. In the short-run, some input can be increased, but others cannot. (*Drury C, 2009:264*)

2.1.2 Concept of Profit Planning and Control

A profit planning and control programmed helps the management perform its planning function by developing a strategy (long run) and tactical (short run) Profit plan. Both of these plan include monitory expectation for assets, liabilities, profit and return on investment, The Foundation for the strategic profit plan include the objectives, goals, planning premises and strategies of the enterprise as develop by top management. The tactical profit plan can actually be viewed as the first years of the strategic plan. If it is details plans for the enterprise and for each of its responsibilities centers. PPC programmed also help management perform if control function by providing realistic goal and standard that are then compared with actual result to measure performance. Under PPC this performance measurement extends from the top to the lower organizational level in the enterprise. As outline fundamental concept of profit planning and control are: (*Hiloton 2000:32*)

- A managerial process that include planning, organizing, staffing, leading and controlling.
- Management must use realistic assumption.
- An organizational structure that clearly specifies assignment management authority and responsibility levels.
- A managerial commitment to effective management participation by all levels in the entity.
- A management planning process.
- A management control process.

- Continuous and consist test coordination of all the management functions. Continues feed forward, Feedback, follow up and re-planning through defined communication channels.
- Management must include strategic profit plan and tactical profit plan.
- A responsibility account system.
- A behavioral management programmed (*Welsh,Hilton and Gorden, 2000:32*)

Usually, profits do not just happen. Profits are managed before we can make an intelligent approach to the managerial process of profit planning, it is important that we understand the management concept of profit. There are, after all, several different interpretations of the term “Profit”. An economist will say that profit is the reward for entrepreneurship for risk taking. A labor leader might say that it is a measure of how efficiently labor has produced and that is provides a base for negotiating a wage increase. An investor will view it as a gauge of the return on his or her money. An internal revenue agent might regard it as the base for determining taxes. The accountant will define it simply as the excess of a firm’s revenue over the expense of producing revenue in a given fiscal period.

2.1.3 CVP Analysis as Tools of Profit Planning and Budgeting

The analysis of relation between cost volume and profit is knows as cost volume profit analysis. It is an analytical tool for studying relationship between volume cost price and profit analysis is great helpful in managerial decision making. Specially Profit planning and control is possible with the help of cost volume profit analysis.

Cost volume profit analysis is an important tool of profit planning because it provide the information about the behavior of cost interrelation to volume, production or sales where the business will between sensitivity of profit due to variation of outputs amount of profit for a projected sales volume and quality of production and sales for a target profit level etc. CVP analysis may therefore by define as managerial tools showing the relationship between various ingredients of profit planning. CVP analysis is an important media through which the management can have an insight into effect on profit on account of variation in cost and sales to take an appropriate decision. Cost volume profit analysis is great helpful in managerial decision making.

Especially profit planning and control is possible with the help of cost volume profit analysis. Profit planning can be done only when the management has the information about the cost of the product and selling price of the product.

2.1.4 Needed of Cost-Volume-Profit Analysis

Planning, controlling and decision making are the essential management functions. CVP Analysis helps managers to prepare plan for profit to control cost and make decision. It helps (*Munakarmi, 2003:401-402*).

- To determine the BEP in terms of units or sales value.
- To ascertain the margin of safety.
- To estimate the profit or loss at various levels of output.
- To assess the likely effect of management decision such as an increase or decrease in selling price, adoption of new method of production to reduce direct labor cost and increase output.
- To help the management to find the most profitable combination of cost and volume.
- To determine the optimum selling price.
- To determine the sales volume of which the profit goal of the firm will be achieved.
- To determine the maximum sales volume to avoid losses.
- To determine the most profitable and least profitable product.

2.1.5 Purpose of Cost-Volume-Profit Analysis

- Cost-volume-profit analysis helps management in a number of ways. The following purposes are served by it;
- Evaluation 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 change in cost and selling price.
- Measurement of effect of change 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 decision on sub-assemble or part.
- To contemplate the increase or decrease in profit due to the change in method of production, etc.

2.1.6 Assumption of Cost-Volume-Profit Analysis

- The mechanism of Cost-volume-profit analysis stresses in fact, "How operating profit evolves with the change in the quantity of sold products, variable costs or fixed costs." CVP analysis relies on several assumptions to simplify the complex relationship among costs, revenues, and activity levels which are to be rarely found in practice and place definite limitations on the conclusion which can be drawn from its result. Some of the key assumptions are :
- The analysis presumes that cost can be reliably divided into fixed and variable category.
- This analysis presumes an ability to predict cost at different activity volumes.
- The analysis presumes that a series of break even chart may be necessary where alternative pricing policies are under consideration.
- It assumes that variable cost fluctuates with volume proportionally.
- It assumes that efficiency and production remain unchanged. In other words, it presents a static picture of a dynamic.
- This analysis presumes that selling price is constant at all levels of sales.
- This analysis presumes only a single product or product mix will not change.
- The fixed cost remains constant over a given volume range.
- The analysis presumes that influence of managerial policies, technological method, and efficiency of the man, material, and machines will remain constant and cost control will be neither strengthen or weakened.
- This analysis presumes that production and sales will be synchronized at all points of time, or in other words change in beginning and ending inventory level will remain insignificant in amount. This analysis also presumes that price of input factor will remain constant (*Saxena &Vashist, 2008:15.28-15,290*).

Discuss the following assumption of CVP analysis:

- Total cost can be divided into fixed component and a component that is variable with respect to the level of output.
- The behavior of total revenues and total costs is linear in relation to output units within the relevant range.
- The unit selling price, unit variable costs and fixed costs are known.
- The analysis either covers a single product or assumes that a given revenue mix of product will remain constant as the level of total units sold changes.
- All revenues and costs can be added and compared without taking into account the time value of money.

This CVP assumption clearly is extreme in the sense that they would rarely match reality. Managers should always question whether a more complicated approach than CVP is warranted. CVP analysis can be only understood after understanding the various terminology used under it. This terminology combines to form a CVP analysis. It include following key features and terminology:

- | | |
|-----------------------------|---------------------------------|
| ▪ Total Revenue | ▪ Sales Mix(Revenue Mix) |
| ▪ Total Cost | ▪ Weighted Average Contribution |
| ▪ Operating Income | Margin(overall contribution |
| ▪ Net Income | margin |
| ▪ Gross Margin | ▪ Weighted Average Contribution |
| ▪ Contribution Margin Ratio | Margin Ration(WCMR) |

2.1.7 Application of CVP in PPC and decision making

Cost volume profit analysis is an important tool for profit planning and in many decisions, including choice of product lines, pricing of products, marketing strategy, and utilization of pervasive in managerial accounting that it touches on virtually everything that manager does. It has been defined as a managerial tool showing the relationship among cost, selling price, profit and volume of activity. CVP analysis can be applied for the following purpose (*Dongol, 2004:416*).

- It helps in fixation of selling price.
- It is helpful in cost control.
- It also assists the management in understanding the behaviors of cost and help in budgetary control.

- It also assists the management in performance evaluation for the purpose of management control.
- It assists the management in profit planning.
- 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 special orders, selection of a profitable product mix.
- It helps in determining the level of output where all the cost can be met.

CVP analysis we can analyze a single product, a group of products, or evaluate the entire business as a whole. The ability to work across the entire product line in this way gives us a powerful tool to analyze financial information. It provides us with day-to-day techniques that are easy to understand and easy to use. The concepts parallel the real world, so they are easy to visualize and use. CVP analysis is simple but flexible tool for exploiting potential profit on cost strategies and pricing decision. CVP may be helpful or the following task:

- To forecast profit by considering relationship between cost and profit on one hand and production volume on other hand.
- To help evaluate a start up operation.
- To prepare a flexible budget showing cost at different level of production.
- To set pricing by projecting the effect of different price structure o cost and profit.

Manager uses the CVP analysis with a view to making decision; many of them can be considered strategic decisions. This type of analysis allows the estimation of profitability expected on a long term for each chosen option (different option can influence the selling price, variable unitary cost , fixed cost, number of unit sold, as well as operating profit).CVP analysis has great utility in the following area of managerial decision making:

- Fixation of selling price:
CVP analysis helps in fixing the selling price of his products. The cost of product and the desired profitability are factor which govern fixation of selling price.
- Maintaining a desired level of profit:
The industry has to cut price of its products from time to time on account of competition, government regulation and other compelling reason. The

contribution margin per unit on account of such cutting is reduced in maintaining a minimum level of profit.

- Accepting of price less than the total cost:

Sometimes prices have to be fixed below the total cost of the product to meet the situation during trade depression. The selling price may be fixed at a level above marginal cost though it may not be enough to cover the total cost.

- Decision involving alternative decision:

The technique of CVP analysis helps in making decision involving alternative choice, viz., discontinuance of a product line, change of sales mix, make or buy, own or lease, expand or contracted. (Maheshwori, 2002"202-208).

2.1.8 Basic Terminology under CVP analysis

CVP analysis can be only understood after understanding the various terminology used under it, this terminology combines to form a CVP analysis. It include following key features and terminology:

- a) Total Revenue:

The amount of money received by the seller from selling a given amount of the product or services is called total revenue. Revenue can be divided into operating and non- operating revenue.

Total revenue = operating revenue + non- operating revenue

- b) Total cost:

Total cost are made up of from variable cost and fixed cost.

Total cost = variable cost + fixed cost

- c) Operating income"

Operating income is total revenue from operation minus total costs from operation (excluding non-operation revenues and costs).

Operating income = total revenues for operation- total costs from operation

- d) Net income :

Net income is operating income plus non operating revenues such as interest minus non operation cost minus income taxes.

Net income = operating income + non operating income – non operating expenses – incomes taxes

- e) Gross margin:

Financial income statement uses the term gross margin. Gross margin is the difference between sales and cost of goods sold. Cost of goods sold includes both fixed and variable costs.

Gross margin = revenue – cost of goods sold

Contribution margin calculation emphasizes the distinction between fixed and variable costs. Hence, contribution margin is more useful concept than gross margin in CVP analysis.

Contribution Margin:

CM is the difference between total revenue and the variable cost of sales. It is most essential part of variable costing and managerial costing. Contribution margin is the profit available to cover fixed cost and provide net income to the owner. The contribution margin determines the change in net income from given change in sales.

Contribution margin in total = sales revenue – variable cost
= fixed cost + profit

$$\text{CM per unit} = \frac{\text{sales} - \text{variable cost}}{\text{Unit sales}}$$

Both contribution margin and contribution margin per unit are valuable tools when considering the effects of volume on profit. Contribution margin per unit tells us how much revenue from each unit sold can be applied toward fixed costs.

f) Contribution margin ratio:

Contribution margin ratio is the contribution margin divided by the sales amount. It is the percentage of sales amount available to cover fixed cost. It established a relationship between the contribution and the sales value. It is also called Profit/volume ratio (p/v ratio) or contribution/sales ratio (c/s ratio). CM ratio is expressed as a percent.

$$\begin{aligned} \text{Contribution margin ratio} &= \frac{\text{sales} - \text{variable cost}}{\text{sales}} \\ &= 1 - \text{variable cost ratio} \end{aligned}$$

Above discuss contribution is for a single product company. But in real life companies produces a range of product, not just one kind. Different product will have different selling price, variable cost per unit and as a result different contribution margin and contribution margin ratio. In such situation

calculation become complicated for CVP analysis. So we use weighted average contribution margin for analysis.

g) Sales mix ratio:

Many organizations sell a combination of different product or services. Sales mix is the relative combination of quantities of products or services that constitute total revenue. For example sales mix of product X and Y may be 2:3 unit or 40% and 60% respectively. Managers try to achieve that combination or mix that will yield the greatest amount of profits. All the products of company are not equally profitable. Profit will be greater if high margin items make up a relatively large proportion of total sales than if sales consist mostly of low margin items.

If a mix changes, overall revenues targets, we still are achieved. But the effects on operating income depend on how the original proportion of lower or higher contribution margin products have shifted. A shift in the sales mix from high margin item to low margin items can cause to decrease even though total sales increase. Conversely, a shift in the sales mid from low margin items to high margin items can cause total profit to increase though total sales decrease.

h) Weighted average contribution margin(Overall contribution margin)

Weighted contribution margin is the sum of the contribution margin for the individual products. It is average contribution margin of the company. The weighted average contribution margin per unit is calculated by multiplying each products contribution margin per unit is calculated by multiplying each products contribution margin per unit (SPPU – CVPU) by the mix ratio applicable to that product and then summing the results. The mix ratio represents the weights. The equation for weighted average contribution margin per unit is:

$$WCMPU = \sum [(sppu - vcpu) \times (\text{mix ratio})]$$

$$WCMPU = \frac{\text{Total contribution margin}}{\text{sales unit}}$$

i) Weighted average contribution margin ratio (WCMR)

Weighted average contribution margin ration for the firm is the overall contribution margin divided by overall sales. The weighted CM ratio has to be

based on the weighted average of the two. WCMR is also based on sales mix. By changing the sales mix in a situation where the value of the CM ratio change from product to product, the weighted average value of a CM ratio also changes, and unless this point is appreciated, the result of any CVP analysis could be easily invalidated. The equation for weighted average contribution margin ratio can be given below:

$$\text{WCMR} = [(\text{CMR}) \times (\text{Mi})]$$

2.1.9 Approaches to CVP and Break-Even Analysis

The cost-volume-profit relationship and the break-even point can be analyzed through different approaches. Mainly the break-even point and other required cost volume profit relationship can be explained through contribution margin statement approach. A contribution margin statement is all fixed cost period costs which should be deducted from the contribution margin of the same period. Most often, we use the equations approach graph or the income statement.

- **Contribution Margin Income Statement Approach**

The contribution margin income statement approach to CVP approach allows the preparation of performance statement from the available information BEP and others required CVP relationship can be explained through a contribution margin statement. A contribution margin statement is the variable costing income statement whose philosophy is fixed cost is period costs that should be deducted from the contribution margin of the same period. Only the variable costs vary proportionately to the level of output or sales.

- **Cost and Revenue Equation Approach (Formula Approach)**

The most popular practiced approach to the break-even point and cost volume profit analysis is the formula also known as the calculate break-even point. The answer provided by solving the equation may sometimes to be rounded to whole number of units or lot sizes.

The calculation is the equation approach is similar to that of the contribution margin statement approach. The equation is mainly a restatement of the others. To developed the cost-volume-profit equation.

Table No. 2.1
Formula Approach in Table

Contribution margin approach	Symbol of Equation
Sales volume (Units)	Q
Selling price per units	SPPU
Sales revenue(Rs)	QSPPU
Less: Variable cost	QVCPU
Contribution margin	QSPPU-QVCPU
Less: Fixed cost	FC
Net profit	QSPPU-QVCPU-FC

Sales –variable expenses-Fixed expenses = Net profit

Or Sales = Variable expenses + Fixed cost + Net profit

Or QSPPU = QVCPU + FC + Profit

Where,

$CMPU = SPPU - VCPU$

Break-even (BEP units)=FC/CMPU

Break-even (BEP Rs)=FC/PVR

Required Sales in units=(FC+DP)/CMPU

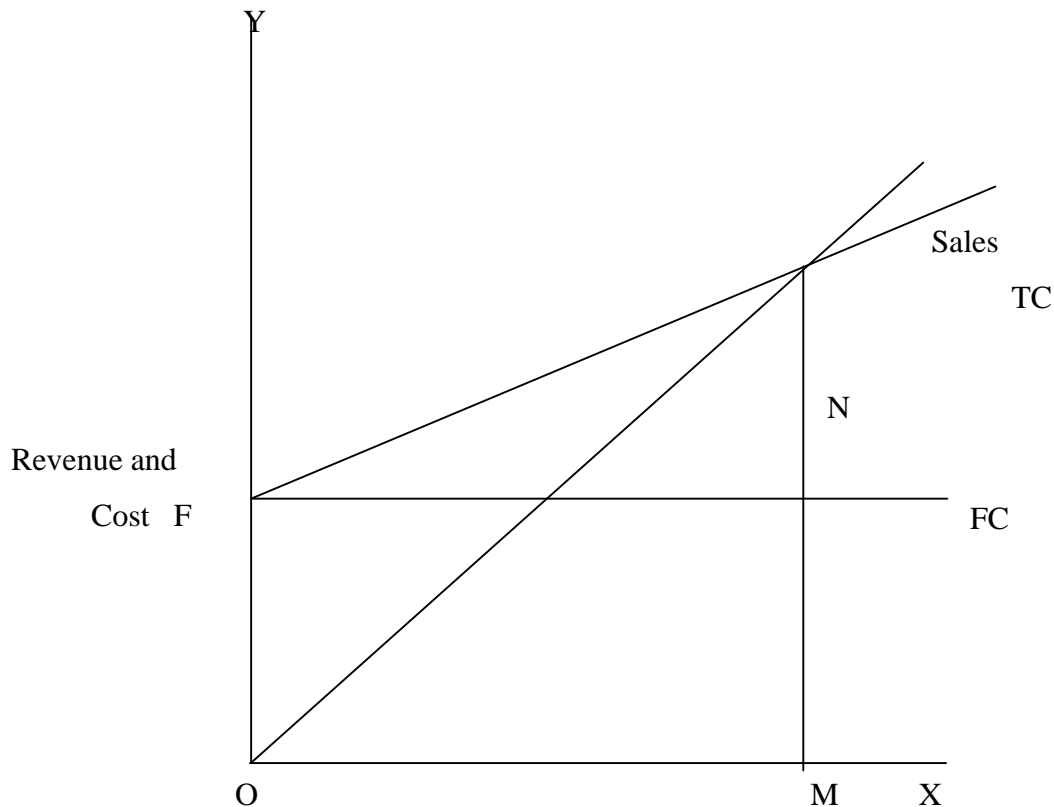
Required Sales in Rs=(FC+DP)/PVR

Required sales after tax in Rs = (FC+(DPAT/1-T)/PVR

The contribution margin and equation approaches are two equivalent techniques for finding the BEP. Both methods reach the same conclusion. So, personal preference dictates which approach should be used. It is especially used in which units' price and unit variable costs are clearly identifiable.

- **Graphic Method**

Break-even point can also be determined by using graph. The relation shown among cost volume and profit with the help of diagram is described as break-even chart. There can be neither profit nor loss at the break-even sales. However, if the sales exceed the break-even point, there will be profit and if the sales are less than break-even sales, there will be loss. Below is a simple illustration of break-even chart;



OX represents output or sales units and OY represents Rs. i.e. total cost as well as revenue. OF denotes the amount of fixed cost. As the increase or decrease in sales does not have any effect on the amount of fixed cost, the fixed cost curve is parallel to x-axis.

Total cost increase if output or activity increases. 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 sloping upward to right side.

The sales curve is organized from the origin “o”. It is because the revenue will be zero, if sales are zero. As the unit increase, sales revenue also increases. Hence, sales curve is also sloping upward to right side.

An equilibrium point between revenue curve and total curve is known as break-even point. OM 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 incur losses.

In the figure, OMF part is regarded as loss area. Loss is the result when the sales tend to be less than break-even point. When sales are made less than the equilibrium point, total cost curve is above to the sales curve, which is followed by loss. In case of sales being higher than break-even sales, sales curve is above to total cost curve. Hence, there is gain, in this condition

2.1.10 Application of Break-Even Analysis

Break-even concept can be used to formulate different policies in business enterprises.

Some of these applications are:

- Determination of it at different level of sales and margin of safety.
- Effect of price reduction on sales volume and changes on sales volume.
- To find the level, output to get desired profit.
- Effect on fixed cost or variable cost changes on sales volume.
- Selection of most profitable alternative, make or buy decisions and drop or add decision.

2.1.11 Assumption of Break-Even Analysis

Contribution analysis and break-even analysis are based on a specific set of assumption that should be clearly understood. These underlying assumptions are as follows:

- All cost can classify into two parts, fixed cost and variable cost. There is not cost other than fixed and variable.
- Fixed cost will remain constant and variable cost vary proportionately with activity.
- There is the relevant range of validity 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 product remains constant.

- Basis management policy about operation will not change materially in the short run.
- The general price level will remain essentially stable in the short run.
- Sales and production level are synchronized, that is inventory remains essentially constant or zero,
- Efficiency and productivity per person will remain essentially unchanged in the short run.
- Changes in the opening and closing inventories are not significant.

2.1.12 Cash Break-Even Point

It is also known as Cash flow breakeven point. It is the point where cash breaks even, i.e., the volume of sales where cash realization on account of sales will be just sufficient to meet immediate cash liabilities. It helps management to know what volume of sales is required to cover all cash payments. Not all fixed operating costs involve cash payment. For example, depreciation expenses are non-cash expenses. To find the cash breakeven point, the non-cash expense must be subtracted from total fixed operating cost. Cash breakeven point is lower than the accrual accounting breakeven point. It is calculated as:

$$\text{Cash Breakeven Point} = \frac{\text{FC} - d}{\text{CMPU}}$$

Where, FC = fixed cost, d= depreciation or amortization,

CMPU = contribution margin per unit

Cash flow breakeven point after tax is the point where the cash inflows after taxes are equal to cash outflows after taxes. We simply convert the contribution margin and total fixed cost to an after tax basis by multiplying (1- T). The equation is as follows:
 $(1-T) * (SPPU - VCPU) * Q = (1-T) * TFC - \text{Non cash fixed costs}$

2.1.13 Margin of Safety

The soundness of business is indicated by margin of safety. The difference between total sales and break-even sales is identified by margin of safety. The high margin of safety is good for business. It indicates that there can be substantial falling of sales and yet profit can still be made. On the other hand, if the margin of safety is small, it indicates that weak position of business the small margin of safety shows that even a

small reduction in sales or production will adversely affected the profit position of business. If margin of safety is unsatisfactory, the following steps can be taken: -

- By increasing the sales and production volume.
- By increasing the selling price.
- By decreasing the fixed cost.
- By reducing the variable cost.
- By changing the sales or product mix ratio.

Margin of safety is ascertained by using the following formula:

- Margin of Safety = Actual sales – Break-even sales
- Margin of Safety (in unit) = Actual sales units-BEP sales Units
- Margin of Safety (in Rs) = Actual sales Rs-BEP sales Rs
- Margin of Safety (%) = $\frac{MOS \times 100}{Actual\ sales}$
- Margin of Safety ratio = $\frac{MOS}{Sales}$

2.1.14 Formula of Cost Volume Profit Analysis

- Determination of contribution margin per units (CMPU);

Contribution margin per unit = Selling price per unit – Variable cost per unit

- Calculation of Profit Volume Ratio (PV ratio);

- PV ratio = $1 - \frac{VC}{Sales}$

- PV ratio = $\frac{CM}{Sales}$

- When sales and Profit or costs of two periods are given:

- PV ratio = %change in profit/%change in sales

- Calculation of Break-even Point(BEP):

- BEP units = $\frac{FC}{CMPU}$

- BEP Rs = $\frac{FC}{PVR}$

- Calculation of Variable cost-volume ratio(V/C ratio):

- V/C ratio = 1-PV ratio

$$\text{V/C ratio} = \frac{VC}{Sales}$$

When cost and sales of two periods are given:

$$\text{V/C ratio} = \% \text{change in cost} / \% \text{change in sales}$$

- Determination of margin of safety(MOS):
- Margin of safety = Actual sales – Break-even sales
- Margin of Safety(in unit) = Actual sales units-BEP sales Units
- Margin of Safety(in Rs) = Actual sales Rs-BEP sales Rs

$$\text{Margin of Safety(\%)} = \frac{MOS \times 100}{Actualsales}$$

$$\text{Margin of Safety ratio} = \frac{MOS}{Sales}$$

- Fixation of sales volume to earn a desired profit:

$$\text{Required sales(units)} = \frac{(FC + DP)}{CMPU}$$

$$\text{Required Sales(Rs)} = \frac{(FC + DP)}{PVR}$$

- Fixation of sales volume to earn a desired profit after tax(DPAT):

$$\text{Required sales(unit)} = \frac{FC - \frac{DPAT}{1-T}}{CMPU}$$

$$\text{Required sales(Rs)} = \frac{FC - \frac{DPAT}{1-T}}{PVR}$$

Determination of profit:

- Profit = (Sales amount PV ratio) Fixed cost
- Profit = (sales unit CMPU) – Fixed cost
- Profit = (Actual sales – Break-even sales) PV ratio
- Profit = (Actual sales units – Break-even units) CMPU
- Profit = Sales – variable cost – Fixed cost
- Ascertainment of Fixed cost:
- Fixed cost = (sales PV ratio) – Profit
- Fixed cost = Break-even point(Rs) PV ratio
- Fixed cost = Break-even point(units) CMPU

- Ascertainment of Variable Cost:
- Variable cost = Sales – Contribution margin
- Variable cost = Sales – (sales PV ratio)
- Measuring the effect of change in Fixed cost(FC):
- Revised BEP(units) = Revised $\frac{FC}{CMPU}$
- Revised BEP(Rs) = Revised $\frac{FC}{PVR}$
- Requires sales unit to earn present profit Requires = New $\frac{FC + DP}{CMPU}$
- Sales amount to earn present profit = New $\frac{FC + DP}{PVR}$
- Measuring the effect of change in variable cost:
- Revised BEP units = $\frac{FC}{NewCMPU}$
- Revised BEP Rs = $\frac{FC}{NewPVR}$
- Required sales amount to earn Present Profit = $\frac{Fixed\ Cost + Present\ Profit}{New\ PVR}$
- Required sales units to earn Present Profit = $\frac{Fixed\ Cost + Present\ Profit}{New\ CMPU}$

2.1.15 Limitation of Break-Even Analysis

The break-even analysis is based on some unrealistic assumptions. Its main limitations are as follows;

- According to the assumption of break-even point, total cost can be divided into fixed and variable cost only which is not practicable in real life. There are some costs, which are neither fixed nor variable. Those costs are described as semi-fixed or semi-variable costs.
- The assumption that fixed cost always remains constant is not true. Sometimes, it can be increased especially in that situation when production or operation technique is changed.
- The assumption that variable cost per unit always remains constant can't be entirely true.

- Constant selling price is also not true. In case of increase in sales volume, some modification can be made in selling price by considering the nature of demands for the goods.
- The assumption that either the firm produces only a single product or product mix ratio remains constant is also obviously quite unrealistic. An industry producing several types of goods has to bring about modification in the product mix ratio from the time to time.
- The assumption that the production level and sales level should be equal is another drawback of break-even point. Such a condition is hardly found in practice.
- The capital invested in business is also a significant element of profit planning and control. However, the place is not given to it in break-even point.

2.1.16 Cost Classification

Classification of an item is to define it as a certain kind. In other words, classification means to put an item or thing under a certain category. Classification of cost depends on the purpose, methods, nature and so on. Same elements of cost can be varied in category depending upon the purpose. Manager of profit planning department should have an in- depth knowledge regarding the nature of costs that on which category does it lie. Otherwise, planning and control of cost is impossible.

2.1.16.1 Classification According to Element of Cost

a) **Direct Cost:** All those expenses, which can be directly traced or identified with each unit of the product, are direct costs. Key elements of direct costs are as follows.

i) **Direct Material:** The cost of material, which is directly and conveniently identifiable or traceable to each unit of product, is defined as direct material. Direct material also known as raw material is the main ingredient of the finished product. A tangible product is almost impossible without the direct material.

ii) **Direct Labour:** The cost of labour that can be directly traced to each units of product without any appointment basis is known as direct labour. Direct labour is therefore, defined as the employment of those workers who are physically engaged in the production of the output.

iii) **Direct Expenses:** Any expenses other than the direct material cost and direct labour cost, which are directly incurred on a particular product.

b) Indirect Cost (Overhead Cost)

All those expenses, which cannot be directly traced or identified with each unit of product, are overhead costs. In fact, overhead costs are indirect costs, which cannot be directly charged to a particular unit of product without allocation based on some appropriate methods. All expenses other than prime costs are overhead costs or indirect costs.

i) Indirect Materials: Items of indirect materials cannot be identified with any one product; indirect materials are used for the benefits of all products rather than for any one particular product.

ii) Indirect Labour: The remuneration of all employees who do not work on the product itself but who assist on the manufacturing operation are classified as the part of indirect labour costs.

iii) Indirect Expenses: Any expenses other than mentioned above are classified as indirect expenses. One has to apportion indirect expenses over the products on appropriate basis.

2.1.16.2 Classification According to Function of Cost

Any organization is consisted with various functions. All of these functions incur costs. For a manufacturing business enterprise, costs can be assigning to the following functions.

i) Manufacturing Cost: Manufacturing costs are all production costs incurred to manufacture the products and to bring them to saleable condition, including the direct material, direct labour and factory overheads. Manufacturing overhead is known as factory expenses, factory overhead or factory burden.

ii) Administrative Cost: Expenses relating to the overall management of the enterprise are administrative costs.

iii) Marketing or Selling Costs: Expenses needed for sales promotion, actual sales activities and post-sales services are included in marketing or selling cost. These would include all cost necessary to receive customer order and get the finished product or service into the hands of the customers.

2.1.16.3 Classification According to Behavior of Cost

Management of any organization wants to know how costs will be affected by changes in the organizational activity. There exist relationship between cost and

activity. Such relationship between cost and activity is known as cost behavior, which affect the management functions of planning, controlling and decision-making. Cost behavior pattern helps to predict the cost for different level of activities.

- **Variable Cost:** Variable cost varies in direct proportion to change in the activity level. If the activity level increases by 50 percent, the amount of variable costs also increases by 50 percent as well. Variable cost in total increase or decrease.

If the activity level increases or decrease but it remains constant if expressed on per unit. The idea that a variable cost per unit is constant but varies in total with the activity level crucial to understanding of cost behavior patterns.

- **Fixed Cost:** Fixed costs remain constant in total amount despite the changes in the level of activity. That the fixed cost remains unchanged in total as the activity level varies. But a fixed cost per unit does change as activity varies. Fixed cost per unit decreases as the level of activity increases and vice-versa. But for internal uses, fixed costs should not be expressed on unit basis because of the potential confusion involved.
- **Semi-Variable Cost:** Expenditure that cannot be categorized as purely fixed or variable is termed as mixed cost or semi-variable cost. Mixed cost contains both variable and fixed cost elements. In mixed cost, variable cost element is added to the fixed element as such mixed cost line slopes upward in the graph.

In practice, mixed costs are varying common. The fixed portion of a mixed cost represents the basic, minimum cost of just having a service for use. The variable portion of mixed cost represents the cost incurred for actual consumption of goods or services. The variable element varies in proportion to the amount of services or goods that is consumed.

2.1.16.4 Classification According to Decision-Making

Decision-making is one most crucial function of management. Decision-making is a process of selecting the best alternative among various courses of actions available. For decision-making costs can be classified as relevant and irrelevant, avoidable and unavoidable costs, out of pocket costs, opportunity cost, sunk cost & differential cost.

i) Relevant Cost: Relevant costs are those costs, which differ from one alternative to the next. Relevant costs pose two fundamental characteristics.

- Relevant costs are future costs
- Relevant costs will be different for each alternative

ii) Irrelevant Cost: All costs other than the relevant costs are irrelevant for decision-making.

- All past costs are irrelevant.
- Those costs, which are likely to be same, under-either alternative is irrelevant.

iii) Avoidable and Unavoidable Cost: sometimes the terms avoidable and unavoidable costs are used instead of relevant and irrelevant costs. Avoidable costs can be saved by dropping a department or product or an alternative. Therefore, only the avoidable costs are relevant for decision-making.

iv) Out of Pocket Cost: Out of pocket, costs mean the cash incurred on an activity. Since, out of pocket, cost involves a cash outlay; it is very important for external reporting and internal planning & decision making both.

v) Opportunity Cost: An opportunity cost can be defined as the potential benefit that is lost or sacrificed when the choice of one course of action requires the giving up of an alternative course of action. In decision-making, opportunity costs are as equally important as the out of pocket costs which is not cash outlays. Rather these are the benefits foregone in the next best alternative.

vi) Sunk Cost: A sunk cost is that cost which has already been incurred and there cannot be any decision made now or in the future. All sunk costs are irrelevant for decision making because these are past costs, which do not alter with the change in decision.

vii) Differential Cost: The economist's marginal cost concept is same thing as the accountant's differential cost concept. Marginal cost is the change in total cost owing to the change in output. More precisely, marginal cost is the increase in cost due to one more unit of output produced. Marginal cost concept has a greater significance in decision making like accepting or rejecting of short-term special orders, because the price of the product must cover at least marginal cost.

2.1.16.5 Classification According to Control

i) Controllable Cost: A cost is considered to be controllable cost if that can be managed or changed with in the related responsibility centre (even lower level of management) and within the given period of time (short run).

ii) Non-Controllable Cost: Any cost which is not subject to change with in the related responsibility centre (lower level of management) and within the short time span is called the non-controllable cost. All costs are controllable at some level in a company. Only at the lower level of management, some costs can be considered non-controllable. Controllability of costs fully depends on two horizon i.e. product cost and period cost.

- **Product Cost:** Those expenses, which matter for the volume of production and inventory valuation, are product costs. Product costs become assets when incurred in the course of production and expensed when outputs are sold.
- **Period Cost:** Those expenses, which do not matter for the volume of output, rather incur with the passage of time or volume of sales is period costs. All period costs are expensed at the time of occurrence.

2.1.17 Segregation of Semi-Variable Cost

There are various types of method to break mixed cost into variable and fixed. But in practice high-low method and least-square method are mostly used.

2.1.17.1 High - Low Method

In the high-low point method the semi variable cost is segregated into fixed and the variable components using exactly two data points. The two points consists of selecting the periods of highest and lowest activity levels comprising the changes in cost that result from the two levels.

2.1.17.2 Least-Square Regression Method

The term least square means that the sum of the squares of the deviations from the plotted points to the regression line is smaller that would be obtained from any other line fitted to the data. So that in trend line analysis drawn from the relationship between the independent and dependent variables. The least square straight-line trend gives more reliable estimate than any other methods. In cost estimation in relation to activity levels, activity volumes are defined as independent variable(X) and the mixed costs relating to that activity as dependant variable(Y). Then the amount of dependent variable or cost(Y) for any level of independent variable or production(X) can be explained through following least square straight line.

Least square straight line Y on X, $Y = a + b.x$

Where,

a = Fixed cost per period

b = Variable cost per unit

n = Number of observations

X = Activity measures (units or hours)

Y = Total mixed cost observed

Since (b) stands for variable cost per unit and (a) stands for fixed cost per period, the value of (a) and (b) should be computed to segregate the mixed cost into variable and fixed components. Value of (a) and (b) can be directly estimated using simple mathematical formula.

2.1.18 BEP for sales Mix/Multi-product

CVP analyze is applied to individual product level and company level. In applying CVP analysis for overall company, the problem of sales mix arises. Sales mix can be define as the relative combination of products represented in total sales. If only one product or similar products are involved, the complication of sales mix is avoided. In case of multiple products, the managers try to achieve that combination or mix that will yield the greatest amount of profits. Most companies have several products and these products are often not equally profitable. Profit of the company will also depend on the sales mix. Profit will be greater if high margin items make up a relatively in large proportion of total sales than if sales consist mostly of low margin items. Changes in the sales mix can cause interesting variations in a company's profits. A shift in the sales mix form high margin items to low margin items can cause total profit to decrease even though total sales increase. The changes in sales mix will also bring changes in BE sales. The sales mix is used to compute a weighted average unit contribution. This is the average of the several products unit contribution margin weighted by the relative sales proportion of each product. The following procedures are followed to calculate BEP sales mix/ multi-product.

- Overall BEP(in unit) $= \frac{TFC}{\text{OverallCMPU}}$
- Overall BEP(in Rs) $\frac{TFC}{\text{OverallPVR}}$
- Required sales for desired profit(in unit) $= \frac{FC + DP}{\text{CMPU}}$

$$\text{Required sales for desired profit(Rs)} = \frac{FC + DP}{PVR}$$

2.1.19 Sensitivity Analysis of CVP

Sensitivity analysis is the measurement of elasticity of change in cost, volume and profit factors or break-even point or given profit. The strategist should focus more on the factors which is more sensitive or responsive for profit. To measure the sensitivity of the cost-volume-profit has been increase by 10 percent. In other words sensitivity analysis is the measurement of responsiveness in outcomes with the change in determinant variables. We know that, of business enterprises is to maximize profits. Profits are the excess of revenue over the total costs.

Net profit = Total sales revenue – Total cost

$$= \text{Sales units SPPU} - \text{sales units} * \text{VCPU} - \text{FCS} - \text{Taxes}$$

But one of the factors remains unchanged; some time the manager can intentionally change the price and cost factors a part of strategic decision. But the strategy should focus more the factors, which is more sensitive, or responsive for profit. Therefore, to measure the sensitivity of CVP factors one can see the impact certain percentage of change in volume, price, or cost factors on net profits (*Bajracharya, et. Al., 2004: 245*). Profit is the function of several of factors. It is affected by change in volume, cost and prices. Profit may be affected by the changes,(increase or decreases),in the following factors (*Pandey,1999:203-208*).

- **Effect of price Changes:** An increase in the selling price will be the increase the PV ratio, and as a result will lower the break-even point. On the contrary a decrease in selling price will reduce the PV ratio and therefore, result in a higher break-even point.
- **Effect of Volume Change:** A change in volume, not accompanied with change in the selling and cost will not affect PV ratio. As a result, the break-even point remains unchanged; profit will increase in volume and will be reduced with the decrease in volume.
- **Effect of price and volume changes:**
- A change in price invariably affects volume. A price reduction increase demand of the product and increase in price may result in increased volume. On the other had, increase in price may adversely affect the demand and thus, reduce volume. The impact on profits under these circumstances is not

obvious. Profit may increase with a price reduction if volume increases substantially. Similarly, a price rise may reduce profits if there is material fall in volume.

- **Effect of Change in Fixed Cost:** A change in fixed cost doesn't influence PV ratio. Other factors remaining unchanged, a fall in fixed costs will however, lower the BEP and raised profits. An increase in fixed costs caused either due to some external factors or due to some changes in the management policy, will raise BEP. Increase in factory rent or insurance and taxes are examples of external factors, while increase depreciation or salaries of managers may be the result of management decisions.
- **Impact of Change in Variable Cost:** The impact of change in variable cost on profit is straight forward if it does not cause any change in selling price and volume. An increase in variable costs will lower PV ratio, push up the BEP reduce profits. On the other hand, if the variable costs decline, PV ratio will increase. BEP will be lowered and profit would rise.
- **Impact of Change in a Combination of Factors:** The management account, evaluating profit plans or budgets, must realize that a change in one factors leads to a change in another factors. Therefore, all such changes should be carefully visualized and their net impact on profit must be seen.

2.1.20 Limitation of cost volume profit analysis

Cost volume profit analysis constitutes a very useful tool for management planning. However, certain underlying assumption upon which it rests place definite limitations on conclusion which can be drawn from its result. The following are the major limitation in the cost-volume-profit analysis.

- It is assumed that the production facilities anticipated for the purpose of cost-volume-profit analysis do not undergo any change. Such analysis given misleading result if expansion or reduction of capacity takes place.
- In case where a variety of products with varying margin of profit are manufactured, it is difficult to forecast with reasonable accuracy the volume of sales mix which would optimize the profit.
- The analysis will be correct only if input price and selling price remain fairly constant which in reality is difficult to find. Thus, if a cost reduction program

is undertaken or selling price is changed, the relationship between cost and profit will not be accurately depicted.

- In cost-volume-profit analysis, it is assumed that variable costs are perfectly and completely variable at all level of activity and fixed cost remains, constant throughout the range of volume being considered. However, such situation may not arise in practical situation. Overall many variable costs are curvilinear costs.
- It is assume that the change in opening and closing inventories are not significant, through sometimes they may be significant.
- Inventories are valued at variable cost and fixed cost is treated as period cost. Therefore, closing stock carried over to the next financial year does not contain any component of fixed cost. Inventory should be valued at full cost in reality.

2.2 Review of Previous Studies

To get the idea and knowledge of some previous studies, related to the subject matter various thesis needs to be studied and undertaken. It is a way to investigation problems that has already been definitely answered. It provides the basic information for generating a comprehensive theoretical framework from which hypothesis can be developed for testing. But there are very few research papers concerning comprehensive cost, volume and profit analysis has been conducted. Few dissertations have been submitted relating to cost volume profit analysis and the study is limited of various constraints. So this study is attempted to review the previous research work on profit planning and control as well as management accounting. As CVP analysis is one of the major tools of PPC. This research work is related to application of CVP analysis in decision making too. It was very hard to get the precious dissertation in CVP analysis of Butawal Power Company Ltd. However, some previous studies related to CVP and PPC are reviewed which will helpful to further study.

Rijal (2005) has conducted a studied on “*CVP Analysis of a Tool to Measure Effectiveness of Profit Planning and Control: (A Case Study of Nebico Private Limited)*”. His research is based on primary data as well as on secondary data and information's. Questionnaire method is used to collect primary and raw data. His study has made a great impact in Nepalese organizations, whether Nepalese

organizations can practice CVP analysis and make improvement through it or not. CVP analysis tool is effective for profit planning can be figured out. Through his outstanding research we can find out some recommendable findings and suggestion. Some of the remarkable findings were as follows:

The main objective of his study was to examine CVP analysis to measure effectiveness of TPC of profit planning of STCL. To achieve to main objective, following sub-objectives were set.

- To study interrelationship of cost, volume and profit.
- To analyze the impact of CVP on profit planning.
- To evaluate the profitability, financial position and sensitivity cost of STCL.

Major findings:

- No classifications of items are done as fixed and variable.
- No clear and defined guideline for objectives, responsibility and duties.
- Lack of decision making power at middle and lower level.
- Lack of effective inventory policy.
- Lack of effective controlling tools to deduce unnecessary costs.
- Need to establish a separate research and development department for better result in future.
- Need of systematic approach towards, comprehensive profit planning.

Dhakal (2005) has conducted studied on “*Cost Volume Profit Analysis as a Tool to Measure the Effectiveness of Profit Planning and Control:(A Case Study of Gorkhakhali Rubber industry Limited)*”. In the partial fullment for MBS, submitted to Shanaker Dev Campus, Tribhuvan University. The objectives of the study were:

- To analyze the cost volume profit for the company.
- To measure the effectiveness of profit planning and control tools.
- To examine the variation between production plan and actual production.

Finding:-

- The Sales plan of GRIL is not properly maintained. The industry uses the various methods for sales planning like market survey, distribution network etc. But up to date record are not maintained. So they have poor budgeting system.

- It has been found that the GRIL is in high interest bracket, out of the total fixed costs almost 60% is to be paid for interest.
- This industry does not have any detailed and systematic practice of planning of cost which is one of the essential elements of profit planning and control.

His major recommendation:

- GRIL should clearly define its goal and objectives and management should develop annual and long term profit plan.
- GRIL is bearing huge amount of fixed cost for employee expenses which is not good for the organization. It should initiate the cost control program.
- The industry if possible should establish separate costing department. Cost classification must be made within the specific framework of responsibility and time.

Gurung (2006) has done studied on "*Cost Volume Profit Analysis of public enterprises in Nepal*". He has done comparative analysis between Nepal telecomm and Nepal electricity. His studied was in partial fulfillment of MBS submitted to the central department, Tribuvan University.

Main objectives of his study:

- To study and analyze the existing provision regarding cost of public enterprises in Nepal i.e NTC and NEA.
- To identify breakeven level of both enterprises for avoiding losses.
- To study comparatively about P/V ratio, BEP, margin of safety and sales volume of these enterprises.

Findings:

- Segregation of fixed and variable cost is ignored by both enterprises. CVP analysis is not practicing by these enterprises. No any method has been adopted to segregate cost into fixed or variable.
- Variability cost of NTC is very less compare to its fixed cost and contribution margin ration of NTC is very high. But NEA has high variable cost and its contribution margin ratio is less.
- Sensitivity test shows that the changes in various factor causes to increase or decrease the CM ratio, BEP, margin of safety etc. Both the enterprises have same impact on sensitivity test.

Recommendation:

- In Nepal most of public or private enterprises have not practices CVP analysis in systematic manner. So it is suggested that every public or private enterprises should apply or practice CVP analysis.
- CVP analysis shows the relationship among the variable related to cost, revenue profit. So this tool is very much useful to every organization.
- Cost plan of both enterprises are not systematically maintain so cost of every sector should plan properly.

Aryal (2006) has done studies on “*CVP Analysis as a Tool to Reassures Effectiveness of PPC (A Case Study of Herbs Production and Processing Co. Ltd.)*”. He used primary and secondary sources to data collected and used seven years data from FY 2056/57 to FY 2062/63

Main objectives of his study:

- To analyze the variance between target and actual sales of HPPCL.
- To evaluate the profitability financial position HPPCL.
- To provide suitable suggestions and recommendations based on the analysis for improving of HPPCL's condition etc.

Findings:

- Budget was prepared on traditional method.
- HPPCL has burden of management and administration expenses and interest on loan which is directly influencing the profitability.
- HPPCL adopted traditional pricing method to determine price, which may not be appropriate in today's competitive market.
- HPPCL is suffering from huge losses; so in every year has negative net profit margin ratio.
- Profit volume ratio of the company is in fluctuated trend, which effects on BEP of the company.
- Margin of safety of the company is negative trend. So company could not sold properly and suffering from losses.

- BEP of the company is analysis higher than Actual sales. So the company should not maintain its expenses.

Adhikari (2008) has done studied topic “*A Study on Cost Volume Profit Analysis as Managerial Tools to Plan Profit of Bottlers Nepal Ltd*”. The objectives of the study were:

- To study relationship to cost volume and profit as managerial tool to plan profit.
- To analyze the cost volume profit of the company and its impact in planning profit.
- To evaluate the sensitivity on profitability.
- To provide suggestion and recommendation of operation of BNL

He conducts the following result after the studied. The Segregation of fixed and variable cost is ignored by BNL. No any method has been adopted to segregate cost into fixed or variable also Sales and production target are not achieving because there is not an effective forecasting system and enterprises has no financial plan, they have only sales and production plan in terms of required budget.

Recommendation:

- Analyze the SWOT.
- Apply participatory management system.
- Apply budgetary control system.
- Classify the cost.

Subedi (2009) has conducted studied on “*Cost Volume Profit Analysis as a Tools to Measure the Effectiveness of Profit Planning and Control: (A Case Study of CVP analysis of Dairy development corporation Nepal)*” in the partial fulfillment for MBS.

The objectives of the study were:

- To fine out the target, actual sales and profit of DDC.
- To analyze the variances between target, actual sales and profit of DDC.
- To evaluate the profitability position of DDC.
- To access the cost volume profit of the DDC and its impact in profit planning.

Findings from his Study:

The corporate has failed to achieve budgeted sales during the study period also The Appropriate and effective sales forecasting techniques like survey method and statistical are not in practice and DDC has not practiced cost volume profit tools for profit planning because the corporation has not any proper policy for using CVP tools.

Kairatee (2010) has prepared studied on "*Application of CVP analysis in Decision Making*". in the partial fulfillment for MBS.

Main objectives of his study:

- To study and analyze the variable and fixed of BPC and CHPCL along with contribution margin and operating profit.
- To analyze the Break Even 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.

Findings from his Study:

- The generation of electricity from the both company is found increasing every year.
- BPC & CHPCL sales electricity to NEA under PPA. However, BPC also sales electricity to local consumer.
- The fixed cost if CHPCL is much greater higher than BPC during first four years of operation.
- Contribution margin and break even of both the company is increasing due to increase in sales volume.

Recommendation:

- 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.

- They should focus on selling to NEA.
- Both companies should control the major break downs to unitize their maximum capacity.

Panthi (2010) has conducted studied on “*Cost Volume Profit Analysis as a Tool to Measure the Effectiveness of Profit Planning and Control :(A comparative study on Case CVP Analysis of “Kantipur and Gorkhapatra Publication”*) in the partial fulfillment for MBS. The objectives of the study were:

- To evaluate and analyze the breakeven point of publication for avoiding losses.
- To analyze P/V ratio, BEP, MOS and volume of the enterprise comparatively.
- To examine the cost components as per their behaviors.

After conducting various calculations and obtaining information Panthi found that: Sales of Kantipur publication are increasing every years in fluctuating rate while sales of Gorkhapatra corporation has increasing in lower rate than Kantipur publication. The sales plan of Kantipur publication has systematic but Gorkhapatra.Corporation has not systematic. So, Gorkhapatra Corporation, it is difficult to achieve their target and variable cost of Kantipur publication is higher compare to its fixed cost. Contribution margin ratio of Kantipur publication is very less while it is satisfactory in place of Gorkhapatra corporation. It is also found that Kantipur publication is running in profit while Gorkhapatra Corporation has fluctuating profit. Kantipur publication has earned reliable profit and has made it able to stand as one of the most successful publication of the country. In other hand, Gorkhapatra Corporation has no satisfactory position. No any systematic plans have been implanted for preventing the loss and improve profit by Gorkhapatra Corporation.

Pandey Raj (2011) has conducted studied on "*Cost Volume Profit Analysis as a Tool of Profit Planning and Control (A Case Study of Salt Trading Corporation Limited)*". He used all secondary data not primary data to data collected.

Main objectives of his study:

- To analyze the cost, profit and loss of STCL.
- To study the relationship of cost, volume and profit.
- To analyze the impact of CVP of the company on productivity.

Major Findings from his Study:

- . Sales of the corporation seemed volatile.
- . Total cost (fixed and variable) of salt trading corporation limited is seemed fluctuating.
- . The corporation has no details of systematic expenses planning are essential for PPC.

2.3 Research Gap

There is the gap between this research and previous research studies were based on cost-volume and profit analysis in various sectors for profit planning and decision making. But the study does not find any research in Hydropower company with reliable data (reference) to Butwal Power Company Limited but they only analysis of income and expenditure for profit planning, mainly in this research I am focusing the analysis of Cost-Volume and Profit of BPC by using all the tools of CVP analysis (like: MOS, BEP, P/V & C/M ratio) with current data. Then in this research I am going to indicate some of the possibilities on hydropower to keep constant budgeting capacity and to explore the impact of BPC to NEA. This research suggested to company and government to solve present scenario with some suitable and possible suggestion.

CHAPTER-III

RESEARCH METHODOLOGY

Research is the process of search of any particular topic or subject. It is a careful search of any subject matter. It provides various tools and techniques to analyze and interpret various aspects of research works. This research work is directed towards the systematically analysis of cost-volume and profit with special reference. The research methodology has been presented with an objective to perform various financial and technical analyses through CVP analysis and draw the result to provide proper recommendation to the Butawol Power Company Limited.

This chapter aims to accomplish the study in realistic term with sound empirical analysis. The main content of research methodology includes Research design, Population and Sample, Data collection techniques and tools and techniques of analysis.

3.1 Research Design

Research design means defining procedures and techniques which guide to study and propound ways for research work. It is an important part of research work; if the design is defective the result obtained will be useless. Therefore, careful attention should be given regarding the preparation of research design; otherwise there will be no effective use of resources. Thus, the research design minimizes the mistake, during the period of research work.

This research work attempt to show relationship among cost, volume and profit in hydro power company with special reference of Butwal Hydropower Company limited. Basically, secondary data of financial performance are used for study. In this research descriptive and analytical method will be adopted.

3.2 Population and Sample

A large group about which the generalization is made is called the population under study, or the universe and small portion on which the study is made is called the sample of the study. Research population would be all company of Nepal. Due to various circumstances it would not be possible to attempt all the number of research population regarding in this research. The hydropower company of Nepal has been

used as a research population for the study. Due to various circumstances and lack of time and resources it could not be possible to attempt all the numbers of research population in this research. So, Butwal Power Company Limited is considered as sample study through random judgment basis which are huge and most important Public Limited Company of Nepal in hydroelectricity sector. Similarly, the financial statement of five years beginning from fiscal year 2063/64 to 2067/68 is selected as sample for the purpose of research.

3.3 Data Collection and Technique

This has been conducted on the basis of the information's collected from the questionnaire, interviews, textbooks, magazines, periodicals, newspaper, bulletins etc. A structure questionnaire was designed to collect the required information; primary data have been collected from the interviews and questionnaire methods. Especially this research is based on secondary data. So the data collection primarily focuses on secondary data sources. The major sources of secondary data collection used in this report are as follows:

- Library of SDC and SEBON
- Booklets
- Books ,journals, Newspaper and Magazine
- Companies' publication like: Annul reports, Brochures, Bulletins, Articles etc.
- Internet and websites.
- Publication of Ministry of Water Resources
- Previous dissertations

For the sake of designing the contents of the questionnaire, suggestions and ideas have been collected from experienced scholars. Mainly following types of tools were conducted to collect primary data.

a. Focus Group Meeting:

Focus group meeting were conducted to gather the information from the experts who are engaged in the field of hydropower sector's activities and expert in hydroelectricity.

b. Observation:

Under observation method, I have used observation diary from related hydropower, checklist, and score cards to gather primary data in this research.

Secondary data are collected by visiting own selves on different institutions and offices to gather books published by different writers ,articles ,magazines , newspapers, reports, Nepal government gazette and especially from Internet browser.

3.4 Tools Used

Both descriptive tool and quantitative tools have been used in this research to make it fruitful and more relevant.

Descriptive tools:

The descriptive technique is used to simplify the understanding as well as analysis of data in theoretical form. It describes how the data are behaving in descriptive way which helps to draw the conclusion and recommendation easily.

Accounting Tool

Financial tools are the main tools for systematic analysis of gathered data. It provides tools in mathematical form to analyze the data.

a. Contribution Margin

Contribution margin is different between the sales and the variable cost of production. CM consists the fixed cost and profit i.e. contribution margin is the amount that contributes to recover of all fixed costs and to the generation of profit. It can be expressed as

$$\text{Contribution margin} = \text{Sales} - \text{Variable cost}$$

Or

$$\text{Contribution Margin} = \text{Fixed cost} + \text{profit}$$

Or

$$\text{CM ratio/ PV ratio} = \frac{CM}{Sales}$$

$$\text{BE sales value} = \text{FC} + \text{VC} \pm \text{profit}$$

This tool is used to analyze profit after deducting the cost which is directly related to sales unit.

$$b. \quad \text{Variable cost ratio} = \frac{\text{variable cost}}{\text{sales revenue}}$$

This tool is used to analyze the percentage of variable cost in sales.

c. Break even tool analysis

$$\text{Break-even point (BEP in unit)} = \frac{\text{Fixed Cost}}{\text{CMPU}}$$

This tool used to determine the minimum quantity to be reduced and sold to cover all the cost of the company.

$$\text{Break-even point (BEP Rs)} = \frac{\text{Fixed Cost}}{\text{PVR}}$$

This tool is used to identify the minimum value of goods to be sold to cover all the cost of the company.

$$\text{Break even ratio} = \frac{\text{BEP (in units or Rs)}}{\text{Sales (in unit or Rs)}}$$

This tool us used to identify the percentage of breakeven point in sales.

d. Margin of safety tool analysis

$$\text{Margin of safety (in units)} = \text{Sales in unit} - \text{Break even point in units}$$

This tool is used to identify the quantity remain for generating profit of the company.

$$\text{Margin of safety (in rupees)} = \text{Sales in rupees} - \text{Breakeven point in rupees}$$

This tool is used to identify the amount remaining to generate profit after covering all the cost.

$$\text{Margin of safety ratio} = \frac{\text{margin of safety (in unit or rupees)}}{\text{sales (in units or rupees)}}$$

This tool analyzes the percentage of margin of safety in sales to generate profit.

e. Profit/ volume ratio

This term is important for studying the profitability of operations of a business. Profit/volume ratio (i.e. P/V ratio) establishes a relationship between the contribution and the sales value.

$$\text{Profit Volume ratio (PV ratio)} = 1 - \frac{\text{VC}}{\text{Sales}} \text{ or } \frac{\text{change in profit}}{\text{change in sales}}$$

Statistical Tools

For the purpose of analysis and presentation of research work in beautiful manner different statistical tools and techniques have been used in this thesis. It is hope that

the tools and techniques will be sufficient enough to present the analysis and findings of the research work in simple but beautiful manner. Data tabulation, graphic approach, regression methods have been used for the sake of tabulation of data and classification the mixed cost into fixed and variable costs. In this study the following statistical tools are used:

- **Bar Diagram**

Bar diagram are one of the easiest and the most commonly used methods of presenting the numerical date. They present the data by means of bars, or rectangles of equal width. The length of the bars represents the given figures and the width may be of any size.

- **Mean**

The sum of all the observations divided by the number of observations is called Mean. I n such cases all the items are equally important. It is usually devoted by X. It is defined by the following formula:

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

Where,

ΣX = Some of Observation

N = Number of Observation

- **Standard Deviation (S.D.)**

The standard deviation is defined as the positive root of the mean of the squared deviation from their mean of a set of values. It is also known as Root Mean Square Deviation. It is usually devoted by the Greek letter & (Small Sigma)

The SD is calculated by the following formula:

$$SD = \sqrt{\frac{\Sigma x^2}{N}} \quad (x^2/N)$$

Where, $x = X - \text{Mean}$

- **Coefficient of Standard Deviation (CSD)**

The relative measure of dispersion based on SD is called coefficient of SD.

Thus,

$$\text{Coefficient of SD} = \text{Mean}/SD$$

Where, = Standard deviation

100 times coefficient of SD is called coefficient of variation. It is denoted by C.V. thus,

Coefficient of SD = $100 \times \frac{\text{SD}}{\text{Mean}}$

▪ **Correlation Analysis**

The degree of relationship between two variables at a time is called correlation. In other words, two variables are correlated in such way that if one variable changes then other variables also changes subsequently.

$$\text{Coefficient of correlation}(r) = \frac{\sum xy}{\sqrt{\sum x^2 \times \sum y^2}}$$

The correlation coefficient measures the degree of correlation between Y on X. It should be between + 1 and -1. If not there is no correlation between two variables.

▪ **Coefficient of Determination (r²)**

A meaningful analysis is available from the square of correlation coefficient (r²), which is called the coefficient of determination and calculated using the following formula:

$$\text{Co-efficient of determination (r)} = \mathbf{r^2}$$

3.5 Limitation of Research Methodology

- It is focused on secondary sources of data. The primary sources are only used for clearance of information.
- It largely uses the tools and techniques regarding CVP analysis.

CHAPTER-IV

DATA PRESENTATION AND ANALYSIS

In order to fulfill the objectives of this study, presentation, analysis & interpretation of relevant data of Butwal Power Company Limited has been made in this chapter. The purpose of this chapter is to introduce the mechanics of data analysis and interpretation. In this chapter both primary and secondary data are presented in systematic manner. The collected data are presented in systematic formats and analyzed using different appropriate tools and techniques. The presentation and analysis of data includes collecting, organizing, tabulating, graphing and performing statistical analysis. Here, primary and secondary data collected from different sources are presented in understandable form and analyzed separately using both qualitative and quantitative measure whichever is appropriate. The major findings of the research depend on data presentation & analysis. Here, only five years data i.e. from 2063/64 to 2067/68 is considered for analysis. The data related to Butwal Power Company limited is discussed below.

4.1 Electricity generation and sales of BPC

As we know that Electricity Act has open energy sector, any person or corporate body who desires to conduct survey, generation, transmission, 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 1000 kilowatt.

After obtaining the license, electricity can 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 dry season. For the expert of electricity bilateral arrangement exist with India.

Butwal Power Company Limited is one of the leading hydropower companies which generate and sell electricity on the basis of above conditions. They only sell electricity to the 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.

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 + 13MW = 17.1MW

Total capacity in a year = (5.1 * 24 * 365) MWh + (12*24*365) MWh
 = 44676MWh + 105120MWh
 = 149796MWh
 = 149796 *1000 KWh
 = 149796000MWh

The Production of electricity and capacity of major project in Nepal presented the following table and figure below.

Table 4.1

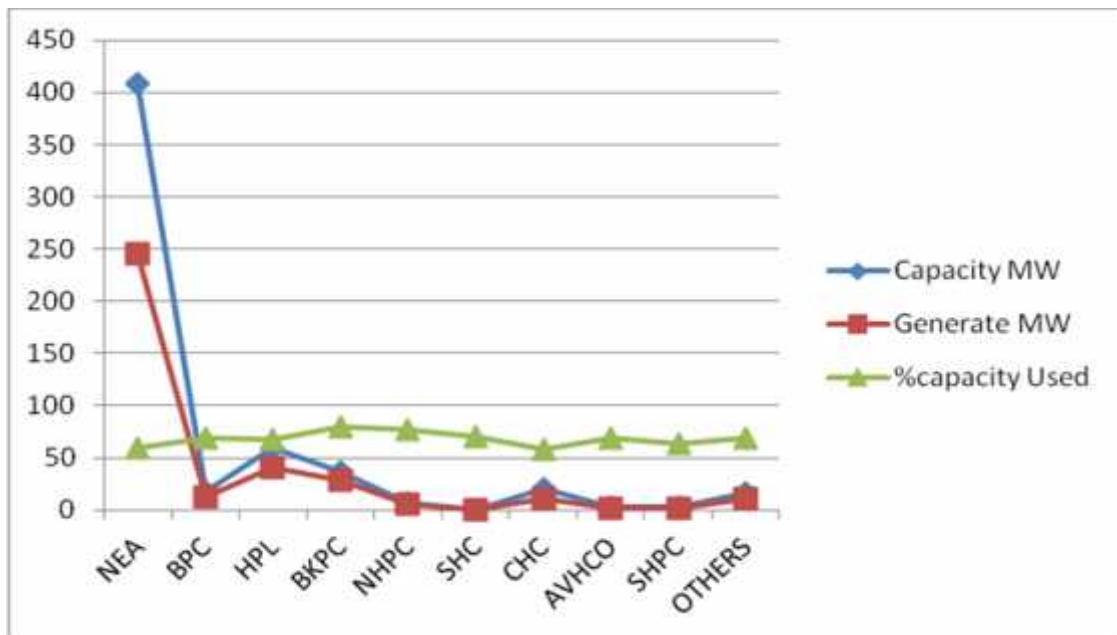
Production and their Installed Capacity of Major Hydropower company in Nepal

Company	Capacity MW	Generate MW	%capacity Used
NEA	407.9	245.22	60.12
BPC	17.1	11.80	69.01
HPL	60	40.30	67.17
BKPC	36	28.8	80
NHPC	7.5	5.82	77.60
SHC	0.2	0.14	70
CHC	20	11.53	57.65
AVHCO	3	2.06	68.67
SHPC	2.6	1.66	63.85
OTHERS	16	11	68.75
Total	570.3	358.33	62.83

Source: Annual Report of BPC, (2063/64-2067/68)

The Above figure presents the capacity and their recent electricity generation. It present that all the company cannot generate their installed capacity. With comparing the companies NHPC is more success than other company to utilization of their capacity. NEA utilized only 60.12% of their capacity like BPC, HPL, BKPC, NHPC, SHC, CHC, AVHCO, and SHPC utilized 69.01, 67.17, 80, 77.60, 70, 57.65, 68.67 and 63.85, percentage respectively.

Figure 4.1
Electricity Generate and their Capacity



Source: Annual Report of BPC, (2063/64-2067/68)

The above figure present the electricity generates and installed capacity of different hydropower company in Nepal. In above figure we can saw NEA generate maximum electricity than other company but below installed capacity like all the company cannot generate electricity with their installed capacity.

4.1.1 Generation of Electricity:

Generation division 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.

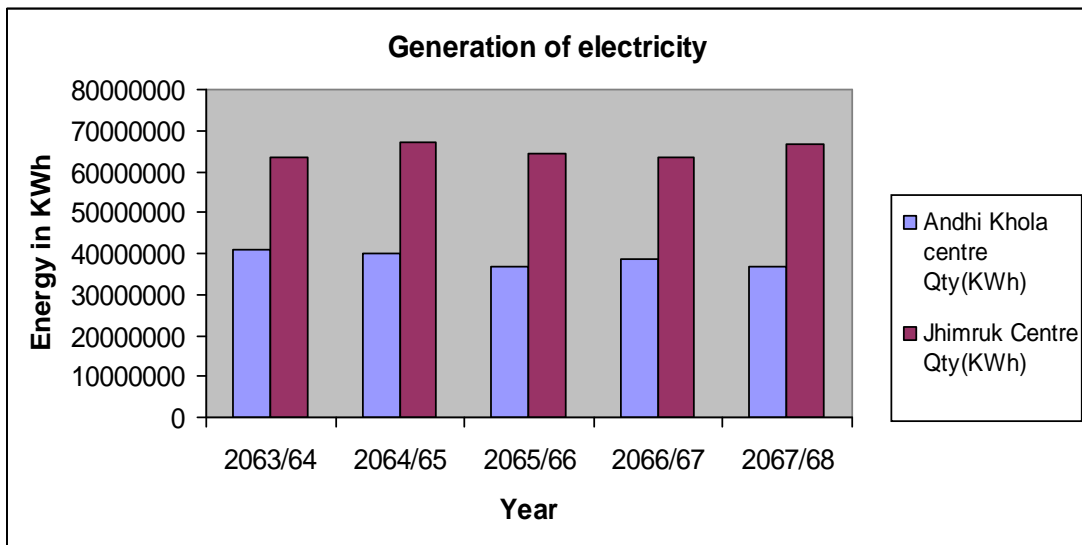
Table 4.2
Generation of Electricity

Year	Gneration				Total		
	Andhi Khola centre		Jhimruk Centre				
	Qty(KWh)	Plant Factor (%)	Qty(KWh)	Plant Factor (%)	Qty(KWh)	Qty(KWh)	Change (%)
2063/64	40735100	91.18	63245613	60.17	103980713	69.41	-
2064/65	40198200	89.98	67193384	63.92	107391584	71.69	3.28
2065/66	36657000	82.05	64541000	61.39	101211000	67.56	(5.75)
2066/67	38679000	86.57	63227000	60.15	101906000	68.03	0.69
2067/68	36902376	82.6	66751200	63.5	103653576	69.20	1.72
Total	193171676		324958197		518129873		

Source: Annual Report of BPC, (2063/64-2067/68)

The table 4.1 shows that BPC generate electricity from two plants. In the fiscal year 2063/64 BPC has generated 103980713 KWh electricity. The generation of electricity from both the plant is reached to 107391584KWh in fiscal year 2064/65 which the highest till this date. The average load factor in this year is 71.69% .But after this fiscal year generation has reduced to 101211000 KWh due to various reasons then again, the generation of the electricity is increasing every year, it is unable to achieve the installed capacity of 149796000KWh. The table shows the the generation has decreased in year 2064/65 , 2065/66 and 2067/68 from Andhi Khola plant by 1.32% , 8.80% &4.59% .Likewise, the generation has decreased in year 2065/66 and 2066/67 from Jhimruk plant by 3.95% & 2.04%.But again , it has increased in this year. The average plant factor of Andhi Khola and Jhimruk centre of 2067/68 are 82.6% and 69.20%.The reasons for increasing trend in generation of BPC is the commitment of management to continual improvement , timely maintenance to reduce downtime and the efficient use of resources, the hard work of staff members and effective coordination with different parties. Every effort is made every year to maximize the output from the plant despite the frequent breakdown of major equipment.

Figure 4.2



Source: Annual Report of BPC, (2063/64-2067/68)

The above figure present the annual electricity generate of BPC from different power plants. Looking at above table 1 the capacity of Adhikhola is less than Jhumruk power plant so production of Adhikhola is lower than Jhumruk because of their capacity.

4.1.2 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 consumer). The largest portion of revenues comes from sales to NEA.

Sales of generate electricity by BPC to different sectors

BPC sales electricity to NEA and other sector 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 80.5GWh from Andhi Khola and Jhimruk respectively and BPC's sales to other sector is 19.9GWh till 2067/68.Sales to consumer or distribution in B PC started through AndhiKhola hydroelectric and rural electrification project (AHREP) in 1990 AD. BPC distribute electricity in 4 districts of westerns and mid western region of Nepal. The districts are Syangja, Palpa,Pyuthan and Arghakhanchi. BPC consumer are categorize as either industrial or domestic, and domestic consumer are further subdivided into metered and cutout. There are 37948 consumers in the fiscal year

2067/68. These consumers are provided service through two distribution centre and two branch offices. These two distribution centre are Syangja & Palpa distribution centre located at Galyang and Pyuthan/Arghakanchhi distribution centre located at Nayagaun, 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 (2067/68), UOs has reached to 112 to provide service to consumers.

Table 4.3
Sales of generate electricity by BPC to different sectors

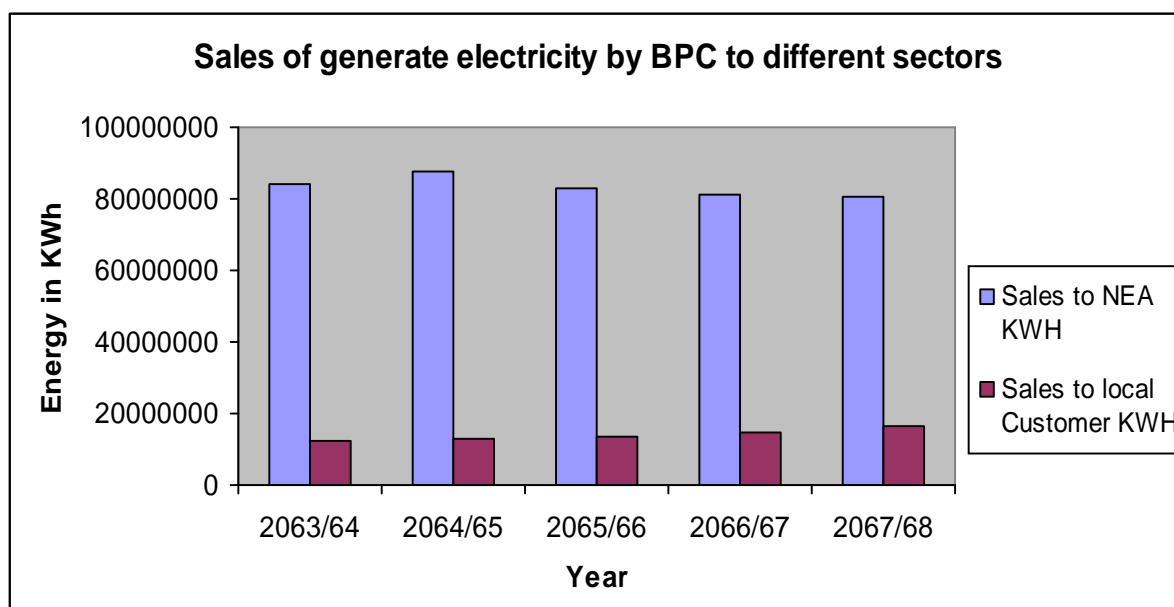
Years	Sales to NEA		Sales to local customers		Total (KWH)
	KWH	%	KWH	%	
2063/64	84000000	85.28	12500000	12.69	96500000
2064/65	87800000	85.08	12900000	12.5	100700000
2065/66	83000000	83.92	13400000	13.55	96400000
2066/67	81400000	82.22	14700000	14.85	96100000
2067/68	80500000	80.179	16400000	16.33	96900000

Source: Annual Report of BPC, (2063/64-2067/68)

The table presents the annual sales of BPC to different sectors. Out of total sales BPC sold maximum electricity to NEA and rest to local customer .Over 80% to 85% of total sales to NEA and nearly 17% sold local customer. Above table shows the decline trend of electricity sales to NEA since 2063/64 to 2067/68 continuously. Out of total production 3.38% was loss and nearly1% used internally by BPC.

The following figure presents the electricity sales by BPC to different sectors.

Figure 4.3



Source: Annual Report of BPC, (2063/64-2067/68)

The above figure presents the annual sales of electricity (KWH) of BPC to different sectors. In above figure it shows BPC sales maximum no of generate electricity to government of Nepal, and small parts to local customers. The selling policy of BPC is changes because in figure every year the company increases the electricity sales to local customers.

Table 4.4

Sales revenue from NEA and Local customer

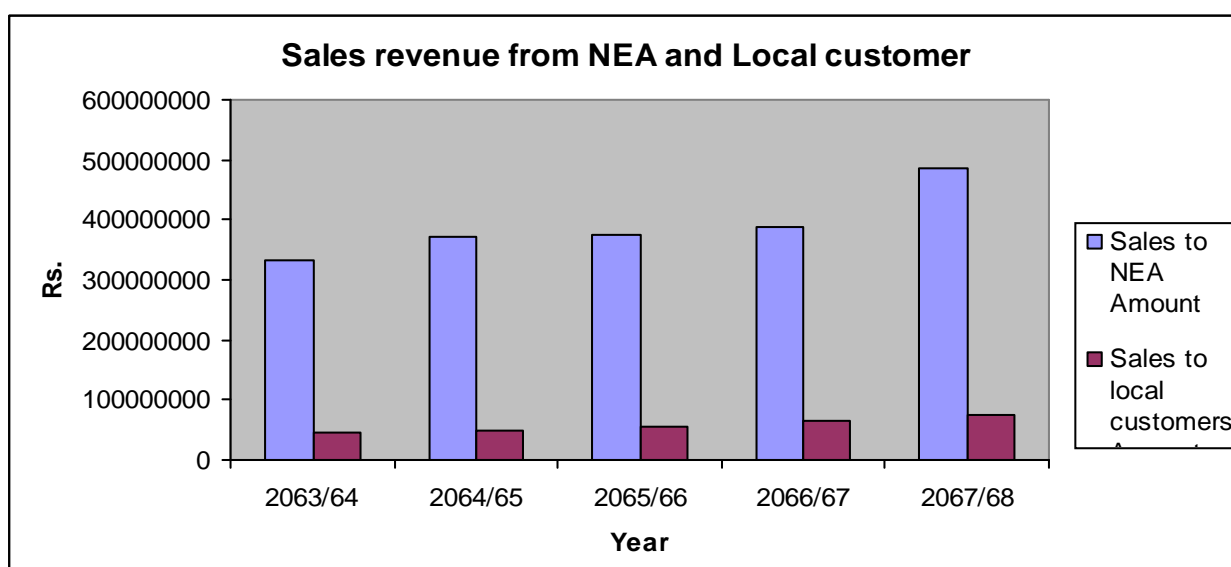
In NPR

Years	Sales to NEA		Sales to local customers		Total amount
	KWH	Amount	KWH	Amount	
2063/64	84000000	334200000	12500000	45600000	379800000
2064/65	87800000	372500000	12900000	49200000	421700000
2065/66	83000000	375100000	13400000	55700000	430800000
2066/67	81400000	387900000	14700000	65500000	454400000
2067/68	80500000	486000000	16400000	75200000	561200000

Source: Annual Report of BPC, (2063/64-2067/68)

The above table 4 shows that revenue from sales of electricity to NEA and local consumer is increasing every year. The revenue form sales reached to Rs. 486000000 & 75200000 in 2067/68 respectively, which was only 334200000 & 45600000 in 2063/64 .The main reason behind it, is increasing demand from local consumer. Every new consumer are adding. So, it also purchases electricity from NEA to meet the demand. Similarly, the rate per KWh is also increasing every year.

Figure 4.4



Source: Annual Report of BPC, (2063/64-2067/68)

4.1.3 Retail sales and consumer growth

The main reason behind it is increasing demand from local consumer. Every new consumer are adding. By the end of the fiscal year 2067/68 , a total of 37948 customers have been electrified in four districts, marking an increase of 10% compared to previous year. Additional 3457 domestic consumers and 63 industrial consumers were added during the fiscal year 2067/68. As a part of our continuous effort to minimize revenue loss, a total of 947 cut-out consumers were converted to metered category. The five year Rural Electrification Expansion Program (REEP) is in its final year of implementation. All the remaining construction and upgrading activities that were delayed during the past year due to technical and social problems are rescheduled to be completed within the project period. As a part of system expansion, 2593 new consumers are planned for addition in the following year (FY 068/69) by construction of 9.3 Km 33Kv line and 210 km of 400 v line and addition

of 7 nos. of transformers. Also, two awareness and capacity building programs have been planned in fiscal year 2068/69. 7 more UOs are planned to be formed in fiscal year 2068/69, resulting into a total of 110 UOs.

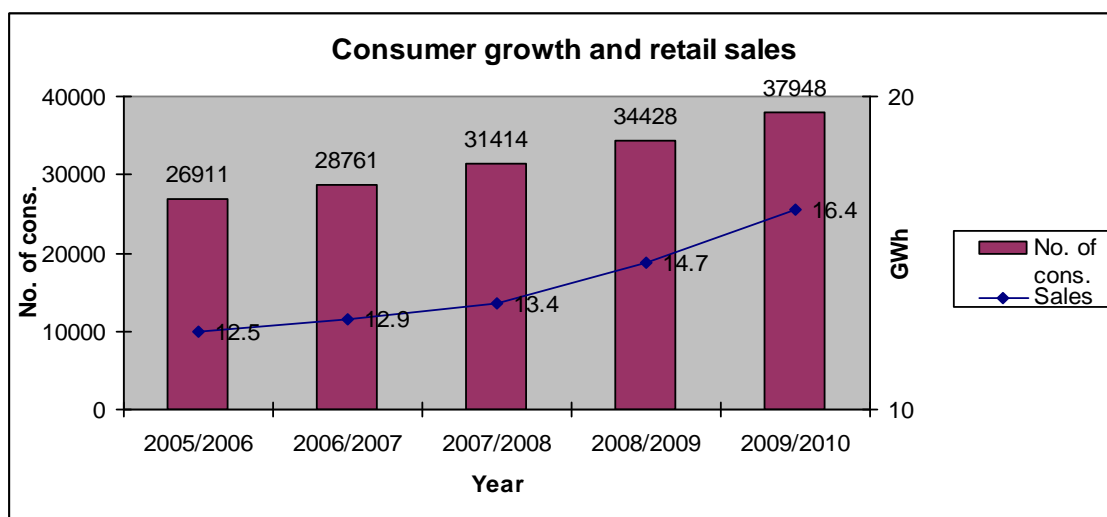
Table 4.5
Retail sales and consumer growth

Years	Retail sales and consumers growth	
	No. of customers	Sales , GWh
2063/64	26911	12.5
2064/65	28761	12.9
2065/66	31414	13.4
2066/67	34428	14.7
2067/68	37948	16.4

Source: Annual Report of BPC, (2063/64-2067/68)

The table presents the annual sales of BPC to local customers. Volume of the electricity sale to LC is increasing every year due to increase in demand from local consumer. Along with volume no. of customers are also increased in every year. Volume of consumers in 2067/68 is 37948 but it was 26911 in 2063/64. Above data can be presented by figure,

Figure 4.5



Source: Annual Report of BPC, (2063/64-2067/68)

4.2 Cost structure of BPC

Cost structure refers to the relative proportion of fixed and variable cost in an organization. The main cost of operating a hydropower company comprises 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 or 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 and semi-variable which is discussed earlier. Fixed costs in hydropower are those costs which the company performs 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, payrolls bonus system, fixed asset 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 as 60% and 40% respectively based on hypothetical assumption after studying cost behavior of other hydropower company and verbal information of some professional.

4.2.1 Cost classification of BPC into fixed and variable

The classification of cost into fixed and variable for 2067/68 is given below which is the base for other year.

Table 4.6
Cost classification of BPC for 2067/68

In NPR

Particular	Behavior	Fixed	Variable Cost	
			Amount	Rate
1. <u>Power plant expenses</u>				
Electricity purchase	Variable	-	16822901	0.8627
Staff cost	Fixed	38295729		
Office Overhead	Fixed	4851760		
Vehicle Operation and Maintenance	Fixed	1044275		
Environment , Community &Mitigation	Fixed	3547564		
Mitigation (JDMP)	Semi-variable	3973189	2648792	0.0256
Power Plant Operation & Insurance6621981	Semi-variable	5960448	3973632	0.0384
Power Plant Maintenance9934080	Fixed	5073064		
Deferred Expenses-Mitigation Works	Fixed	56275233		
Royalty	Fixed	463322		
Transmission Line Repair & Maintenance	Fixed	269253		
Expenses Written off	Fixed	28677561		
2. <u>Distribution expenses</u>	Fixed	3963185		
Staff Cost	Fixed	1511016		
Office Overhead	Fixed	67993		
Vehicle Operation and Maintenance	Fixed	14223770		
T/L Maintenance	Fixed	3064587		
D/L Network Operation	Fixed	479250		
D/L Network Repair & Maintenance	Fixed	7521222		
Subsidy on sales of meter	Fixed	521640		
Royalty	Fixed	6607021		
Expenses Written Off	Fixed	56133390		
3. <u>Administrative expenses</u>	Fixed	10762365		
CEO's Remuneration & Expenses	Fixed	62199000		
Staff cost	Fixed	25240000		
Office Overhead	Fixed	342021838	23445325	0.064
Depreciation	Fixed			
Interest on loan	Semi			
Total	variable			

Source: Annual Report of BPC, (2063/64-2067/68)

Fixed cost 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 tables. The fixed and variable costs of BPC for 5 years based on 2067/68 are given in following table.

Table 4.7
Fixed and variable cost of BPC

In NPR

Year	Fixed cost		Variable cost	
	Amount	% Change	Amount	%Change
2063/64	196806215.6	17.23	8320506.4	12.88
2064/65	243220809	23.58	9989982	20.06
2065/66	264365665.8	8.69	12988072.4	30.01
2066/67	335493015.2	26.90	20099029.8	54.74
2067/68	342021838	25.35	23445325	50.54

Source: Annual Report of BPC, (2063/64-2067/68)

Sales total Expenses and profit position of BPC over the five years study period present following table and figure.

Table 4.8
Sales, Expenses and Profit

In NPR

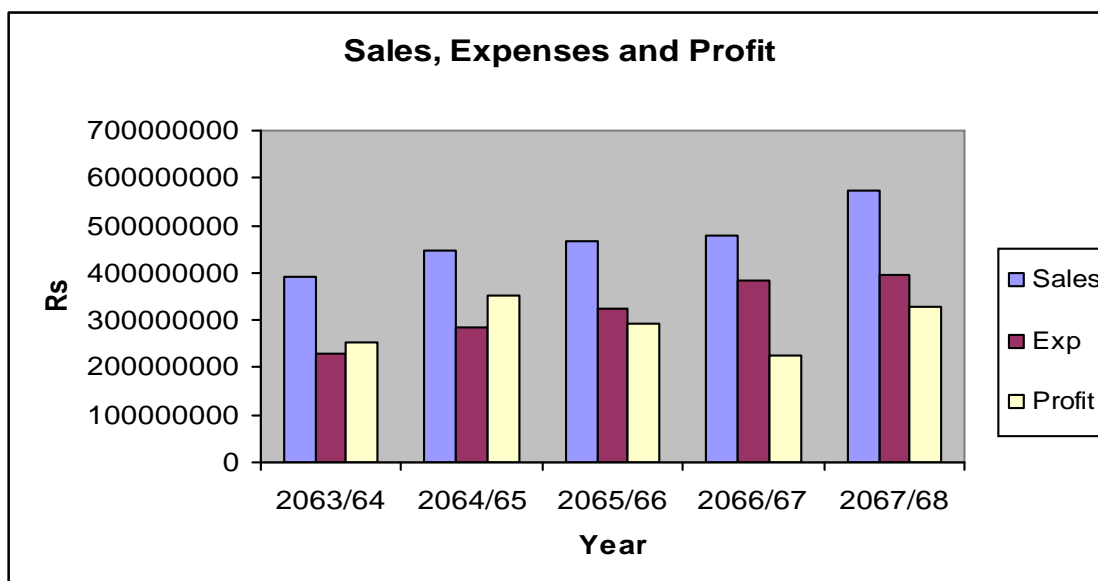
Year	2063/64	2064/65	2065/66	2066/67	2067/68
Sales	392938000	446732000	466949000	479809000	573892989
%change in Sal	-	13.69	4.53	2.75	19.61
Total expenses	229305000	286327000	323144000	381650000	395933000
% change in Exp	-	12.49	12.85	11.81	3.75
Profit	252840000	353879000	291592000	224233000	328970000
%change in Profit(Decreased)	-	39.96	(11.49)	(23.10)	46.71

Source: Annual Report of BPC, (2063/64-2067/68)

As per above table the highest sales was on Rs.573892989 the sales in fiscal yrs 063/064 was 392938000.after then the sales trend has been increasing since 066/067.the expenses in fiscal yrs 063/064 was Rs.. 229305000 after 063/064 the expenses also has been increasing trend till 067/068.the profit was highest in fiscal yrs 064/065 is Rs353879000.in 2062/063 the profit of company was Rs252840000 then after if is decreasing trend .it shows that the profit of company is in fluctuation position . At last year the company has Rs. 328970000 profit amount which is in increasing trend.

As per the norms regarding the relationship between the sales and expenses i.e. cost .they are directly related .here increase in sales% every yrs was greater in % .expenses except fiscal yrs 065/066 and 2066/67.therefore the profit of company decreases due to increase in expenses greater then increase in sales %.

Figure 4.6



Source: Annual Report of BPC, (2063/64-2067/68)

Figure no 3 clearly depict the indication of above table. We can show that in fiscal year 2063//2064 to 2067/68, the company was able to earned profit. The company was made their highest profit in fiscal year 2064/65 which was clearly shown by above figure.

The following table and figure presents the relation of Sales VC, FC and Profit of BPC over the five years.

Table 4.9
Sales, Variable cost, Fixed cost and Profit

In NPR

Year	2063/64	2064/65	2065/66	2066/67	2067/68
Sales	392938000	446732000	466949000	479809000	573892989
% change in sales	-	13.69	4.53	2.75	19.61
Variable cost	8320506.4	9989982	12988072.4	20099029.8	23445325
%change in VC	-	23.58	8.69	26.90	25.35
Fixed Cost	196806216	243220809	264365665.8	335493015	342021838
% change in FC	-	23.58	30.01	54.74	50.54
% of VC on Sales	21.18	22.36	27.81	41.89	40.85
% of FC on Sales	50.08	54.44	56.61	59.92	59.59

Source: Annual Report of BPC, (2063/64-2067/68)

The relationship between sales fixed costs and variable cost shown by above table. The table has cleared the relationship between sales with variable costs and sales with fixed costs. The percentage of variable cost with sales in fiscal year 063/064, 064/065, 065/066, 066/067 and 067/068 are 21.18, 22.36, 27.81, 41.89 & 40.85 respectively. In fiscal yrs 067/068, the percentage of variable cost with sales indicates that, the company bears maximum variable cost and the lowest variable cost with sales indicates that the company bears minimum variable cost.

4.3 Contribution Margin Analysis

In simple terms, the contribution margin is total revenue minus total variable cost. This different can be expressed as a percentage of total revenue. A company's contribution margin can be expressed as the percentage of each sale that remains after the variable costs are subtracted. Given the contribution margin, a manager can make better decisions about whether to add or subtract a product line, about how to price a product or service, and about to structure sales commission or bonuses. The contribution margin is computed using a special type of income statement that has been reformatted to group together a business's fixed costs and variable costs. The contribution margin of BPC is given below:

Table 4.10
Contribution Margin

In NPR

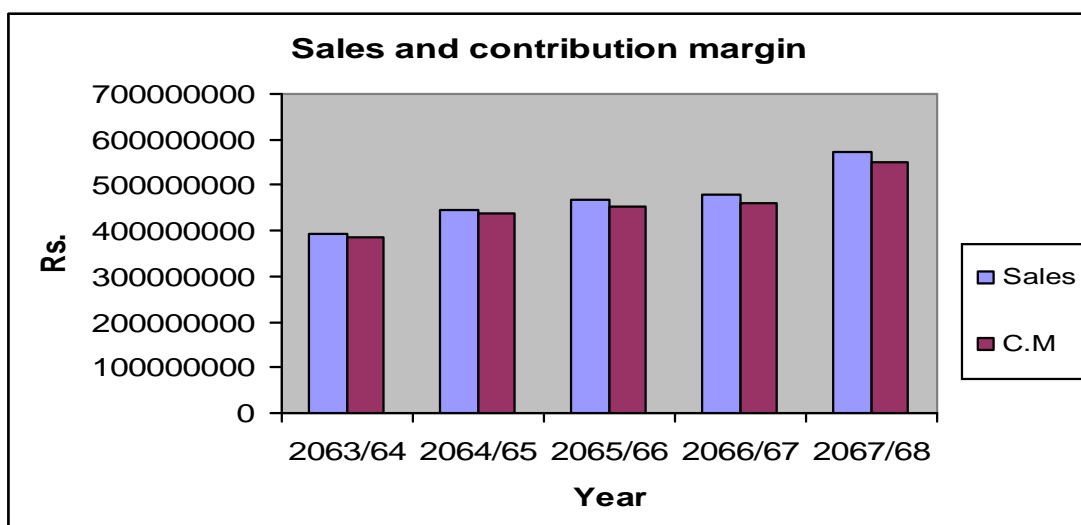
Year	2063/64	2064/65	2065/66	2066/67	2067/68
Sales	392938000	446732000	466949000	479809000	573892989
VC	8320506.4	9989982	12988072.4	20099029.8	23445325
CM	384617494	436742018	453960927.6	459709970	550447664
PVR	0.9789	0.9777	0.9722	0.9582	0.9592
% change in PVR	-	(0.1225)	(0.5657)	(1.4612)	0.1042

Source: Annual Report of BPC, (2063/64-2067/68)

The contribution margins from above table in fiscal yrs 2063/064, 064/065,065/066, 0666/067, 067/068 are Rs. 384617494, 436742018, 453960927.6, 459709970 &550447664 respectively. The highest continuation margin was in fiscal yrs 067/068 i.e. Rs. 550447664 it shows that company has made better performance. Similarly, the lowest continuation margin was in fiscal yrs 2063/064 i.e. Rs384617494.it show that, company has made bad profitability position.

Profit volume position established a relationship between the contribution margin and sales volume .the factors profit and volume were interconnected and dependent with each other .profit depend upon sales, it can express by $PVR=CM/SALES$. So high PVR gives more profit and low PVR gives less profit to the company's .therefore it plays important role for companies.

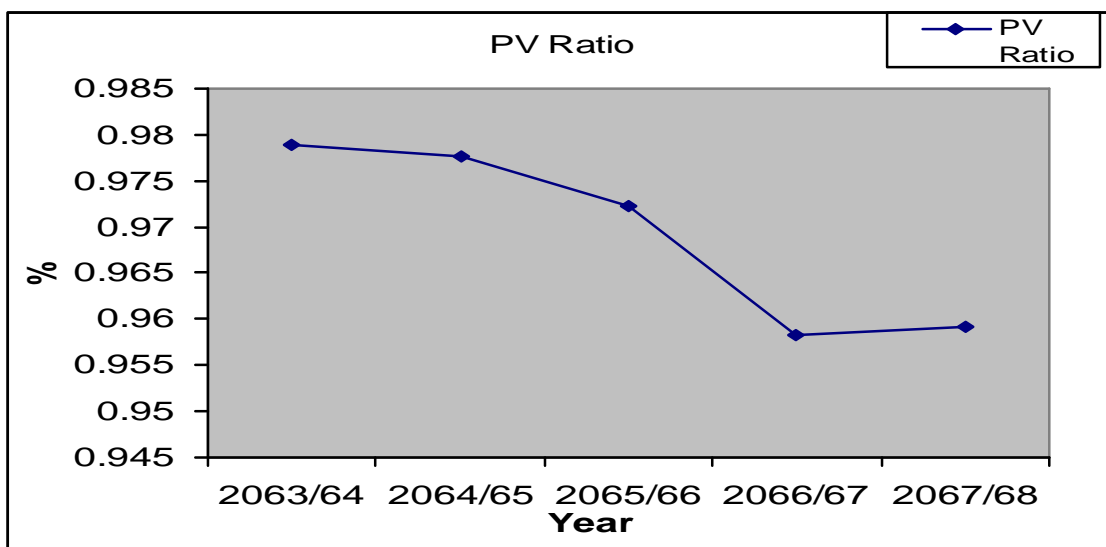
Figure 4.7



Source: Annual Report of BPC, (2063/64-2067/68)

We have known the relationship between Sales and Contribution margin from above figure which is derived by table 10. The figure has showed clearly the relation between sales and contribution margin. In fiscal year 2067/68, contribution margin is high. Higher contribution margin indicates the more profit. The contribution margin gives the actual profitability position of the company. The high contribution margin indicates better performance and low contribution margin indicates bad performance of the companies. It also can be cleared from profit volume ratio's figure which is presented following figure

Figure 4.8



Source: Annual Report of BPC, (2063/64-2067/68)

In fiscal year 2063/64, the PV ratio is high i.e. 97.89% but after that year the PV ratio was decreasing trend. In fiscal year 2067/68, the PV ratio is maximum but low in fiscal year 2066/67, it is maximum high. The PV ratio indicates that, how the company has made their profitability position. High PV ratio gives more profit and low PV ratio gives less profit to the companies. Therefore, it plays important role for companies

Table 4.11
Actual Sales and Actual Profit Relation

In NPR

Years	Sales	Increase(Decrease)	Profit	Increase(Decrease)
2063/64	392938000	-	252840000	-
2064/65	446732000	13.69%	353879000	39.96%
2065/66	466949000	4.53%	291592000	(11.49)%
2066/67	479809000	2.75%	224233000	(23.10)%
2067/68	573892989	19.61%	328970000	46.71

Source: Annual Report of BPC, (2063/64-2067/68)

The basic objective of running any business organization is to earn profit. Profit is taken to measure the company's efficiency of the management. In other words, profit is the primary measurement of business success in any company. Profit is a residual income left after the payment of factors of production. The difference between the outflow of expenses and inflow of income is called profit. It is a reward for business activities. Profit determines the strength of financial position of the company. The above present the actual sales of the BPC of last 5 yrs. which is increased in amt every years but fluctuate in percentage. i.e. the both sales and profit have more variability. In order to examine the nature of variability of actual sales and profit of different years, the arithmetic means, standard deviation, and coefficient of variation calculated in have:

Table 4.12
Summary of Statistical Calculation

	Sales	Profit
Mean	472064000	290302800
Standard deviation(S.D)	58919816	47555112
C.V	12.48	16.38
Correlation(r)	0.4137	
Probable Error(PE)	0.651412	
Coefficient of Determination(r^2)	0.17117	

Source: Annual Report of BPC, (2063/64-2067/68)

By looking above table, it is found that sales achievement were less fluctuated than profit because of lower CV of actual sales were less than that profit .other statistical measurement correlation coefficient present in above table show the relation between sales and profit .The value of correlation coefficient is 0.4137 explains that there is positive correlation between sales and profit it is good for the company. The value of the probable error is 0.651412 that explain the value of correlation coefficient isn't significant, since correlation coefficient is less than 6 times of probable error (PEV) .the value of coefficient of determination is 0.17117 is 17.117%. This states that only 17.117% of the variation in the profit has been explained by actual sales.

4.4 Break even analysis of BPC

Break even analysis is an important part of cost column profit analysis. It is the point 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 detailed information about BEP analysis is given in chapter 2. The different types of breakeven point of BPC are discussed below. The term “break-even” implies that point at which the company neither makes a profit nor suffers a loss. A break-even analysis indicates at what level cost and revenue is equilibrium. The break-even point of BPC is presented below

Table 4.13
Break-Even Point

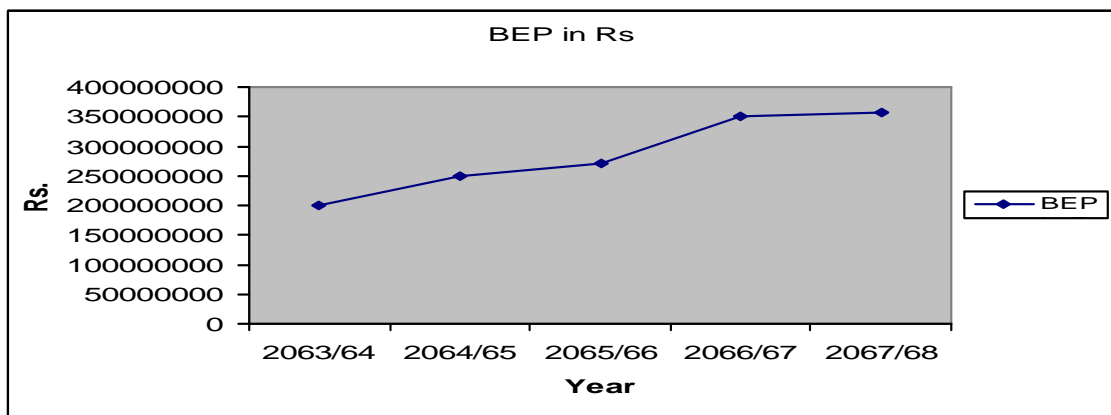
In NPR

Year	2063/64	2064/65	2065/66	2066/67	2067/68
Sales	392938000	446732000	466949000	479809000	573892989
VC	8320506.4	9989982	12988072.4	20099029.8	23445325
PVR	0.9789	0.9777	0.9722	0.9582	0.9592
FC	196806215.6	243220809	264365665.8	335493015.2	342021838
BEP	201048335	248768343.1	271925186	350128381.5	356569889.5
change in BEP	-	23.74	9.31	28.76	1.84

Source: Annual Report of BPC, (2063/64-2067/68)

From the above table, we can be cleared that the company's fixed cost is fluctuated because of the percentage of BEP (changes) is in increase and decreasing position over the 5 yrs period. By looking above table it seem that the BEP of BPC every yrs in increasing trend in amount .But looking at percentage it isn't in increasing trend. So the company has maximize fiscal years in 2064/65 and 066/067 over the last yrs, but minimize in 067/068 over the last yrs .It shows that company is making average performance i.e. not good not bad.

Figure 4.9



Source: Annual Report of BPC, (2063/64-2067/68)

We have showed the above figure which has cleared by table 4.8. It is presented by graph. We can see the line which has gone to upward in every year but the line slope is gone upward slowly in coming year. It shows that the company has decreased fixed cost in onward year.

Table 4.14

Break even points in KWH

In NPR

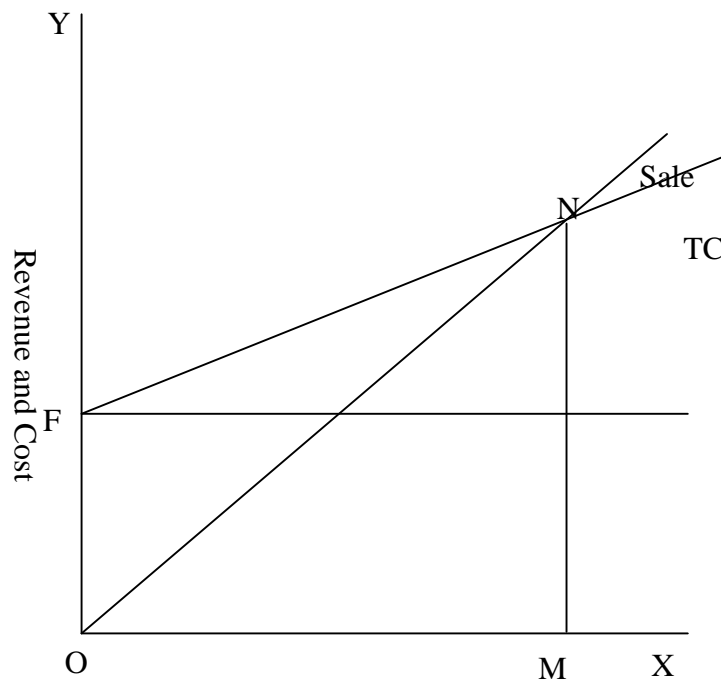
Year	2063/64	2064/65	2065/66	2066/67	2067/68
Sales	392938000	446732000	466949000	479809000	573892989
VC	8320506.4	9989982	12988072.4	23445325	
FC	196806215.6	243220809	264365665.8	335493015.2	342021838
Total cost	205126722	253210791	277353738.2	355592045	365467163
Prod and Sales KWH	103980713	107391584	101211000	101906000	103653576
SPPU	3.778	4.159	4.614	4.708	5.536
VCPU	0.0800	0.0930	0.1283	0.1972	0.2261
CMPU	3.6979	4.0659	4.4856	4.5107	5.3098
BEP KWH	53221075.6	59819673.14	58936522.6	74377151	64413318
Installed capacity KWH	149796000	149796000	149796000	149796000	149796000
%Prod	69.42	71.68	67.56	68.03	69.11

Source: Annual Report of BPC, (2063/64-2067/68)

The Above table presents the Sales, Variable cost, fixed cost, Production in KWH, BEP in KWH and installed capacity of both power plants run by BPC. It shows the electricity generate by BPC increases over the first two years period than in fiscal year 2065/66 the production is decrease than increases in 2066/67 & 2067/68. Anyway the company unable to use their installed in fully over the five years study period. The BEP in KWH of BPC including both power plant (Adhikhola and Jhumrik) are presented annual basis under the following figures.

Figure 4.10

BEP in KWH of BPC for the fiscal year 2063/64

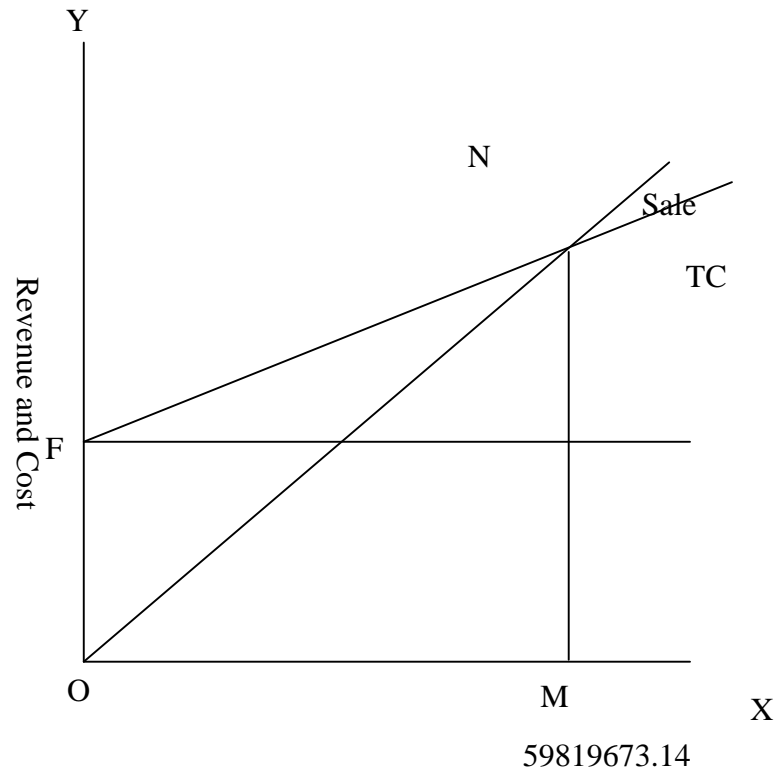


53221075.6

The above presents the graphical presentation of BEP in KWH of BPC for fiscal year 2063/64. The company's BEP where revenue (sales) curve and total cost curve are meet each other at that point the company is in no gain no loss condition, so the BEP KWH including both plant is 53221075.6. The total electricity generation at that period is 103980713 KWH which is higher than BEP, so the company at that period is in profit position. But company unable to generate electricity at their installed capacity. Just 51.18% only generate by the company.

Figure 4.11

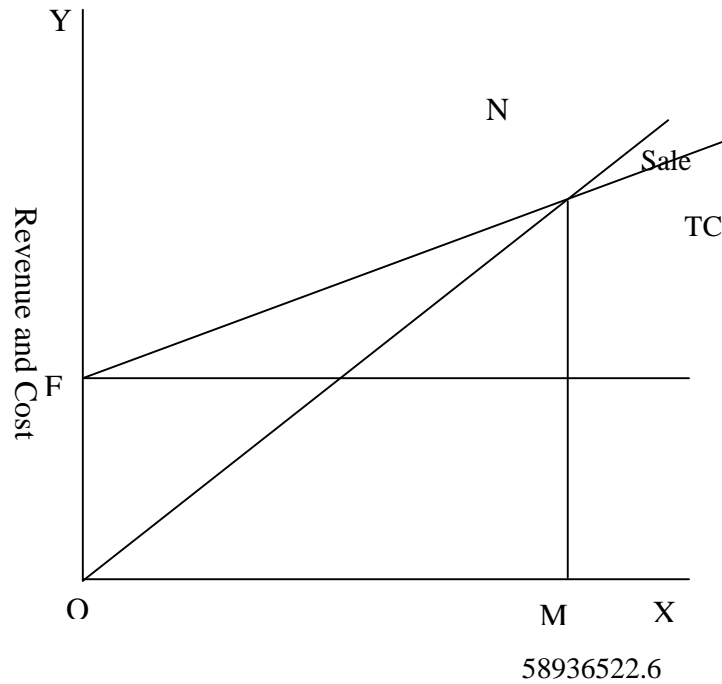
BEP in KWh of BPC for the fiscal year 2064/65



The figure presents the sales cost and BEP level of BPC in fiscal year 2064/65. The BEP level of the company at that period is 59819673.14KWH. Where sales curve and total cost curve meet each other at point N so this point is known as BEP point, which is lower than it production, therefore the company is able to profit. But company unable to generate electricity at their full capacity just 71.69% of their capacity is used. If the company utilized remaining capacity the profit level of company also increases.

Figure 4.12

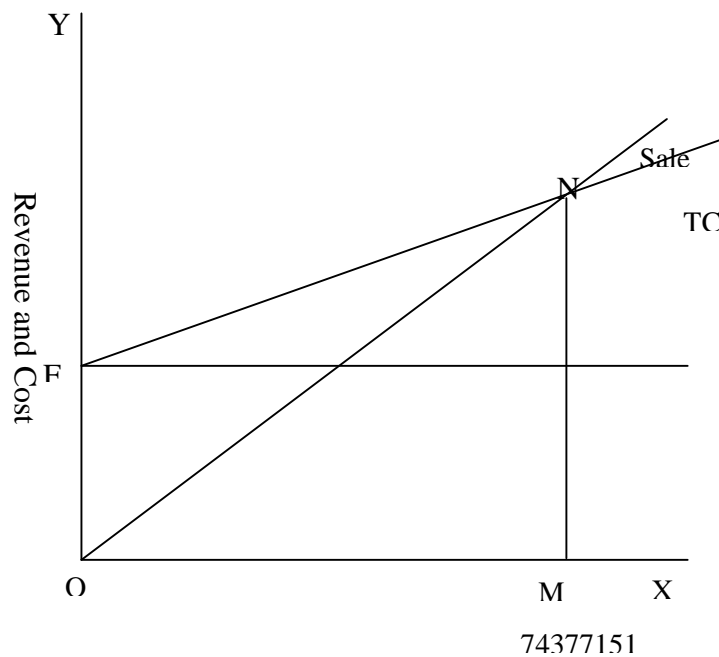
BEP in KWh of BPC for the fiscal year 2065/66



The above figure x axis present the output and y-axis present the revenue and cost. In the figure, we can see that the BEP level of BPC is 58936522.6KWH which is lower than their production level. So company is able to earned profit at that year. But company' installed capacity is 149796000KWH and it generate only 67.56% of their capacity.

Figure 4.13

BEP in KWh of BPC for the fiscal year 2066/67



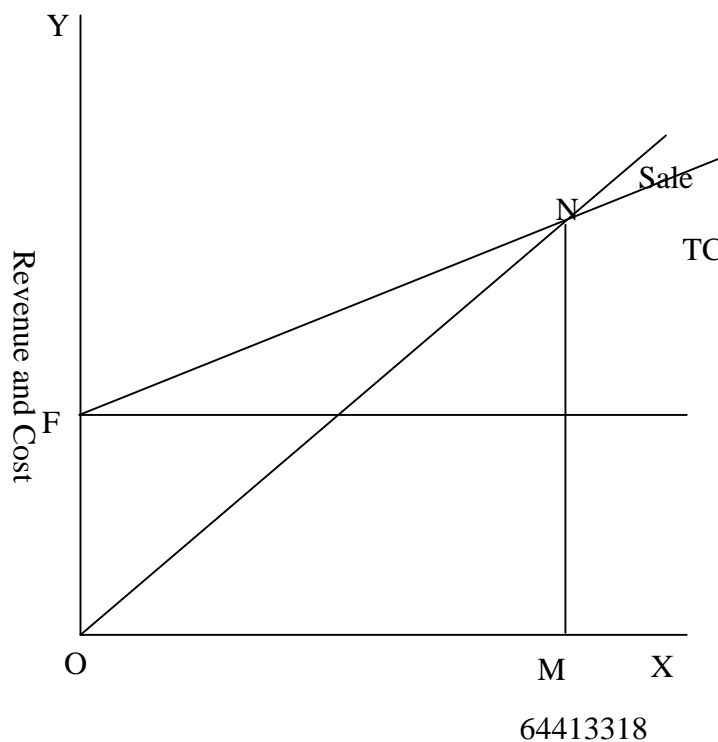
The above presents the graphical presentation of BEP in KWH of BPC for fiscal year 2066/67. The company's BEP KWH including both plant is 74377151. The total electricity generation at that period is

The above presents the graphical presentation of BEP in KWH of BPC for fiscal year 2066/67. The company's BEP KWH including both plants is 54381594. The total electricity generation at that period is 101211000 KWH which is higher than BEP, so the company at that period is in profit position. But company unable to generate electricity at their installed capacity. Just 67.56% only generate by the company.

KWH which is higher than BEP, so the company at that period is in profit position. But company unable to generate electricity at their installed capacity. Just 68.03% only generate by the company.

Figure 4.14

BEP in KWh of BPC for the fiscal year 2067/68



The figure presents the sales cost and BEP level of BPC in fiscal year 2067/68. The BEP level of the company at that period is 64413318KWH, which is lower than it production, therefore the company is able to profit. But company unable to generate electricity at their full capacity just 69.11% of their capacity is used. If the company utilized remaining capacity the profit level of company also increases.

4.4.1 Proportion of BEP Sales on Actual Sales

The actual sales and break-even sales measure the performance of the companies. If actual sales is greater than BEP sales, the company makes better performance but actual sales is less than BEP sales, the company makes bad performance. The proportion of BPC of BEP sales on actual sales is presented below:

Table 4.15
Actual sales and Break-Even sales

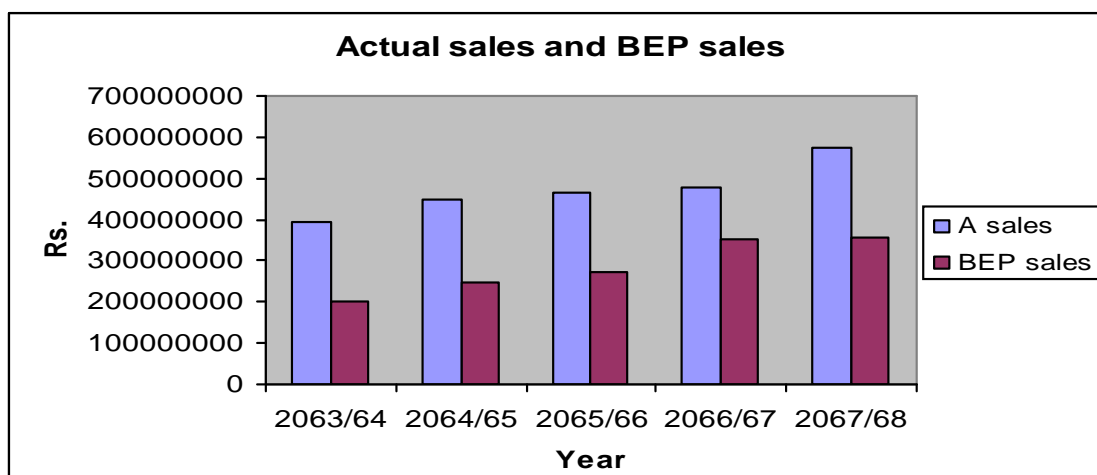
In NPR

Years	Actual Sales	BEP Sales	% of BEP Sales on Actual sales
2063/64	392938000	201048335	51.16
2064/65	446732000	248768343	55.68
2065/66	466949000	271925186	58.23
2066/67	479809000	350128381.5	72.97
2067/68	573892989	356569889.5	62.13

Source: Annual Report of BPC, (2063/64-2067/68)

The above table presents the proportion of BEP sales on actual sales. There is an increasing trend BEP sale and actual sales in amount .But looking the proportion of BEP sales on actual sales there is fluctuated between actual sales and BEP sales. By looking actual sales BEP we found the in every yrs actual sales in greater than BEP it shows company able to earn profit each and every yrs.

Figure 4.15



Source: Annual Report of BPC, (2063/64-2067/68)

We can be cleared from above figure the proportion between actual sales and BEP sales of the company. It presents that; if actual sales are less than BEP sales the company bears loss. We can see the figure in every year, there is actual sales are more than BEP sales. It indicates that the company can make their profitability position in those years. So, the company can make their profitability position onward year.

In order to find out the nature of variability, we can calculate different type of statistical tools like arithmetic mean, standard deviation, coefficient of determination and probable error.

4.5 Margin of Safety Analysis

The different between the total sales and break-even sales is identified by margin of safety. The high margin of safety is good for business. It indicates that there can be substantial falling of sales and yet profit can still be made on the other hand, if the margin of safety is small, it indicates that weak position of business. The small margin of safety shows that even a small reduction in sales or production will adversely affected the profit position of business. The calculation of margin of safety of BPC can be presented below:

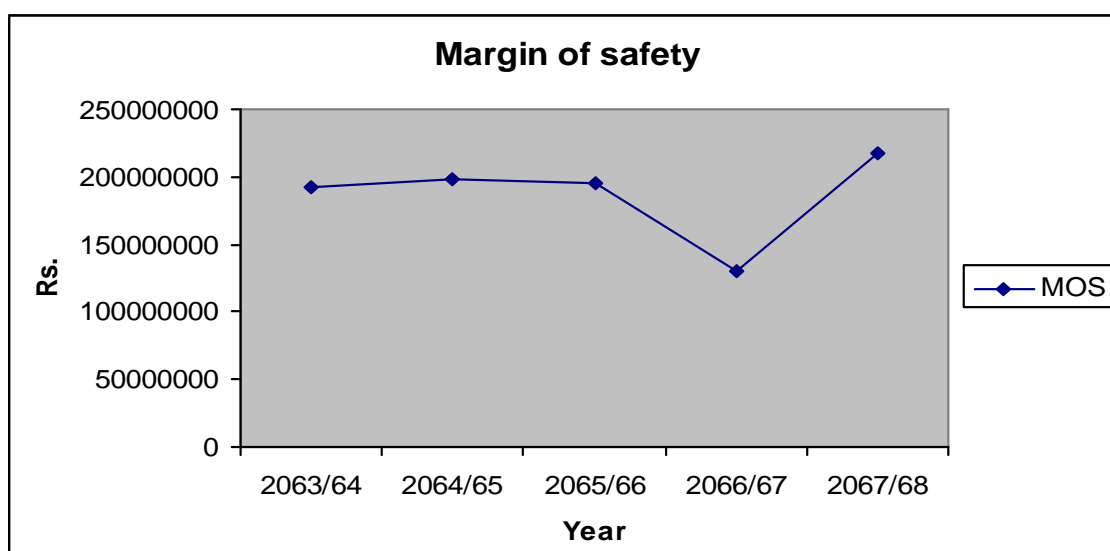
Table 4.16
Margin of safety

	In NPR				
Year	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010
Sales	392938000	446732000	466949000	479809000	573892989
VC	8320506.4	9989982	12988072.4	20099029.8	23445325
FC	196806215.6	243220809	264365665.8	335493015.2	342021838
CM=(Sales-VC)	384617494	436742018	453960927.6	459709970	550447664
PVR=CM/Sales	0.9789	0.9777	0.9722	0.9582	0.9592
BEP	201048335	248768343.1	271925186	350128381.5	356569889.5
MOS=(Sales-BEP)	191889665	197963656.9	195023814	129680618.5	217323099.5
%of MOS on Sales	48.83	44.31	41.76	27.02	37.86

Source: Annual Report of BPC, (2063/64-2067/68)

The above table presented the margin of safety of BPC sales which is in fluctuating trend .the margin of safety in fiscal yrs 063/064 is Rs. 191889665. It increased in year 2064/65 and decreased in rest two years but again in last or this year it is increased and reached to 217323099.5 which is good for the company.

Figure 4.16



Source: Annual Report of BPC, (2063/64-2067/68)

The above figure has presented the margin of safety. In every fiscal year of study period the margin of safety is positive but in fluctuating trend. . There is positive in margin of safety for five years of study period. In fiscal year 2067/68 there is highly positive in MOS. In this period the company has made more profit than other year. We can predict that the company will Increase their MOS in further year.

4.6 Financial Analysis of BPC

Ratio analysis is a powerful tool of financial analysis. A ratio is defined as “the indicated quotient of two mathematical expressions” and as “the relationship between two or more things”. In financial analysis, a ratio is used as a benchmark for evaluating the financial position and performance of a firm. The absolute accounting figures reported in the financial statement do not provide a meaningful understanding of the performance and financial position of a firm. An accounting figure conveys meaning when it is related to some other relevant information for example a Rs 7 coron net profit may look impressive, but the firms performance can be said to be

good or bad only when the net profit figure is related to the firm's investment. The relationship between two accounting figure, expressed mathematically, is known as a financial ratio. Ratios help to summaries large quantities of financial data and to make quantitative judgment about the firm's financial performance. The various type of ratio analysis of BPC is presented below:

4.6.1 Liquidity Ratio

Liquidity ratios measure the ability if the firm to meet its current obligation. A firm should ensure that it does not suffer from lack of liquidity, and also that it does not have excess liquidity. The failure of a company to meet its obligations due to lack of sufficient liquidity, will result in a poor creditworthiness, loss of creditors' confidence, or even in legal tangles resulting in the closure of the company. A very high degree of liquidity is also bad; idle assets earn nothing. The firm's fund will be unnecessarily tied up in current assets. Therefore, it is necessary to strike a proper balance between high liquidity and lack of liquidity. The current ratio and Quick ratio are presented in liquidity ratio as below:

4.6.1.1 Current Ratio of BPC

The current ratio is calculated by dividing current assets by current liabilities.

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

Current assets include cash and those assets which can be converted into cash within a year, such as marketable securities, debtors and inventories, prepaid expenses are also included in current assets as they represents the payment that will not be made by the firm in the future. All obligations maturing within a year are included in current liabilities. Current liabilities include creditors, bills payable, accrued expenses, short-term bank loan, income-tax liability and long-term maturing in the current year.

Current ratio of BPC is presented below:

Table 4.17
Current Ratio

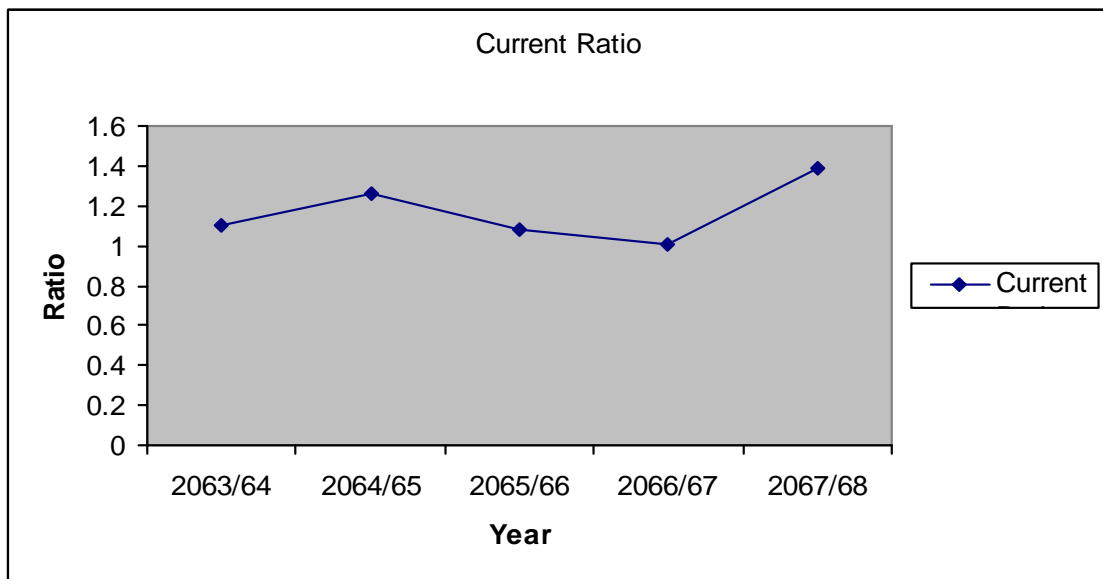
In NPR

Years	Current Assets(CA)	Current Liabilities(CL)	Current Ratio(CA/CL)
2063/64	648304000	587408000	1.10:1
2064/65	750901000	595872000	1.26:1
2065/66	749572000	691203000	1.08:1
2066/67	657163000	653672000	1.01:1
2067/68	605286000	436110000	1.39:1

Source: Annual Report of BPC, (2063/64-2067/68)

The above table presents the current assets, current liabilities and current ratio of BPC over the period of last five yrs .the current ratio of BPC in fiscal years 063/064, 064/065, 065/066, 066/067, and 2067/68 is 1.10:1, 1.26:1, 1.08:1, 1.01:1 and 1.39:1 respectively. It indicates that the current asset of the company is higher than current liabilities. But less than two times and more than one times every yrs. According to principle of current ratio, current assets are more than two times of current liabilities. As a rule a current ratio of 2:1 or more is considered satisfactory. This rules is based on the logic that in a worse situation, even if the value of current assets becomes half the firm will be able to meet its obligation .the CR, the greater the margin of safety, the longer the amount of CA is relation to CL, the more the firm's ability to meet its current obligation however, an arbitrary standard of 2 to 1 CR should be blindly followed .firms with less than 2:1 CR may be doing well while firms with 2:1 or even higher CR may be struggling to meet their obligation.

Figure 4.17



Source: Annual Report of BPC, (2063/64-2067/68)

The above figure presents the current ratio which is cleared by table 15 & Chart 15. In the year 2067/68 current ratio is high but less than 2 times. But in fiscal year 2066/67 it is very low i.e. 1.01:1. Looking at the study period the current ratio of BPC is in decreasing trend. But in current year it is improved. It shows that the hold of current assets of the company is decreases since 2064/65, but 2064/65 it is increased higher than increased in current liabilities.

4.6.1.2 Quick Ratio of BPC

Quick ratio establishes a relationship between quick or liquid assets and current liabilities. An asset is liquid if it can be converted into cash immediately or reasonably soon without a loss of value. Cash is the most liquid assets. Other assets which are considered to be relatively liquid and included in quick assets are debtors and bills receivable and marketable securities. Investors are consider to be less liquid inventories normally require some time for realizing in to cash; their value also has a tendency to fluctuate the quick ratio is found out by dividing quick assets by current liabilities.

$$\text{Quick ratio} = \frac{\text{Quick Assets}}{\text{Current Liabilities}}$$

$$\text{Quick Assets} = \text{CA} - \text{Inventory} - \text{Prepaid}$$

The quick ratio of BPC is presented below:

Table 4.18
Quick Ratio

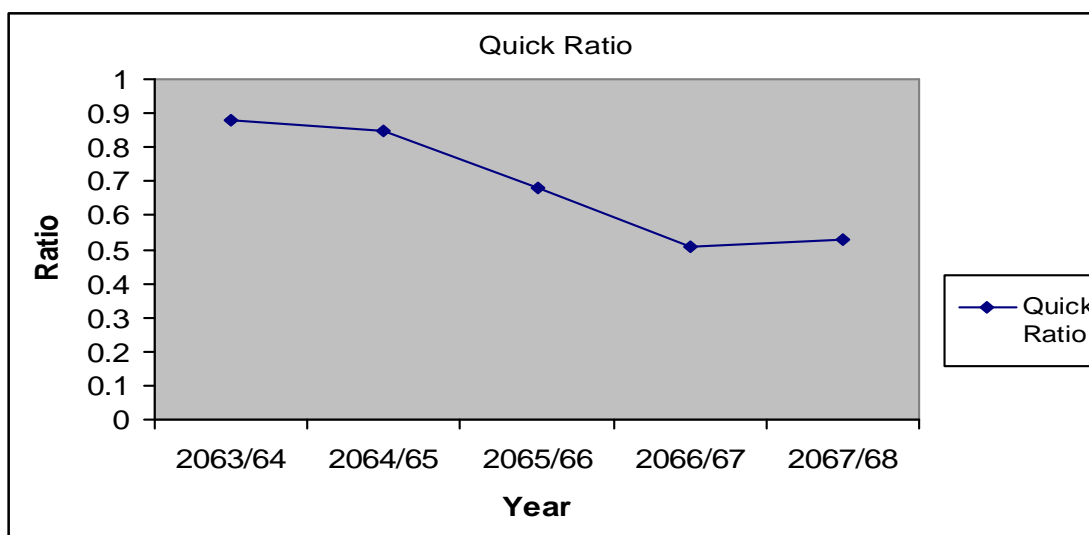
In NPR

Years	Quick Assets(QA)	Current Liabilities(CL)	Quick Ratio(QA/CL)
2063/64	516841000	587408000	0.88:1
2064/65	505807000	595872000	0.85:1
2065/66	468781000	691203000	0.68:1
2066/67	334222000	653672000	0.51:1
2067/68	229042000	436110000	0.53:1

Source: Annual Report of BPC, (2063/64-2067/68)

The table presents the quick ratio of BPC. It is less than 1 times every yrs .thus if the BPC's stock (inventories) does not sell and it has to pay all the current liabilities. It may find 0.88 times, 0.85 times, 0.68 times, 0.51 times, 0.53 times in the fiscal years 063/064, 064/065, 065/066 and 066/067 , 2067/68 respectively. It is unfavorable for the company because quick assets are less than current liabilities .it must be 1:1.

Figure 4.18



Source: Annual Report of BPC, (2063/64-2067/68)

Above figure showed the quick ratio in times. In all years the quick ratio is less than one times. In fiscal year 2066/67, quick ratio is very low. In fiscal year 2063/64, it has

maximum as compare to others years of study period. Quick Ratio of BPC has been decreasing trend. It indicates that, the company unable to pay current liabilities in the time. In current year this trend is going upward from decreasing trend.

4.6.2 Leverage Ratio

The short-term creditors, like bankers and suppliers of raw materials are more concerned with firm's current debt paying ability. On the other hand, long-term creditors, like debenture holders, financial institutions etc. are more concerned with the firm's long-term financial strength. In fact, a firm should have a strong short-term as well as long-term financial position. Of the firm, financial leverage, or capital structure, ratio are calculated. These ratios indicate mix of funds provided by owners and lenders. As a general rule, there should be an appropriate mix of debt and owners' equity in financing the firm's assets.

Leverage ratios are also called long-term solvency ratios or capital structure ratios. The term 'solvency' implies the ability of a company to meet the payments associated with its long-term debts. Thus, solvency ratios are the measure of the company's ability to meet its obligations. Generally, these ratios are expressed in proportions. However, if the ratio is in fraction or less than one, it is expressed in percentage. The following are the major types of leverage ratio:

4.6.2.1 Debt Ratio of BPC

Several debt ratios may be used to analyses the long-term solvency of a firm. The firm may be interested in knowing the proportion of the interest-bearing debt in the capital structure. It may, therefore, compute debt ratio by dividing the total debt by capital employed or net assets. Total debt will include short and long-term borrowings from financial institution, debenture/ bonds, deferred payment arrangements for buying capital equipments, bank borrowings, public deposit and any other interest-bearing loan. Capital employed will include total debt and net worth, the ratio is ascertained by using the following formula:

$$\text{Debt Ratio} = \text{Total Debts} / \text{Total Capital}$$

$$\text{Total Debt} = \text{CL} + \text{LTD}$$

$$\text{Capital Employed} = \text{LTD} + \text{Shareholder's equity}$$

The debt ratios of are presented below:

Table 4.19

Debt Ratio

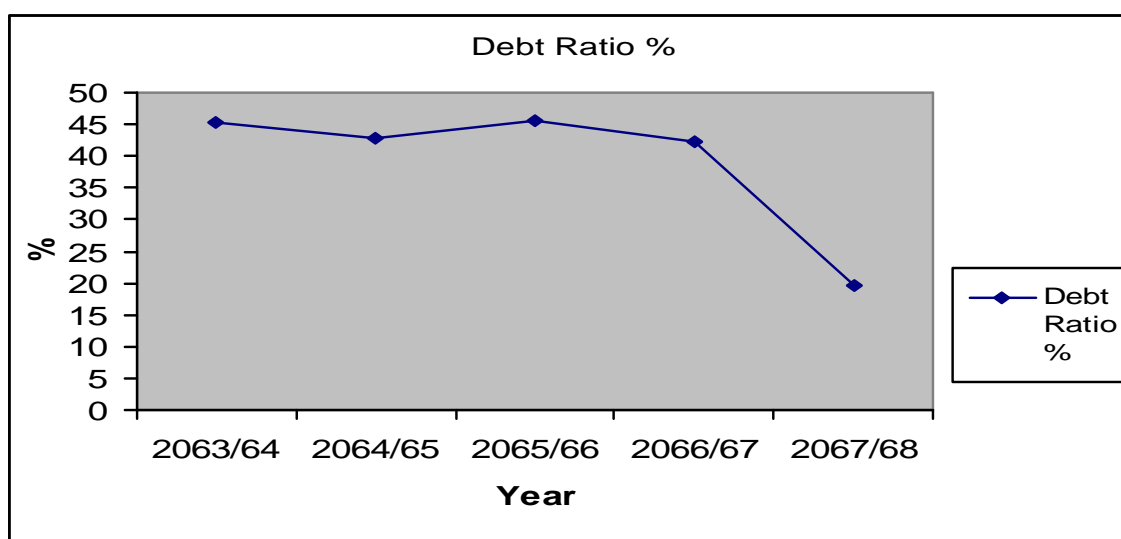
In NPR

Years	Total Debt	Capital Employed	Debt Ratio%
2063/64	587408000	1294863000	45.36
2064/65	595872000	1395820000	42.69
2065/66	717932000	1572997000	45.64
2066/67	711642000	1687772000	42.16
2067/68	554221000	2829053000	19.59

Source: Annual Report of BPC, (2063/64-2067/68)

The above table presents the BPC uses less than 50% of debt to fulfill requirement source of capital. Out of total capital (including external and internal equity). This year only 19.59% of borrowing and rest 80.41% from internally, like wise 45.36%, 42.69%, 45.64%, 42.16% in fiscal yrs 063/064, 064/065, 065/066 and 2067/68 respectively.

Figure 4.19



Source: Annual Report of BPC, (2063/64-2067/68)

The figure has cleared the debt ratios of BPC. In fiscal year 2067/68, debt ratio is very less but before this year is also debt ratio is in fluctuating position. In 2065/66 it is in

high position. The less debt ratios are better than high debt ratios for the company. The debt ratio less than one indicate that the company has more assets than debt. But the debt ratios are more than one indicates that, the company has more debt than assets. The BPC has less debt than assets. According to above chart BPC's assets position is strong in 2067/68 rather than previous years.

4.6.2.2 Debt-Equity Ratio of BPC

The debt-equity ratio is calculated to ascertain the soundness of the company's long-term as well as short-term financial position. It indicates the extent to which it depends upon borrowed funds for its existence. It portrays the proportion of its total funds acquired by way of external financing. The ratio is ascertained by following formula:

Debt-equity Ratio = Total debt/ Total Share Holder's Equity

Share Holder's Equity = Capital Employed - LTD

The BPC debt-equity ratio can be presented below:

Table 4.20
Debt –Equity Ratio

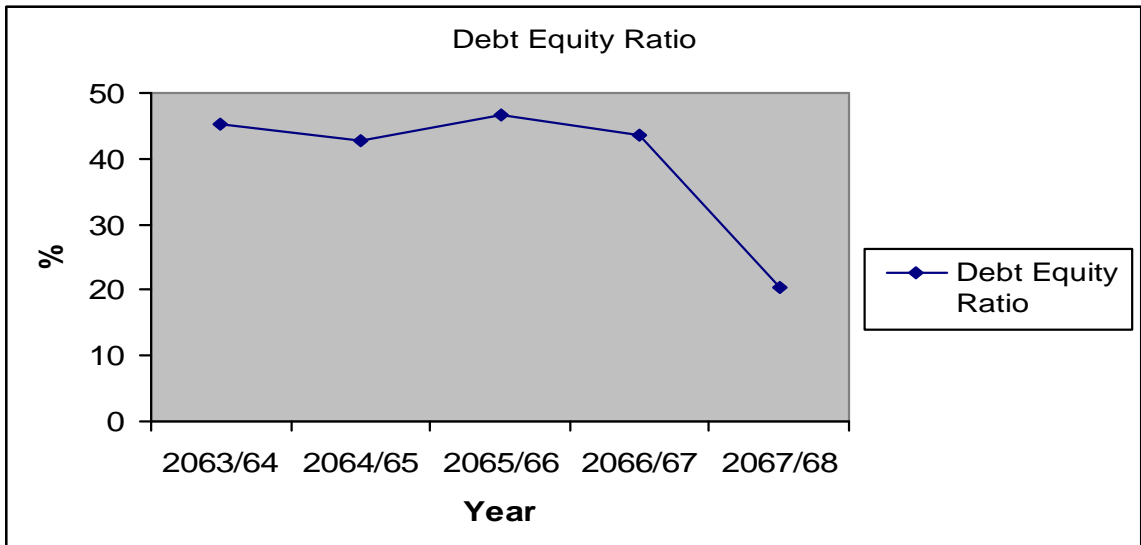
In NPR

Years	Total Debt	Share Holders Equity(SE)	Debt Equity Ratio(DER)%
2063/64	587408000	1294863000	45.36
2064/65	595872000	1395820000	42.69
2065/66	717932000	1546268000	46.63
2066/67	711642000	1629802000	43.66
2067/68	554221000	2710942000	20.44

Source: Annual Report of BPC, (2063/64-2067/68)

The table presents the debt equity ratio of BPC. We can be cleared that debt and equity relation from the above table. In fiscal yrs 0663/064, 064/065, 065/066 ,066/067 and 2067/68 Debt Equity Ratio is 45.36%, 42.69%, 46.43% ,43.66% and 20.44 respectively .It indicates the company has contributed more equity fund than debt. If market interest rate is Generations Company's return the position is suitable.

Figure 4.20



Source: Annual Report of BPC, (2063/64-2067/68)

The figure has cleared the debt-equity ratio. In the study period of five years the company's debt equity ratio is less than 50%. It indicates that the company is not considering more debts than their assets. Above chart shows the highest debt has borrowed in 2065/66 and lowest debt in 2067/68.

4.6.3 Profitability Ratio

Profit is the difference between revenue and expenses over a period of time. Profit is the ultimate 'output' of a company, and it will have no future if it fails to make sufficient profits. Therefore, the financial manager should continuously evaluate the efficiency of the company in term of profits. The profitability ratios are calculated to measure the operating efficiency of the company besides management of the company, creditors and owners are also interested in the profitability of the firm. Creditors want to get interest and repayment of the principal regularly. Owners want to get a required rate of return on their investment. This is possible only when the company earn enough profits. The various type of profitability ratios are as follows:

4.6.3.1 Gross Profit Margin of BPC

The first profitability ratio in relation to sales is the gross profit margin. It is calculated by dividing the gross profit by sales

Gross Profit Margin =Gross Profit/Sales

Gross Profit = Total operating income – Total operating expenses

The gross profit margin reflects the efficiency with which management produces each unit of product. This ratio indicates the average spread between the cost of goods sold and the sales revenue. When we subtract the gross profit margin from 100 percent, we obtain the ratio of cost of goods sold to sales. Both these ratio show profits relative to sales the deduction of production cost and indicates the relation between production cost and selling price. A high gross profit margin relative to the industry average implies the firm is able to produce at relative lower cost. A high gross profit margin ratio is a sign of good management. A low gross profit margin may reflect higher cost of goods sold due to the firm's inability to purchase raw material of favorable terms, inefficient utilization of plant and machinery; or over investment in plant and machinery, resulting in higher cost of production. The gross profits margins of BPC are presented below:

Table 4.21
Gross Profit Margin

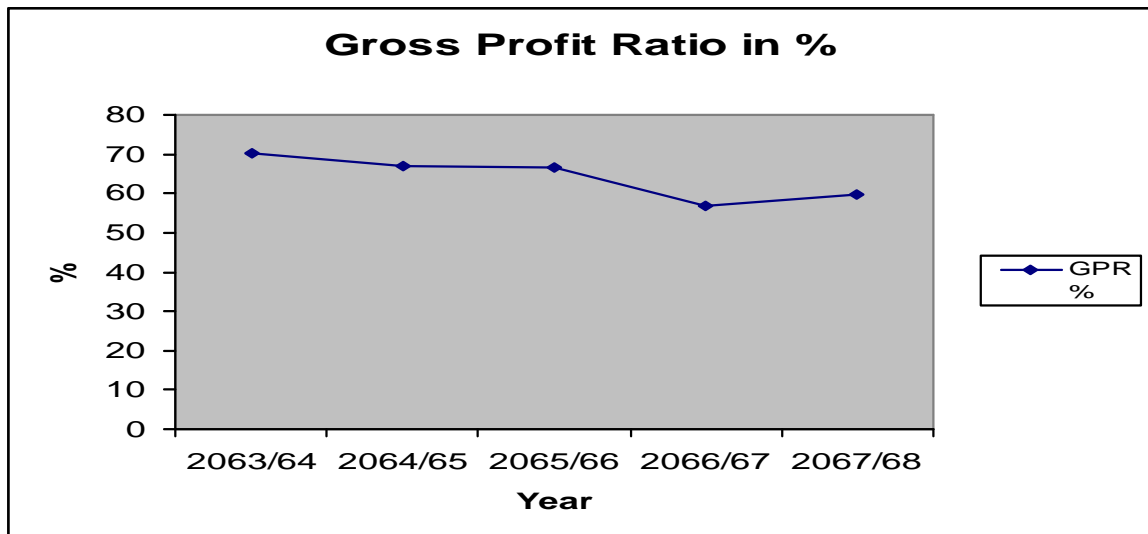
In NPR

Years	Sales	Gross Profit(GP)	GPR%
2063/64	392938000	276296000	70.32
2064/65	446732000	299047000	66.94
2065/66	466949000	314540000	66.56
2066/67	479809000	273088000	56.92
2067/68	573892989	342318000	59.65

Source: Annual Report of BPC, (2063/64-2067/68)

The above shows the gross profit margin of BPC in aggregate the position of BPC by looking gross profit is satisfactory. But table presents that the gross profit margin is in declining position which is not good for the company.

Figure 4.21



Source: Annual Report of BPC, (2063/64-2067/68)

The graph clearly shows the gross profit margin which is given by above table. The gross profit margin is decreasing trend but it is improved in fiscal year 2067/68. Looking at five years period, in fiscal year 2067/68 the company has more gross profit margin and in 2066/67 the company has less gross profit margin.

4.6.3.2 Net Profit Margin of BPC

Net profit is obtained when operating expenses, interest and taxes are subtracted from the gross profit. The net profit margin ratio is measured by dividing profit after tax by sales:

$$\text{Net Profit Margin} = \frac{\text{Net Profit after Tax}}{\text{Sales}}$$

Net profit margin ratio establishes a relationship between net profit and sales and indicates management's efficiency in manufacturing, administering and selling the products. This ratio is the inadequate; the firm will fail to achieve satisfactory return on shareholder's funds.

This ratio also indicates the firm's capacity to without adverse economic conditions. A firm with a high net margin in ratio would be in an advantageous position to survive in the fact of falling selling prices, rising cost of production or declining demand for the product. It would really be difficult for a low net margin firm to withstand these advertise. Similarly, a firm with high net profit margin can make better use of favorable conditions, such as rising selling prices, falling cost of production or increasing demand for the product. Such a firm will be able to

accelerate its profits as a faster than a firm with low net profit margin. The net profit margins of BPC are presented below:

Table 4.22
Net Profit Margin

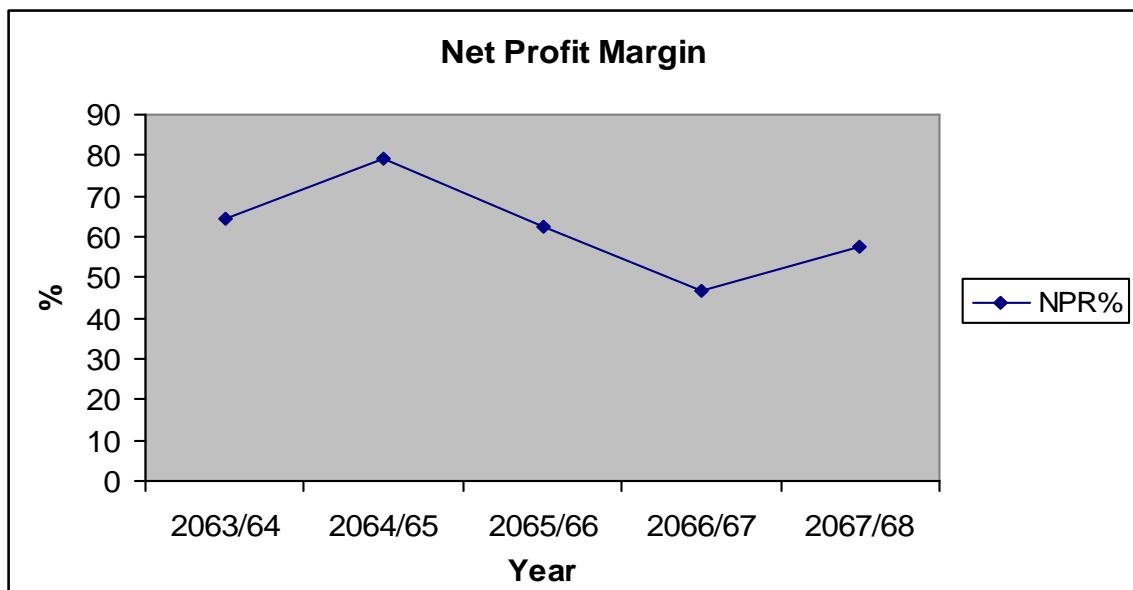
In NPR

Years	Sales(RS)	Net Profit(NP)RS	NPR%
2063/64	392938000	252840000	64.35
2064/65	446732000	353879000	79.22
2065/66	466949000	291592000	62.45
2066/67	479809000	224233000	46.73
2067/68	573892989	328970000	57.32

Source: Annual Report of BPC, (2063/64-2067/68)

The above table presents the net profit margin of BPC .In fiscal yrs 2063/64 the margin is 64.35% But in fiscal yrs 064/065 the company goes to 79.26% of net profit margin which is higher in cost 5 yrs. After that company's net profit margin is in decreasing position and again in fiscal year 2067/68 it it trying to recover but not in good position so, company's NPR is in fluctuating in every year which is not good for the company.

Figure 4.22



Source: Annual Report of BPC, (2063/64-2067/68)

The above graph clearly shows the Net profit margin which is given by above table. The gross profit margin is fluctuate trend in first three years of study period after that BPC's net profit margin is in decreasing trend. But, both charts in fiscal year 2067/68 show the improving result of Gross Profit Margin and Net Profit Margin

4.6.4 Sensitivity of CVP Analysis

The analysis of cost behavior facilitates the use of CVP technique to know the degree of impact on financial result which is known as "sensitivity analysis." CVP analysis helps to measure the extent of the impact (sensitivity) of changes in key factors (such as price, volume, variable cost, fixed cost and combination of factors which shows proportionate relationship. The management team may not only be able to obtain a numerical expression of their business orientation, but in addition may be able to assess a range of issues in relation to product and service profitability profit improvement and effectiveness. The following table provides the insights into the "sensitivity analysis".

Table 4.23
Different Factors Affecting CVP Analysis

Factors	Effects in PV Ratio	Effect in BEP	Effect in profit
Sales Revenue:			
Increase	No effect	No effect	Increase
Decrease	No effect	No effect	Decrease
Variable Cost			
Increase	Decrease	Increase	Decrease
Decrease	Increase	Decrease	Increase
Fixed Cost			
Increase	No effect	Increase	Decrease
Decrease	No effect	Decrease	Increase

4.7 Majors Finding of the Study

Every research work is done to find something new based on the objectives of the study .objective of study fulfils by the analytical part ,which is the heart of the study makes an analysis of various aspects of the financial performance of BPC by using CPV, financial ratio and statistical tools.

After completing the basic analysis required for the study the final and most importance tools of the research is to findings issues and goal of the study and gives suggestions for further importance. This would be meaningful to the top management of the corporation to initiates action and achieve the desire result. The objectives of the researches are not only to point errors and mistakes but also to correct them and give directions for further growth and improvement.

On the basis of different analysis, observation and formal as well as informal discussion the following major findings have been drawn.

1. BPC hasn't practiced cost volume profit tools for profit planning because the BPC hasn't any proper policy for using CVP tools.
2. The electricity generation of BPC isn't constant and both power plants are unable to meet their installed capacity of 17.1MW. Adhikhola plant generate in average 82.6% of its capacity but Jhimruk power plant generate in average 63.5% of its capacity.
3. BPC sales electricity to NEA under Power Purchase Agreement (PPS).However, BPC also sales to local consumer. Out of total electricity generate by BPC.80% to 85% of total generation sold to NEA. Nearly 17% is sold to local customer and rest were used internally and loss.
4. BPC generate only 69.20% of their full capacity including both power plants (Andhi Khola Generate only 82.6% & Jhimruk Plant 63.5%)
5. The selling policy of BPC is changes because in figure every year the company increases the electricity sales to local customers due to increase in demand from local consumer. Volumes of customers are also increased in every year. By the end of the fiscal year 2067/68, a total of 37948 customers have been electrified in four district, marking an increase of 10% compared to previous year.
6. The net profit of the BPC is in highest position with 39.96 % in fiscal year 2064/65 as compared to last year. But decreases 11.49% and 23.10% in 2065/66 and 2066/67 but in 2067/68 the net profit of BPC is reached in 46.71%, which are positive part/ point for the company.

7. Variable cost of BPC is Rs. 8320506.4, 9989982, 12988072.4, 20099029.8 & 23445325 in fiscal year 2063/64,2064/65,2065/66,2066/67 and 2067/68 respectively. But fixed cost of BPC is Rs. 342021838 which is maximum/ in fiscal year 2067/68 and Rs. 196806215.6,243220809,264365665.8 in rest fiscal year 2063/64,2064/65,2065/66 and 2067/67 respectively.
8. Actual sales BPC is Rs. 392938000 in fiscal year 2063/64 but BEP sales in that year is Rs.201048335. Likewise in fiscal year 2067/68 is Rs. 573892989 and BEP sales is Rs. 356569889.5.The lowest % change in BEP 1.84%is in fiscal year 2067/68 but highest % change in 2066/67 by 28.76%.
9. The annual capacity utilization of Butwal Power Company is below 70% in the five years study period.
10. As a role a current ratio of 2:1 or more is considered satisfactory but BPC current ratio in 5 yrs study period is 1.10, 1.26, 1.08, 1.01 and 1.39. It indicates that the current asset of the company is higher than current liabilities.
11. The margin of safety of BPC is Rs. 191889665, 197963656.9,195023814, 129680618.5and 217323099.5 for the fiscal year 2063/64, 2064/65, 2065/66, 2066/67 & 2067/68 respectively.
12. Quick ratio of BPC is 0.88,0.85 0.68, 0.51 & 0.53 in the five year study period which is lower than one times .so the liquidity position of BPC is lower.
13. BPC used below 50% debt out of total sources capital, which is good part of the company.
14. The gross profit margin and net profit margin of BPC is positive and better every year. But. It is in fluctuating position. BPC have 70.32%, 66.94%, 66.56%, 56.92% and 59.65% gross profit margin 64.35%, 79.32%, 62.45%, 46.73% and 57.32%net profit margin in the five years study period.
15. The sales revenue of BPC is increases 13.69% in fiscal year 2064/65.Likewise 4.53%, 2.75% and 19.61 in fiscal year 2065/66,2066/67 and 2067/68 respectively
16. The Break Even price of BPC is found increasing due to increase in fixed cost per unit .The value of BEP is 201048335, 248768343.1,
17. 271925186,350128381.5 and 356569889.5 in fiscal year 2063/64, 2064/65, 2065/66, 2066/67 and 2067/68 respectively. And its % change ratios are 23.74, 9.31, 28.76 &1.84 in FY yrs 2064/65 to current year.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATION

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 met by the traditional energy sources as fuel wood, agric 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 83000 MW of economically feasible hydropower potential, it has only 652 MW of installed capacity in its 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, BPC is 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 use 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 & control to study interrelationship among cost, volume & 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 quality 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 assess 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 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 data from 2063/64 to 2067/68 for analysis. The descriptive and analytical approaches were used throughout the study. The whole study is divided into five chapter including Introduction, Review of Literature, Research Methodology, Data presentation and analysis and Summary, Conclusion and Recommendation.

CVP analysis under this study aims to determine sales, cost structure, contribution margin, effect of other income & expenses, Breakeven point, operating margin of safety, current ratio, quick ratio, debt ratio, debt equity ratio, gross profit margin net profit margin. The research study shows that generation and sales of BPC is increasing. Although the company is unable to utilizes their full installed capacity due to various technical and policy problem. The sales trend of the company is increased. Total expenses are also increasing trend. But the increased sales trend is greater than increased trend of total expenses. The percentage of change in sales in 13.69% in fiscal year 2064/65. Likewise 4.53%, 2.75% and 19.61 in fiscal year 2065/66, 2066/67 and 2067/68 respectively. It showed that, there is fluctuation in increasing trend of sales in studying year. Similarly, the percentage of change in total expenses in fiscal year 2064/65 is 12.49% whereas it is 3.75% in fiscal year 2067/68. The percentage of variable cost and fixed cost is increasing trend. The profit is fluctuated trend. There is maximum profit in fiscal year 2064/65 which amount is Rs. 353879000 & increasing rate is 39.96% and lower profit as compare the five years study period in fiscal year 2066/67 i.e. Rs. 224233000 change ratio (23.10)%. The profit volume trend was decreasing trend up to 2066/67 but in fiscal year 2067/68 it is increased and reached to 95.92%. The proportion of the BEP in every fiscal year is below 100%. Which indicate that the company always in profit position. The highest margin of safety is 48.83% for the fiscal year 2063/64. The highest margin of safety is better for the company. The lowest margin of safety of the company is 27.02% in fiscal year 2066/67. So it shows that the company performance is in decreasing position. But the company has improved decline position and in fiscal year 2067/68 it is reached to 37.86%. The financial analysis is also show here. The financial position of the companies is good but not better. The company has more current assets than current liabilities. The current ratios are less than 2 times and quick ratios are less than one times. It means the company has not enough current assets. The leverage ratios are

also shown. The company is operated by more own capital. Mostly, the company does not depend on debts. The profitability of the company is satisfactory level in current year. But both gross profit and net profit margin are not constant, they are seen in fluctuating trend.

5.2 Conclusion

To conclude, with separating fixed and variable costs helps gathering relevant cost related information useful in short term decision making, such as for instance profit estimate for following, time interval. But such practices of segregating cost has not found in 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 company. 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 BPC, the research study aims to use CVP tools in decision making and planning regarding sales volume, prices, cost & profit. The product of HP 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 product 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 BPC following information has been concluded based on major findings.

- There is no practice of classifying cost into fixed and variable. Both the plants are not preparing direct costing. However, after classifying cost under certain assumption, Fixed cost is higher than variable cost.
- Although the generation and sales of both plants are increasing, they are unable to meet their installed capacity, because it is found that Adhikhola power plant is operating around 82.6% of its capacity but Jhimruk power

plant is operating around 63.5% of its capacity. So BPC is unable to utilize its installed capacity. This shows that there is improvement regarding capacity utilization.

- All major hydropower company running in Nepal cannot able generate electricity of their installed capacity.
- The sales trend of the company has been increasing. Similarly, the total cost also increases rapidly as compare to sales.
- Beginning of study period company able to earned maximum profit but after that company's profit is not satisfactory with increases in sales. But again BPC has got success to earned profit in this fiscal year.
- The profit volume ratio is more than 90% in all five year because of low variable cost.
- The BEP sales are also increased cause to increase of fixed cost over every year of study period.
- The margin of safety of company in the beginning year of the study is high than decreasing trend than again it is in increasing trend so the company's profit margin is also high at beginning years of study period than decreasing position, finally it is improved in fiscal year 2067/68.
- The current assets are less than 2 times more than current liabilities in all five years of study period. Quick ratios are less than one times. It showed that, the liquidity position of the company is very weakness.
- The debt ratios are low. So the company is operated by more own capital. Mostly, the company does not depends on debts.

The profitability of the company is satisfactory level in beginning of the study period but every year BPC's profit margin is in decreasing position except fiscal year 2064 /65 & 2067/68. Company able to earn profit every year. In fiscal year 2064/65 company earned maximum profit over the five years period.

Thus, the company has able to earned profit and uses own capital over the study period .Likewise company success to increase sales every years. But liquidity position is not satisfactory over that period.

5.3 Recommendation

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 leads 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 its HP is internationally more salable. Nepal has more opportunities but they have no materialized due to failure in 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 Butwal Power Company is a giant company on which study is focused. The study performs the Cost Volume Profit analysis of company and draws the various conclusions as discussed above. On the basis of conclusion following suggestion and recommendation are outlined.

1. 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.
2. 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.
3. Nepal is second richest country in the world in water recourses but nowadays it is suffering from shortage of electricity because of the poor planning and narrow concept so government should facility to the running hydropower company like BPC. If this company operates in full installed capacity the problem electricity may solved.
4. The average load factor of BPC is far less i.e. about 31% installed capacity is unutilized. Both the companies should control the major break downs to utilize their maximum capacity.
5. The internal consumption and transit loss of BPC is also high. So BPC should have control over such losses. This also helps to achieve the targeted sales to NEA.
6. Govern of Nepal should maintained that environment to the hydro power company to run in their full capacity.
7. If the running hydropower company runs in full capacity, needed capital of new hydropower company should invest other sectors.
8. Government of Nepal should stop the leakage of electricity and loses by maintaining the suitable rules.
9. If the problem of the utilization of full capacity to hydropower project is shortage water flow government should facilities to built water collection center for off season.
10. The average selling price of BPC with NEA is greater than local consumer. So, BPC should focus on selling to NEA.
11. To 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
12. Separate cost control department should be established for the effective management of cost

13. Profit, sales and costs should be analyzed by preparing budgeting or planning with actual performance with in a periodic term such as monthly, quarterly and semi quarterly which will help to improve the profit planning and controlling of the company.
14. The company should increase their liquidity position.
15. A systematic approach should be made toward comprehensive profit planning tool like CVP analysis. This can considerably contribute to the increase in profitability of BPC.
16. BPC supplies excess energy to grid which should be reduced as it reduced as it increases the sales of the company.
17. BEP analysis shows that BEP of BPC is not satisfactory as it is in increasing trend. It is highly recommended to BPC to operate at The BEP level of Rs201048335 in fiscal year2063/64, which is the lowest and operating profit is higher at this point as proportion to sales.
18. The company should focus on BEP analyses while preparing revenue plan, operation plan and setting price of its product.
19. The major problem faced by the management for construction of hydropower in some area is the unwanted demand put up by the people of that area thinking that this is the right opportunities to fulfill their demand, which lead difficulties for management of hydropower. Which should be immediately solve by government by making pre- plan.
20. This company is 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.
21. 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 model 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 reasons that India took more ahead in the energy sector besides HP development started later than Nepal.

22. NEA's three mandate: generation unit, transmission 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.
23. 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.
24. Government should create opportunities and condition for enhancing the technical and management capabilities related to hydropower in banks and also in private developers.

Calculation of statistical Measurement of Actual Sales and Actual Profit:

Year	Actual sales(X) Rs(000)	Actual Profit(Y) Rs(000)	x=X-Mean X	y=Y- Mean Y	xy	X ²	Y ²
2063/64	392938	252840	(79126)	(37462.8)	2964281513	6260923870	1403461384
2064/65	446732	357879	(25332)	63576.2	(1610512298)	641710224	4041933206
2065/66	466949	291592	(5115)	1289.4	(6595281)	26163225	1662552.36
2066/67	479809	224233	7745	66069.8	511710601	59985025	4365218472
2067/68	573892	328970	101828	38667.4	3937424007	10368941584	1495167823
Total	2360320	1451514	-		5308542796	17357723934	11307443440

Source: Annual Report of BPC

N=5

Mean Actual Sales = $X/N=2360320/5=Rs45233.6472064$ thousands

Mean Actual Profit = $Y/N = 1451514/5=Rs282192.6290302.8$ Thousands

Standard deviation of Actual Sales (x) = $(x^2/N)=$
 $(17357723934/5)=Rs58919.8165$ thousands

Standard deviation of Actual Profit (y) = $(y^2/N)=$
 $(11307443330/5)=Rs47555.112$ Thousands

Coefficient of variation of Actual Sales (CV_x) =
 $S.DX/MeanX=58919.8165/472064=0.1248$

Coefficient of variation of Actual Profit (CV_y) =
 $S.DY/MeanY=47555.1121/290302.8=.1638$

Correlation Coefficient (r) = $xy/(x^2*y^2)=5796308542/(17357723934*11307443440)=0.4137$

Coefficient of Determination (r*r) = $0.4137*0.4137=0.17117$

Probable Error (P.E) = $0.6745*(1-(r^2/N))=0.651412$

6 P.E. = $6*0.651412=3.908$

Appendix II

Five Year Summary of Balance Sheet

In Thousand NRs

PARTICULARS	2063/64	2064/65	2065/66	2066/67	2067/68
	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
ASSETS & PROPERTY:					
Fixed Assets	743,893	725,742	765,339	781,666	1,536,215
Land	60408	60408	64305	66,561	66561
Office Building & Quarters	33629	33502	32976	30508	28267
Access Road	3014	2784	2554	2323	2093
Suspension Bridge	1989	1836	1685	1533	1381
Power Plant & Machinery	340697	314043	287502	281217	258644
Switching Station			20734	19893	19006
Transmission Line Upgrading					18680
1 KV Conversion into 11 KV					5814
Sub Station				33048	31708
Transmission & Distribution Line	276756	267466	294953	305741	326480
Office Equipments	22700	25695	28870	20866	19869
Furnitures	1461	1645	2078	1373	1378
Vehicles	3239	18362	29682	18603	21918
Revalued Assets					719737
Work in Progress	24369	37191	43155	95404	205488
Investment in Shares	465705	477858	706134	807211	932853
Crurrent Assets, Loan & Advance	647416	746136	743837	651519	600391
Stock	58896	74647	92723	104543	83413
Debtors & Receivable	58918	88407	171359	93690	184140
Cash & Bank Balance	457035	412635	291687	234888	44902
Advance & Deposit	72567	170447	188068	218398	287936
Deferred Revenue Expenditure	888	4765	5735	5644	4895
Total	1882271	1991692	2264200	2341444	3265163
CAPITAL & LIABILITIES:					
Equity	839058	839058	839058	922968	1015269
Reserve & Surplus	455805	556762	707210	706834	1695673
General Reserve	148700	148700	148700	148700	148700
Retained Earnings	222805	306397	429502	385120	621051
Grant Aid in Reserve	84300	101665	129008	173014	206185
Revaluation Reserve					719737
Long Term Loan			26729	57970	118111
Current Liabilities	568510	570323	624543	566569	328979
Short Term Loan	89947	183956	154294	205495	162932
Creditors & Payables	447705	356934	434050	301517	148189
Advance & Deposit	30858	29433	36199	59557	16858
Provisions	18898	25549	66660	87103	107131
Provision for Corporate Tax	9619	9401	12247	25207	38291
Corporate Tax for 2060/61 (under Appeal)	-	-	16774	16774	16774
Provision of loss in investment	9279	16148	37639	45122	38762
Provision for Expenses					13304
Total	1882271	1991692	2264200	2341444	3265163
PARTICULARS	2063/64	2064/65	2065/66	2066/67	
	2006/2007	2007/2008	2008/2009	2009/2010	
INCOME					
Operation Income					

Electricity Sale to NEA	334166	372521	375103	387896	408755
Electricity Sale to Consumers	45603	49166	55697	65535	75212
Electricity Services	3634	6151	8040	9137	9228
Management and Technical Support			3740	17241	80877
Consultancy Services	9535	18894	28108		
Total Operating Income	392938	446732	470688	479809	573892
Income from Other Sources					
Interest Income	15365	16495	11272	6408	15825
Foreign currency Exchange Gain (Loss)	-25740	18217	30809	-3651	-4283
Dividend Income	97982	156894	104843	137803	164265
Gain (Loss) on Disposal of Assets & Stock Materials		143	608	-602	2295
Depreciation Being Revenue Portion of Grant Aid	6964	5276	5866	7547	9408
Grant Support for Technology Transfer	2794	3867	4317	2077	
Other	1461	1983	2897	1699	1792
Total Non-Operating Income	98826	202875	160612	151281	189302
Total Income	491764	649607	631300	631090	763194
EXPENDITURE	74565	82514	88491	137842	144495
Generation Expenses	33303	48428	48700	55762	59509
Management and Technical Support Expenses				12072	19556
Project Development Expenses				1045	8014
Consultancy Services	8774	16743	18957		
Administrative Expenses	40068	59920	70377	83253	73503
Provision of Loss in Investment	9479	6869	21491	7483	-6360
Interest expense	5266	7246	7913	18104	25240
Depreciation	51924	55103	61873	60632	62199
Staff Bonus	5926	9504	9659	5457	9777
Total Expenditure	229305	286327	327461	381650	395933
Net Profit Before Tax	262459	363280	303839	249440	367261
Income Tax Provision	9619	9401	12247	25207	38291
Net Profit After Tax	252840	353879	291592	224233	328970
Retained Earnings b/f	222131	222805	306397	429502	385120
Prior Year's Adjustment	-531	-18570	-676	-115	-742
Dividend of 2057/58 Paid	-41871				
10% Stock Dividend				-83906	-92297
Proposed Dividend	-209764	(251717	-167811	-184594	
Balance transferred to B/S	222805	306397	429502	385120	621051

Quick Assets = CA – INVESTMENT

CA = CURRENT ASSET & ADVANCE + DIFFERED REVENUE EXPENSES

TOTAL DEBT = CURRENT LIABILITES + LONG TERM DEBT(PROVISION)