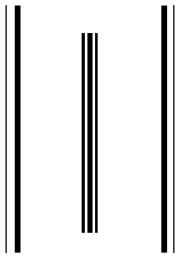
A Study on Cost Volume Profit Analysis as a Tool to Measure the Effectiveness of Profit Planning and Control

(With Reference to Bottlers Nepal Limited)



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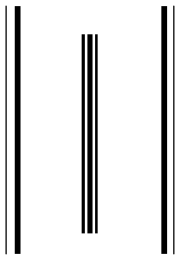

A Thesis Submitted To:

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IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF BUSINESS STUDIES (MBS)

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April, 2010

RECOMMENDATION

This is to certify that the thesis

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"A Study on Cost Volume Profit Analysis as a Tool to Measure the Effectiveness of Profit Planning and Control"

(With Reference to Bottlers Nepal Limited)

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

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VIVA-VOCE SHEET

We have conducted the viva-voce examination of the thesis presented by

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"A Study on Cost Volume Profit Analysis as a Tool to Measure the Effectiveness of Profit Planning and Control"

(With Reference to Bottlers Nepal Limited)

And found that the thesis to be original work of the student and written according to the prescribed format of Faculty of Management, Tribhuvan University. We recommend the thesis to be accepted as a partial fulfillment of the requirement for Master of Business Studies (MBS).

Viva-Voce Committee

Head of the Research Department : .....

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Date: 06-04-2010

DECLARATION

I hereby declare that this dissertation entitled **"A Study on Cost Volume Profit Analysis as a Tool to Measure the Effectiveness of Profit Planning and Control (With Reference to Bottlers Nepal Limited)"** submitted to Office of the Dean, Faculty of Management, Tribhuvan University is my original work done in the form of partial fulfillment of the requirement for the degree of Master of Business Studies (MBS) under the supervision of my respected Gurus Prof. Dr. Kamal Deep Dhakal and lecturer Mr. Joginder Goet, Shanker Dev Campus, Tribhuvan University.

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Biplab Poudyal

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LIST OF ABBREVIATIONS

BEP	: Break-even Point
BES	: Break-even Sales
BNL	: Bottlers Nepal Limited
B.S.	: Bikram Sambat
CM	: Contribution Margin
CMPU	: Contribution Margin per Unit
Co.	: Company
Coef.	: Coefficient
C.V.	: Coefficient of Variation
CVP	: Cost-Volume-Profit
DPAT	: Desired Profit After Tax
DPBT	: Desired Profit Before Tax
eg.	: example: for example
ELS	: Economic Lot Size
eq^n	: equation
et al.	: et alia
etc.	: etcetera, and other similar things
FC	: Fixed Costs
Fig	: figure
F/Y	: Fiscal Year
i.e.	: that is
Ltd.	: Limited
Min.	: Minimum
MOS	: Margin of Safety
No.	: Number
P.E.	: Probable Error
PPC	: Profit Planning & Control
PPU	: Profit per Unit

Prod^{n}	:	Production
PV	:	Profit Volume
Pvt.	:	Private
Regd.	:	Registration
Rs.	:	Rupees
S.D.	:	Standard Deviation
SPPU	:	Selling Price per Unit
SQ	:	Selling Quantity
SR	:	Sales Revenue
TC	:	Total Cost
TU	:	Tribhuvan University
Var.	:	Variance
VC	:	Variable Cost
vol.	:	volume

CHAPTER – ONE

1. INTRODUCTION

1.1 Background of the Study

Nepal, sandwiched between the two giant countries i.e. India and China, is one of the land locked countries and survives with her own natural beauty in Asia. Industrialization is an important factor for achieving the basic objective of a country's economic and social progress. Industrialization not only provides goods and services but also creates employment opportunities. It facilitates an effective mobilization of resources of capital and skill, which might otherwise remain unutilized. Industrialization plays a crucial role in achieving high rate of economic growth in developing countries. Economic development of a country is contingent to the industrialization, which is conventionally measured by increment in the share of industry and a rise in per capita income. Industrial development, a phenomenon more than what has been traditionally defined, is a function of interaction among the set of parameters comprising resources, human capital and natural technology and management dynamism. In the history of industrialization, especially after the Second World War, a very few developing countries in Asia witnessed especially newly industrialized economies. Nepal, a developing region in Asia, where development efforts have been thwarted by amazingly increasing population growth rate, acute disguised unemployment and object poverty, unstable politics and other many factors that have halted the aspirations of better future of this region.

With a low per capita income and more than 42 percent people living below the poverty line, Nepal falls in the group of the least developed countries in the world. The country's isolation from the outside world for more than a century during Rana's reign kept it backward in every aspects of development. Although planned economic development has begun since 1950s, the pace is very slow and the country is facing acute problems in this path. Lack of strong leadership, committed ideology, clear cut policies and above all, the political instability of the country is adversely affecting the national economic scenario. The restoration of democracy in 2046 marked the dawn of a new beginning in the country. Since then, the open, liberal and development oriented economic policy adapted by the country created new market opportunities for the companies of outside world.

Industrialization is a comparatively new phenomenon in Nepal. The Biratnagar Jute Mill (1936) marked the beginning of organized industry in the country. In the years that

followed, industrial growth was accelerated. Industries like the Morang Cotton Mills (1941), the Morang Sugar Mill (1946), the Raghupati Jute Mill (1946) and the Juddha Match Factory (1946) were set up in Biratnagar in collaboration with Indian businessmen. These industries set a milestone in the industrialization history of Nepal. Before 1950s, the environment was not favorable to develop the industrial sector and the government had no vision about this matter. Those that were established early were liquidated later. They could not sustain for long period. Industrial development in Nepal, however, started getting regular attention of the government under the aegis of the development plans after the dawn of democracy in 1951. Prior to 1962, there was no conducive environment for industrial development in Nepal. In 1962, Nepal formulated its first industrial policy to provide incentives to industries so that the development could be insured. In 1974, the government came out with a new industrial policy, which had the fundamental objectives of contributing to the growth of imports substitution and exported industries. Several industries were established in the public sector mostly with the financial and technical assistance of the then USSR and China. As a result, Nepal witnessed the development of quite large number of manufacturing industries in the public sector. The industrial development strategy of the government, however, changed after mid 1980s. The government then shifted its development strategy from state-led development to market-led open economy. As a result, many of the public sector industrial units privatized in the early 1990s.After the restoration of democracy in 2007 B.S., later 5 years was the stagnant period for political and development of the country. Only from 2013 B.S., the government came out with distinct vision. Then, five-year development plans were carried out. Now Nepal is in tenth plan and up to this period the country has achieved a lot but not as expected.

Nepal has a very slow pace in industrialization. The performance of existing industries is not satisfactory. A success of the business depends on the performance of organization which measures in terms of profit. Profit is the primary measurement and the blood of success in any economy. If firm is not able to earn profit, then it fails to hold the capital for long period. When business firm can't hold capital, it can't secure and retain other sources such as manpower, material and machine etc. In other words, the more profitable firm/enterprises are more attractive to the holders of the available capital. These firms can attract capital, which they need to buy the other resources. Here key is that capital and other resources are scarce. They are allocated to the profit makers in roughly descending order of their profit potential. The main objective of business is to increase the profit. The chance of making profit can be improved by proper planning and following a definite strategy. The industrialization sector has not been able to contribute adequately in GDP of the nation. They are not able to make good profit. What are the reasons behind this? What can be done to increase the level of profit and thus industrial development? To find the solution of these questions, we have undergone this research.

1.1.1 Introduction to Bottlers Nepal Limited

1) An Overview of Company

BNL is one of the manufacturing and processing companies. It is established in 1979 A D under the company Act 1964 A.D. It is initially started as a private enterprise in 1985 by issuing shares to public. It was established with the objective of producing and bottling soft drinks under the brand name of Coca Cola Sabco Asia Ltd. The company also makes and sales soft drinks under the registered trademarks of Coca Cola managed by Dubai based Coca Cola Sabco Asia Ltd. The company is located at Balaju, Kathmandu; in an area covering 10,648 square meters of land and the buildings of the company covers 5,828 squares meters. The company has been launching various types of promotional activities with financial and technical support from the Coca cola Sabco Asia Ltd. Dubai *(BNL Annual Report 2003/04:21).*

2) Share Capital of BNL

The BNL was started with an authorized capital of Rs. 30,250,000. In the initial period, its paid up capital was Rs. 10, 500,000 of Rs. 100 per share. Now, the company has authorized capital of Rs. 430,000,000, issued capital of Rs. 370,000,000 and paid up capital of Rs. 194,889,000 *(BNL Audit Report: 2005/06:11).*

3) Subsidiary Company of BNL

Bottlers Nepal (Tarai) Ltd. is operated as a subsidiary company of BNL, Balaju. BNL (Tarai) Ltd. was established in 1986 under the company Act, 1964 with the object of producing and bottling soft drinks under the brand name of Coke, Fanta and Sprite. The company is situated in Chitwan district. It is managed by Coca-Cola Sabco Asia Ltd., Dubai. The installed capacity of plant is 350 bottling per minute. BNTL belongs to 92% (nearly) of equity shares to holding company BNL, Balaju. The company has increased investment on the subsidiary company by acquiring additional shares from open market. The company's equity interest has increased to 91.78% after the new acquisition of shares in BNTL *(BNL Audit Report 2005/06:12).*

4) Product Line

BNL produces Coke, Fanta and Sprite in returnable glass bottle as well as non-returnable bottles. Upgrading the product lines, the company has already upgraded its 430 bottles per minute line to produce 175ml. package in returnable glass bottle.

Considering the market demand, the company has also invested in pet line to produce 1.5 liter packages in non returnable bottles. The lines have commenced production and they have started sales of locally manufactured pet since the previous year. So, the company has been able to increase the production efficiency of the plant giving better outputs as compared to the previous year. The company is able to fulfill the market demand without any production constraints after the installation of new plant *(BNL Audit Report 2005/06:13).*

5) Profit Position

BNL is one of the top ten companies listed on the NEPSE in terms of market capitalization. The company produces soft drink named Coca-Cola, Fanta Orange, Fanta Lemon and Sprite. Despite several market competition and disturbances in the market due to the external factors, the company has been able to increase sales volume by 3.68% compared to previous year. However, the profit after tax of the company has increased by 11.48% *(BNL Audit Report 2005/06:14).*

6) Distribution Policy

The company does not have direct distribution to the consumer. The strategic long term plan is used in the company. As mentioned above, the company uses two types of distribution channel i.e. through the dealer and retailer to consumer. Since the company doesn't sell the products by itself but it uses some kinds of commission system. But, it does not offer any kind of discounts and incentives. The company provides 8% commission on sales price is given to distributor whereas nearly 13.30% commission on sale is provided for retailer. In order to stay ahead of the competition, the company had launched several programs with financial and technical support from the Coca-Cola Company. The objectives of those programs are to increase the per capital consumption of its beverages in the market. This company will continue to promote all its products as before.

1.2 Focus of the Study

Industrialization is an important factor for achieving the basic objective of a country's economic and social progress. But manufacturing organizations are facing so many problems in Nepal. Most of the organizations are getting sick and not able to meet their desired profit in the lack of effective planning and control.

1.2.1 Profit Planning and Control

Profit planning is the estimation and predetermination of revenues and expenses that estimate how much income will be generated and how it should be spent in order to meet investment and profit requirement. In the case of institutional operation, it presents a plan spending income manner that does not result in a loss. The profit plan tells managers how much money remains to be spent in each expense category.

Profit planning or budgeting is forward planning and involve the preparation in advance of the quantitative as well as financial statements to indicate the intention of the management in respect to the various aspects of the business. Profit planning in fact, a management techniques and a business budget, is such a written plan in which all aspects of business operations with respect to a definite future period are included. It is a formal statement of plan, policy, goal and objectives established by the top management in respect of some future period. Thus, profit planning and control is an important approach, mainly in profit-oriented enterprises. Profit planning is merely a tool of management. It is not an end of management or substitute of management. It facilitates the managers to accomplish managerial goals in a systematic way.

1.2.2 Cost-Volume-Profit Analysis

Cost-volume-profit analysis applies the variable costing approach to analyze the built in relationship between cost, volume and profit. It makes use of the principles of marginal costing. The systematic relationship between cost, volume and profit is known as CVP analysis. It is an analytical tool for analyzing the relationship among cost, price, profit, sales and production volume. It is analysis of three variables viz. cost, sales or production volume and profit which explores the relationship existing among costs, revenue, activity levels and the resulting profit. All these terms are interrelated and depended on each other. For instance, profit per unit of a product depends on its selling price and its cost. The selling price to a greater extent depends upon the cost and cost depends upon the volume of production.

A dynamic management, therefore, uses CVP analysis to predict and evaluate the implications of its short-run decisions about fixed costs, variable costs, volume and selling price for its profit plans on continuous basis.

1.2.3 CVP Analysis in Profit Planning and Control

Out of various profit planning tools, cost-volume-profit analysis is the most important tool. CVP analysis is a greater helpful in managerial decision making, especially cost control and profit planning.

It provides attention-directing and problem solving backgrounds for important planning decisions, such as selecting distribution channels, pricing, special promotions and personnel hiring. “Know your cost” is an essential theme for any managers. And CVP analysis helps to direct managerial attention to important problems and paves the way to their solution *(Horngren, et al.,2001:207).*

Hence, accompany may use CVP analysis as a planning tool. When the sales volume is known, management needs to find out how much profit it will result. Another way of planning is to begin with a target profit. Then, a company can decide the level of sales needed to reach that profit through CVP analysis. Similarly, for the cost control purpose, CVP analysis is a way to measure how well different departments in the company are doing. At the end of a period, the company analyzes sales volume and related actual costs to find actual profit. It measures the performance by comparing actual costs with expected costs. These expected costs are computed by applying CVP analysis to the actual sales volume. The result is a performance report on which management can base the control of operations.

1.3 Statement of the Problem

Nepal is in infancy period of industrialization. The manufacturing sector is very small. In recent years, the growth rate is relatively more satisfactory. The manufacturing sector has to face numerous problems which have acted as constraints in the growth of manufacturing industries. Mainly, such problems are caused by the land locked situation of the country, undeveloped situation of the country, undeveloped situation of physical, human, financial and administrative infrastructure and energy at high rates, non availability of trained and skilled manpower, shortage of capital, small size of market, unawareness of the industrial potential, higher cost of production, low productivity of inputs, manpower and technology, instabilities in government policy etc.

The industrialization process in Nepal is being developed very slowly. In spite of various attractive policies of the government in respect to the industrialization, new investment made on industrial sector is not satisfactory. The financial performance of established

manufacturing industries is also not good. Most of the industries are operating in losses and such condition of the established industries discourages the new investment both in manufacturing and non –manufacturing sector. There may be various and different reasons for the poor performance of manufacturing industries. Such reasons should be investigated and corrective actions should be taken for the improvement of their performance.

Like an every business organizations, Bottlers Nepal Limited is also established to earn profit. Mostly, success is measured in terms of profit. To earn desired level of profit, it is to be planned and managed. CVP analysis provides the techniques of profit planning framework based on the annual report published. Performance of Nepalese industries cannot be considered as satisfactory. Poor performance is the outcome of poor planning, controlling and decision-making. This has raised the question whether Nepalese mangers are competent enough? Do they practice CVP tools and techniques to carryout planning, controlling and decision-making function? BNL is currently facing problem to have fair estimate of total cost, total revenue and profit at various sales volume. Due to the lack of application of profit planning tools, they can't forecast budgeted sales to recover total cost and to achieve profit.

Hence, this research is more concerned with the use of CVP analysis in profit planning process. So, this importance of CVP analysis in PPC for a firm and the problems that arises in this field has led to the selection of this topic for study. This study is basically designated to solve the following problems:

- Is BNL practicing CVP analysis for its profit planning?
- What are the major problems faced by BNL during the application of cost-volume-profit analysis?
- Are the costs incurred by BNL are realistic on the basis of cost-volume-profit relationship?
- Is profit earning made by BNL is satisfactory or not?
- What sales volume is needed for BNL to achieve break even and what should be the sales volume to earn a desired profit?
- What will be the effect of changes on the prices, cost and volume towards its profitability of BNL?
- How is the risk associated with BNL?

- What will be the chance of meeting the desired profit for BNL?
- Is there any significant difference between budgeted and actual sales of BNL?

1.4 Objectives of the Study

The basic objective of this study is to compare the existing cost-volume-profit analysis system applied by Bottlers Nepal Ltd. and its impact towards its profit planning and control. A question may arise, "Why a multinational company is selected for the purpose and not a Nepalese company?" The reason is quite obvious. It is an attempt to study what kind of “Profit Planning and Control” system a multinational company follows in the Nepalese business environment and becomes more successful than other similar national companies. The study, however, does not compare the Profit Planning & Control system of this multinational company with any other national company.

So, the prime objective of this research is to study how efficiently multinational companies manage their planning process and what basic problems do they face in this field. Some other specific objectives can also be outlined that in overall contribute to the attainment of these prime objective. Those specific and functional objectives of this study are as follows:

- To study the application of CVP analysis as a tool of profit planning and control in terms of efficiency and cost effectiveness towards profitability of BNL.
- To evaluate the CVP analysis of BNL.
- To compare Profit Volume Ratio, Break Even Point, Margin of Safety, Capacity Utilization and Sales Volume among different five fiscal years of BNL.
- To evaluate the sensitivity of profitability of BNL.
- To examine and assess the risk of BNL with the help of operating leverage technique.
- To evaluate the probability to achieve the target sales and profit of BNL under normal distribution.
- To evaluate & compare the performance report of BNL.

- To forecast sales of BNLfor next five years through trend analysis.
- To make a multiple correlation analysis of profit with sales and operating expenses of BNL.
- To test whether there is significant difference between budgeted and actual sales or not with the help of t-Test of BNL.
- To indicate required improvements and provide suggestions to BNL, if any on the basis of major findings of the study.

1.5 Significance of the Study

Because of the globalization, market has become very competitive. A few studies have been made in relation to the tool of profit planning of multinational companies in Nepalese environment & context. Multinational companies in Nepal deserve a crucial role for the socio-economic development of our country. The main role and objectives of multinational companies are to increase the rate of economic growth, develop infrastructure, contribute huge amount in national fund, provide necessary goods and services to the public, and develop the nation equally by paying huge amount of tax to the government of Nepal.

CVP analysis is one of the tools in profit planning and control. CVP analysis helps to determine the minimum sales volume to avoid losses and the sales volume at which the profit goal of the organization will be achieved. It helps management in seeking the most profitable combination of cost and volume. It also helps short run decision about fixed costs, variable costs, volume and selling price for its profit plan on a continuous basis.

So, every organization has to pay attention towards their cost-volume-profit analysis system. This study of CVP analysis of BNL helps to know BEP level, required sales revenue to achieve target profit, safety margin and other information to take correct action to control unusual cost for the company. In this way, it helps BNL to formulate and implement the profit plan. Hence, the policy makers in the area of multinational companies would be benefited from this study. The importance of the study can be pointed out as follows:

- This report serves the purpose of fulfilling the compulsory requirement for the MBS degree.

- The research attempts to find out the strength and weaknesses of sales plan and production plan. It also deals with probability to achieve the sales, production and profit targets. So, it is very useful for the company to identify areas that requires further deep study and research. The report can also help the company management for decision making purpose.

- The study would be very useful for entrepreneurs, decision makers, researchers and the managers because it deals with the practices of CVP analysis in multinational company as a very important tool of PPC.

- The report is also useful for library purpose as well as helpful for future students and researchers who wish to carry similar kinds of researches.

- The report also gives the big opportunity to apply the theoretical concept in the real practical life.

- The report develops the research skills as well as interpersonal communication skills through interfacing with people of community and organization.

1.6 Limitations of the Study

Each and every research has some limitations. Basically, not availability of required data and information would be the major limitations of the study. Beside this, there are few things that played an important role to limit the area of study. They are pointed out below:

- This study examines only in the area of cost-volume-profit analysis of Bottlers Nepal Limited.

- The researcher felt inadequacy of time and also lack of required conceptual and practical knowledge to be involved in a detailed investigation.

- Companies in Nepal are always reluctant to reveal in depth information of their production and other process. Due to their reluctance, it is very difficult to achieve clear information for study.

- Analysis is concentrated in some managerial, financial and accounting aspect and it does not cover all areas of enterprise.

- It is very difficult to separate cost as fixed, variable & semi variable, and also difficult to allocate cost to different products.

- Major portion of analysis and interpretation will be done on the basis of available secondary data and information, which are provided by Bottlers Nepal Limited.

- The accuracy of the study depends on the reliability of information provided by personnel of the company.

- The time period of the study is limited only to last five years.

- Due to the short span of time, the researcher is unable to sketch much more information related to the study. Hence, the time duration for this work may not be sufficient to make the study more realistic and wide coverage.

- This study is carried out for academic reason. So, the outcomes may differ if carried out reasons by other scholars or experts.

1.7 Organization of the Study

The entire study has been organized into five chapters viz. introduction, review of literature, research methodology, presentation and analysis of data, and summary, conclusion &recommendations.

The first chapter contains the introductory part of the study. This chapter is concerned with reasons behind the selection of topic. It has included background of the study, focus of the study, statement of the problem, objectives of study, significance of the study, and limitations of study which are presented in detail.

The second chapter will review the existing literature in the relevant area. Mainly, it includes review of theories and journal. Review of previous research work and research gap. The chapter does not explain in detail all the tools available, but only explains those that are used in chapter IV for analysis purpose.

The third chapter explains the research methodology used in the research for collection, presentation and analysis of data. This chapter deals with methodology that includes research design, sources of data, data collection techniques, method of analysis and research variable.

The fourth chapter presents the information gathered and interprets the data available about the concerned topic and company. For this purpose various analytical tools has been used. It also summarizes the main findings of the study.

The fifth chapter presents a brief summary of the whole study and also points out the weaknesses and strength of the organization. It includes summary and conclusion of the study and recommendations made to the organizations.

An extensive bibliography and appendices are included at the end. Documents and books reviewed, calculations done etc. are separated shown in appendices.

CHAPTER – TWO

2. REVIEW OF LITERATURE

2.1 Conceptual Framework

An organization is established to achieve some goals. It has its own objectives. Organization should clearly mention its objectives to achieve its goals. In this competitive globalize business age an organization whether it is public or private, profit is essential. Profit is not chance, it is result of successful management. The management of an enterprise requires continuing performance of certain managerial responsibilities. These responsibilities collectively are called the function of management. Planning, organizing, staffing and human resource management, leading and interpersonal influence and controlling are major functions of management. Planning is process of developing enterprises objectives and selecting future course of action to accomplish them. It reduces uncertainty and provides effective direction to the employee by determining the course of action in advance, controlling means evaluating the firm's activities against the plan and deciding what should be done if the plan is not being followed.

In business organization there may involve various parties like competitors, employees, trade union, government society, investment analysts, suppliers, financial institutions, managers, owners, customers etc. All these parties need to analyze the financial position of the firm before any decision made regarding the firm. Actual position of the enterprises can be found from financial statement. So, financial statement should be analyzed to know the performance and current position of the organization. There are various tools and techniques to measure and analyze the financial performance. Cost-volume-profit analysis is one of the major and popular tools to analyze the financial statement of the firms which is the important part of profit planning and control.

2.1.1 Profit Planning and Control

In these modern days, businesses except very small companies, it is virtually impossible for the top manager to have firsthand knowledge of all the relevant factors operating throughout a business. Nor can a single lower-level manager be expected to have the range of knowledge, experience and competence to make all the decisions for the large segments of a company, either as a source of reliable information or as a participant in

decision-making. The quality of the judgments of the total management effort will continue to distinguish the better managed and more successful companies. Profit planning and control is the tool that is used to increase significant effectiveness of a management and to place managerial judgments on a more objective and informed foundation.

Profit planning involves streaming activities in order to get target profit and to secure maximum benefit from minimum effort and expenditure. A best result seems to be obtained from a single product. The planner is a given the right to prove economies of the organization, the mode of operation, the determination of pricing, the marketing or any other fact of making and selling the product that affects profit acquiring from the product. The concentration of efforts upon gross traditional boundaries of the enterprises should be directed to translate needs from one group to another and to obtain consumed profit building efforts among those who can affect profits. And profits are the fundamental factors that contribute to the success of profit planning.

Profit planning is a comprehensive plan expressed in financial terms by which an operating program is effective for a given period of time. Business managers are continually involved in planning, organizing and controlling the operation of both large and small business organizations. Budgeting is one of the most important management tool used to plan and control business operations. Budgets are financial plans prepared as a guide to plan and control business operations. A financial plan must be designed to serve as a guide for the activities. Best results are obtained when the planning period is the same as the company's fiscal year. The annual budget is broken down by months, weeks and days of operations. The budget should be designed to co-ordinate the effort of the sales department, production department and all other departments *(Bajracharya, et al., 2005: 344).*

Controlling means evaluating the firm's activities against the plan and deciding what should be done if the plan is not being followed. It is a process of ensuring that actual activities confirm to plan activities. Control helps in correction. Therefore, planning and controlling are the major functions of management *(Lynch &Williamson, 1999: 112).*

Koontz and O' Donnel have given emphasis on planning and control function of management. The role of management on profit planning and control has been defined and the assumption that management can plan and control long term destiny of an organization through perfect decision making process. In favor of planning and control, economist and the management experts have said that planning means prosperity and unplanned means happenstance. So, a modern management expert has given more

importance to profit planning and control. Profit planning and control has been regarded as a basis for perfect decision-making. Profit planning and control, also known as comprehensive profit planning and control, is a new term in the literature of business. Though it is a new term but it is not a new concept in the management. Comprehensive profit planning and control or PPC on other terms are business budgeting, managerial budgeting and budgeting. It is an integral part of management.

Profit plan is a financial and narrative expression of the expected results from the planning decisions. It is called the profit plan (or the budget) because it explicitly states the goals in terms of time expectations and expected financial results (return on investment, profit, and cost) for each major segments of the entity. Typical profit plans establish the content and format of the internal–control reports with respect to operations, inputs, outputs and financial position developed by the entity for monthly performance reporting to the various levels of management *(Welsch, et al., 2000:34).*

In comprehensive sense, we can say that PPC is one of the most important approaches that has been developed to facilitate effective performance of the management process.

2.1.1.1 Principle & Purpose of PPC

The main principle and purpose of profit planning are as follows:

- To provide a realistic estimate of income and expenses for a period and the financial position at the close of the period detailed by areas of management responsibility.
- To provide a co-ordinate plan of action which is designed to activate the estimates reflected in the budget.
- To provide a comparison of actual results with those budgeted and an analysis and interpretation on deviation on by the responsible heads to indicate course of corrective action and to make improvements in procedures in preparing future plan.
- To provide a guide for management decision in adjusting plans and objectives as the change in uncontrollable conditions.
- To provide a basis for making forecasts during the budget period and to guide management to make day-to-day decisions.
  (Welsch, et al., 2000:255)

2.1.1.2 Importance & Advantages of PPC

A profit planning is financial narrative expression of the expected results from the planning decision. It is called the profit plan or budget because it states the goals in terms of time expectations and expected financial result for each major segment of entity. Many benefits are derived from budgeting although it is a means not as end in itself. PPC is a feed forward process. It involves the evaluation of the variables likely to affect future operations of the enterprises. It predicts future with reasonable precision and removes uncertainty to a great extent.

The main advantages or importance of comprehensive profit planning and control are as follows:

- PPC focuses basic policies to initiatives.
- It sets responsibilities of employees in relation to each function.
- It creates the feeling of co-operation and understanding between different departments of enterprises.
- It leads to maximize and most economical utilization of material, labour, capital and other sources with a view to ensure maximum return.
- It forces the management to keep adequate and correct historical data in the business.
- In competed management to plan future, the budgeting process forces management to look a need and become more effective and efficient administration in the business operations.
- It forces the management to take necessary steps for getting satisfactory results.
- It improves the quality of communication. The organizational objectives, goals, plans, authority and responsibility and procedures to implement plans are clearly written, so it is very easy to communicate budget to all individuals in the enterprise. This results better understanding and harmonious relationship among top-level managers and their sub-ordinates.
- It develops the atmosphere of profit and cost consciousness in the mind of employees.
- It highlights upon the lack of efficiency in the business if any and thus helps the management to take remedial action immediately.

- Profit planning necessitates a periodical and critical appraisal of every elements of a business.
- It tends to remove the cloud of uncertainty that exists in many firms especially among lower levels of management related to basic policies and objectives of enterprises.

2.1.1.3 Basic Assumption & Limitation of PPC

There are so many assumptions for using profit-planning programs. Firstly, it is required to measure the basic plan in terms of money. Secondly, there should be good co-ordination in every aspects of the business for the optimum profit goals and thirdly, profit gives guidelines about what to do? It is happened as forecast but it also gives guidelines of things work out differently from the forecast. The limitations of PPC are as under:

- The profit plan is based on estimates. The success of profit planning and control depends to a large degree on the accuracy with which the basic estimate will be made.
- PPC is an estimation and quantitative expression of all relevant data. So, there can be the tendency to attach some sort of rigidity or finality to them.
- The installation of a complete PPC is not possible in a short period. It should be continuously used in the business, and should be revised and modified with the changed situation in the business.
- Execution of a profit plan will not occur automatically. So, a skillfully prepared PPC will not itself improve the management of an enterprise, unless it is properly implemented.
- PPC is a tool. It is not a substitute for the management.
- The installation of a PPC system is an elaborated process involving too much time and costs.
- Unrealistic targets should not be set and used as a pressure tactic. By doing it, PPC will lower morale and productivity.
- In the absence of proper evaluation, PPC will hide inefficiencies. So, there should be continuous evaluation of the actual performances. Standards also should be re-examined regularly.

2.1.1.4 Application of PPC to Various Types of Organization

Some people say that comprehensive profit planning and control is applicable only to large and complex organizations. Comments like "comprehensive budgeting is a fine idea for most businesses, but ours is different," or "it is impossible to project our revenues and expenses," and so on. Such types of comments are common regarding non-manufacturing enterprises, service organizations, financial institutions, hospitals, certain retail business, construction companies, and real estate enterprises. On the contrary, profit planning and control can be adapted to any organization (profit or non-profit, service or manufacturing), regardless of size, special circumstances, or conditions. The fact that a company has peculiar circumstances or critical problems is frequently a good reason for the adoption of certain profit planning and control procedures. In respect to size, when operations are extensive enough to require more than one or two supervisory personnel, there is a need of profit planning and control applications. The smallest company certainly has different needs in this respect than a large one. As with accounting, a single profit planning and control system that is appropriate for all enterprise cannot be designed. A profit planning and control system must be tailored to fit the particular enterprise, and it must be continually adapted as the enterprise and its environment change.

2.1.1.5 Different Tools to Measure the Effectiveness of PPC

PPC is used for the development and acceptance of objectives and goals. The broad concept of PPC entails an integration of numerous managerial approaches and techniques, such as sales forecasting, sales quota system, capital budgeting, cash flow analysis, cost-volume-profit analysis and variable budget, time and motion study, standard cost accounting, strategic planning, production planning, management by objectives, organizational planning, managerial planning and cost control. PPC has wide application. It can be applied in profit and non-profit, manufacturing and non-manufacturing organization.

2.1.1.6 CVP Analysis as a Tool of PPC

Out of various profit planning tools, CVP analysis is the most important tool. It provides the information about the behavior of cost in relation to volume, volume of production or sales where the business will break-even point, sensitivity of profit due to variance of output , amount of profit for a projected sales volume and quantity of production and quality of production and sales for the target profit level etc. Therefore

CVP analysis may be defined as a managerial tool showing the relationship between various ingredients of profit planning.CVP analysis is an important media through which the management can have an insight into effects on profit on account of variance in cost and sales and take appropriate decisions. CVP analysis is great helpful in managerial decision-making. Especially cost control and profit planning is possible with the help of CVP 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.

2.1.2 Cost-Volume-Profit Analysis

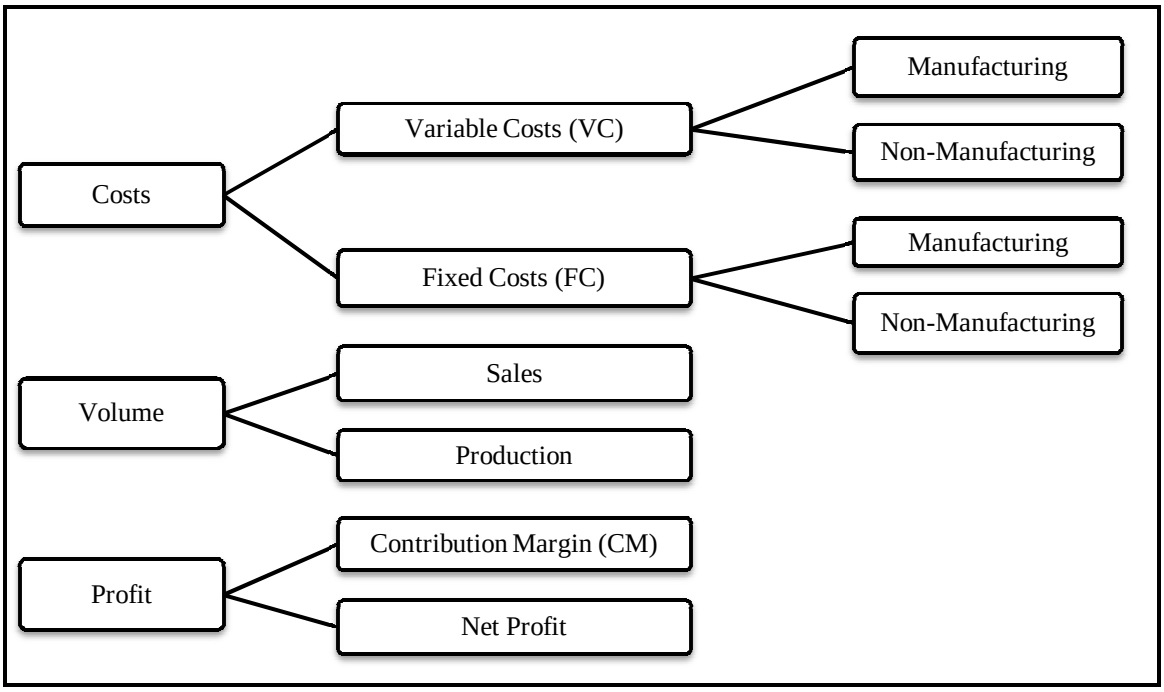
There are three words viz. cost volume and profit.

In general, **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 the total amount of money that needs to be spent by a business. It is the key players of every management decision.

In general **volume** is the level of production or scale of production or level of output.

And **profit** is the money that is made in business or by selling things, especially after paying the costs involved. It is the premium for the producers for the act of producing the given products. In other words it's the incentive to the producers.

Fig. 2.1: Classification of Cost, Volume & Profit



Cost volume profit analysis is the process of examining the relationships among revenues cost and profits for a relevant range of an activity and a particulars time frame. It is one of the most important and powerful tools that manager have at their command in short term planning. It helps managers to understand inter relationship between cost, volume and profit in an organization.

Cost-volume-profit (CVP) analysis examines the behavior of total revenues, total costs, and operating income as changes occur in the output level, the selling price, the variable cost per unit, and/or of a product *(Horngren et al., 2003).*

Cost-volume-profit analysis is a systematic method of examining the relationship between changes in activity (i.e. output) and changes in total sales revenue, expenses and net profit. As a model of these relationships CVP analysis simplifies the real-world conditions that a firm will face. Like most models, which are abstractions from reality, CVP analysis is subject to a number of underlying assumptions and limitations, nevertheless, it is powerful tool for decision making in certain situations *(Drury, 2000: 112).*

CVP analysis is the analysis of three variables cost, volume and profit. Such an analysis explores the relationship existing amongst cost, revenue, activity levels and the resulting profit. It aims at measuring variances of cost with volume. On the profit planning of a business, cost volume profit relationship is the most significant factor. The CVP analysis is an extension of marginal costing. It makes use of principle of marginal costing. It is an important tool of planning. It is quite useful in making short-run decision *(The Institute of Chartered Accountants of India, 2004: 216)*

Most of the business fails after a few years, sometimes months, of starting because they tend to do anything for volume without thinking how it's going to affect the bottom line. Cost-volume-profit analysis is a management accounting tool to show the relationship between the elements of profit planning. Profit planning is the function of the selling price of product, demand, variable costs, fixed costs, taxes, etc. The whole picture of profit planning is associated with cost-volume-profit interrelationships *(Bajracharya, et al., 2005: 225).*

The key motive of business enterprises is to make and maximize profit. Profit does not happen by chance. It is to be managed. Cost-volume-profit analysis is a supplementary tool of planning for profit. CVP is immensely helpful for developing alternative strategies in sales planning and cost estimation. CVP analysis is an accounting technique showing the relationship between variables.

2.1.2.1 Cost-Volume-Profit Relationship

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 is 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.

2.1.2.2 Importance & Use of CVP Analysis

Planning, controlling and the decision-making are the essential managerial functions. Cost-volume-profit analysis helps the managers to plan for profit, to control cost and make decision as such it helps to:

- To determine the break-even point in terms of unit or sales value.
- To determine the margin of safety.
- To estimate profits or losses at various level of output.
- To help management to find the most profitable combination of costs and volume.
- To assess the likely effects of management decisions such as increase or decrease in selling price, adoption of new method of production to reduce direct labour and increase output.
- To determine the optimum selling price.
- To determine the sales volume at which the profit goal of the firm will be achieved.

- To determine the most profitable and least profitable product.
- To determine new BEP for changes in fixed or variable cost.

2.1.2.3 Assumption & Limitation of CVP Analysis

CVP analysis is a vital technique that provides supplementary information for profit planning. Every business starts with the target o break-even and then it aims to earn profit over its life. But the business firm passes through many ups and downs. CVP analysis helps to plan for every set of goals in the short-run. But the CVP analysis encompasses the following assumptions and limitations:

- All costs can be classified into fixed and variable components.
- The behavior of variable cost should be linear.
- Fixed costs will be remained the same in the short-run up to maximum level of output or entire range of output.
- Selling price should be constant for any volume of output in the short- run.
- Planned selling price and actual selling price are homogeneous.
- There is no effect of the size of inventory on net income.
- CVP analysis is a short-term planning tool.
- The ratio of each product on total sales will be in accordance with a predetermined sales mix either a single product is sold or more products are sold.
- Cost of raw material, wage rate, methods of production design of the product will not be changed as well as no change in productivity and efficiency.

2.1.2.4 Application of CVP Analysis

Business organization is established to earn a profit. Planning is the fundamental part of the overall management function. Profit planning can be done only when the management has the information about the cost of product, variable cost, fixed cost and selling price of the product. Profit of a business organization is affected by selling price of the product, volume of sales, unit variable cost, fixed cost and sales mix. The most important factor that affects the planning for profit is cost and volume of sales. The cost-volume-profit relationship will be established by break-even analysis. Cost-volume-profit analysis is applied especially for:

- It helps in profit planning and cost controlling process.
- It also assists the management in understanding the behaviors of cost and helps in budgeting control.
- It helps to fix selling price to meet the desired profit.
- It helps to determine the level of output where all the costs can be met with revenue i.e. break-even point.
- It helps to determine the required sales volume to meet the desired profit.
- It assesses the business risk associated with enterprises thorough margin of safety analysis.
- It assesses the business risk in different cost structures.
- It assesses the impacts of the changes in cost-volume-profit variables (Sensitivity Analysis).
- It helps to make managerial decisions regarding the alternative choices such as make or buy a part, drop or continue a department/product line, accept or reject a special order, selection of profitable product mix etc.
- It helps to determine the optimum sales-mix in multi-product firm.
- It also deals with the optimum allocation of constraint resources to different product lines.

2.1.2.5 Contribution Margin Analysis

Contribution margin is the excess of sales revenue over variable cost. So, contribution margin means how much is left from sales revenue, after covering variable expenses that are contributed toward the covering of fixed expenses and then toward profit for the period. Contribution margin is used first to cover the fixed expenses, and then whatever remains, after the fixed expenses are covered, goes toward profit. If the contribution margin is not sufficient to cover the fixed expenses, then a loss occurs for the period. Basically, contribution margin indicates why operating income changes as the volume of sales changes. It can be expressed as:

1) $\text{Contribution Margin (CM)} = \text{Sales Revenue (SR)} - \text{Variable Cost (VC)}$

2) $\text{Contribution Margin (CM)} = \text{Fixed Cost (SR)} \pm \text{Profit/Loss}$

3) $\text{Contribution Margin per Unit(CMPU)} = \text{SPPU} - \text{VCPU}$

4) $\text{Contribution Margin per Unit(CMPU)} = \frac{\text{Change in Profit}}{\text{Change in Sales(Units)}} = \frac{\Delta \text{Profit}}{\Delta \text{Sales(Units)}}$

5) $\text{Contribution Margin per Unit(CMPU)} = \frac{\text{Net Profit Before Tax(NPBT)}}{\text{Margin of Safety(Units)}}$

6) $\text{Contribution Margin Ratio(C/M Ratio)} = \frac{\text{Contribution Margin(CM)}}{\text{Sales Revenue(SR)}}$ or, $\frac{\text{CMPU}}{\text{SPPU}}$

7) $\text{Contribution Margin Ratio(C/M Ratio)} = \frac{\text{Change in Profit}}{\text{Change in Sales(Rs)}} = \frac{\Delta \text{Profit}}{\Delta \text{Sales(Rs)}}$

8) $\text{Contribution Margin Ratio(C/M Ratio)} = \frac{\text{Net Profit Before Tax(NPBT)}}{\text{Margin of Safety(Rs)}}$

2.1.2.6 Break-even Analysis

Break-even analysis uses the same concepts as contribution analysis. However, it emphasizes the level of output or productive activity at which sales revenue exactly total costs that is there is no profit or loss. Break-even analysis rests upon the foundation of cost variability, separate identification and measurement of the fixed and variable components of cost. It is usually applied on a "total company" basis *(Saksena, 1995: 112).*

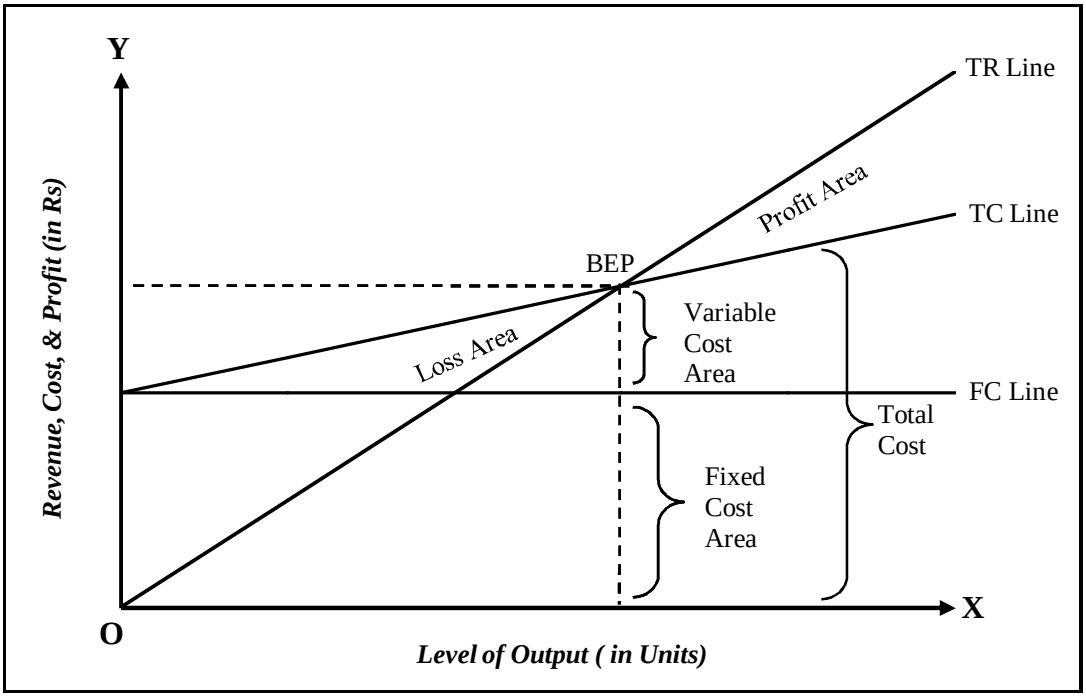
The break-even point is that point where total revenue equals total costs incurred. There is neither a profit nor a loss at the BEP. Although management typically plans for a profit each period, the break-even point should be concerned. If sales falls below the BEP, losses are incurred. Management must determine the break-even point in order to compute the margin of safety. Management can quickly measure the likelihood success of new ventures or product lines by finding its BEP.

Approaches to Break-even Analysis:

1) The Graphical Approach

The BEP can be computed graphically. A break-even chart portrays a pictorial view of the relationship between costs, volume and profit. The indicated BEP in the chart will be one at which total cost line and total sales line intersect with each other.

Fig. 2.2: Graphical Approach of BEP



2) Algebraic Equation Approach

The most popularly practiced approach to the break-even point and cost-volume-profit analysis is the formula, also known as the equation. The formula approach uses an algebraic equation to calculate the break-even point. The answers provided by solving the equation may, sometimes, need to be rounded to whole numbers of units or lot sizes. The rounding of break-even point is always done upward because this will provide a small profit rather than the small loss that would be shown from rounding downward *(Raiborn, et al., 1993: 89).*

Table 2.1: Contribution Margin Income Statement

Particulars	**Symbol for Equation**
Sales Volume (Units)	Q
Selling Price per Unit	SPPU
Sales Revenue (Rs)	Q × SPPU
Less: Variable Costs	Q × VCPU
Contribution Margin	Q × SPPU – Q × VCPU
Less: Fixed Costs	FC
Net profit	**Q × SPPU – Q × VCPU - FC**

$\therefore$ Sales Revenue (SR) $-$ Total Cost (TC) $=$ Profit/Loss

or, $SR - (FC + VC) =$ Profit/Loss

or, $SPPU \times Q - (FC + VCPU \times Q) =$ Profit/Loss

or, $SPPU \times Q - VCPU \times Q - FC = 0 \quad [\because \text{Profit/Loss} = 0]$

or, $Q(SPPU - VCPU) = FC$

or, $Q = \frac{FC}{SPPU - VCPU} = \frac{FC}{CMPU}$

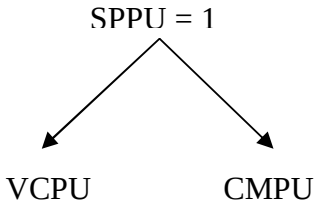
$\therefore$ BEP (Units) $= \frac{FC}{CMPU}$ & BEP (Rs) $= \frac{FC}{C/M\ Ratio}$

3) Contribution Margin Income Statement Approach

The contribution margin income statement approach to CVP analysis allows the preparation of pro forma (projected) statement from the available information. BEP and Other required CVP relationships can be explained through a contribution margin statement. A contribution margin statement is the variable costing income statement whose philosophy is all fixed costs are period costs that should be deducted from the contribution margin of the same period. Only the variable costs vary proportionality to the level of outputs or sales.

	Sales Revenue (Rs)	XXX	⟶ BEP (Rs)
Less:	Variable Costs	XXX	
	Contribution Margin	XXX	
Less:	Fixed Costs	XXX	
	Profit	Nil	

Then,



$\therefore$ V/C Ratio $= \frac{VCPU}{SPPU}$ & C/M Ratio $= \frac{CMPU}{SPPU}$

Now,

$$\therefore \text{Sales Revenue (SR)} = \text{Total Costs (TC)} \pm \text{Profit/Loss}$$

$$\text{or, SR} = (\text{FC} + \text{VC}) \pm \text{Profit/Loss}$$

$$\text{or, SR} = \text{FC} + \text{SR} \times \text{V/C Ratio} \pm \text{Profit/Loss}$$

$$\text{or, SR} - \text{SR} \times \text{V/C Ratio} = \text{FC} \pm \text{Profit/Loss}$$

$$\text{or, SR}(1 - \text{V/C Ratio}) = \text{FC} \pm 0 \qquad [\because \text{Profit/Loss} = 0]$$

$$\text{or, SR} = \frac{\text{FC}}{1 - \text{V/C Ratio}}$$

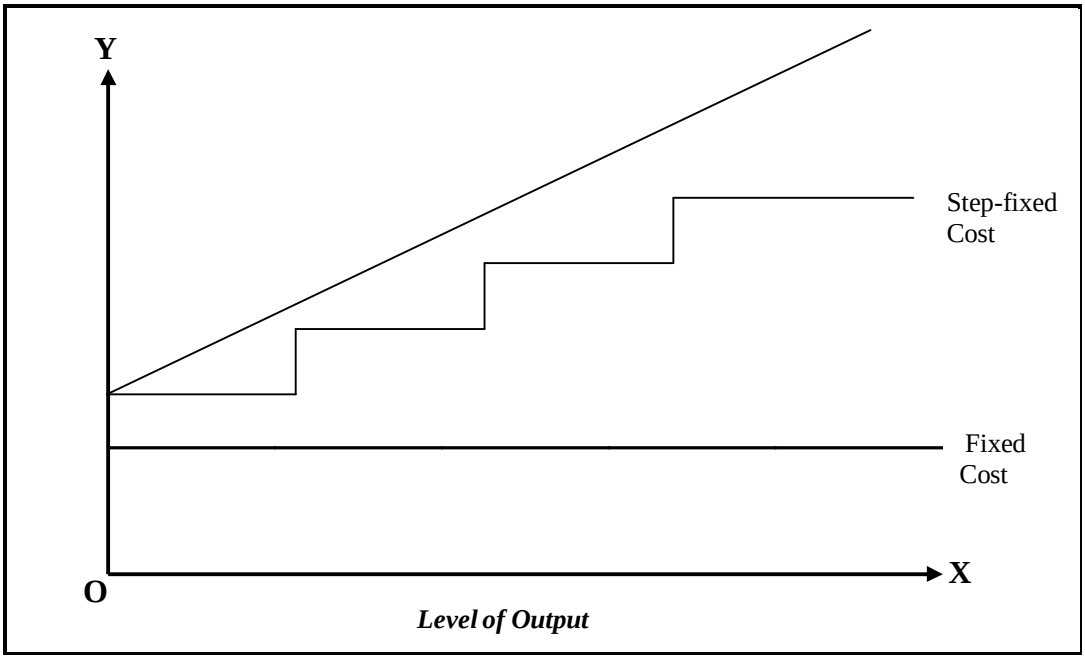
$$\text{or, SR} = \frac{\text{FC}}{\text{C/M Ratio}}$$

$$\therefore \text{BEP(Rs)} = \frac{\text{FC}}{\text{C/M Ratio}} \quad \& \quad \text{BEP(Units)} = \frac{\text{FC}}{\text{CMPU}}$$

Step Fixed Costs & BEP Analysis:

Step fixed costs are those which neither remain the same for all levels of output nor change proportionately. Step fixed costs jump if the level of activity exceeds a certain level. So, these costs are unknown before estimating the required level of sales. Step fixed costs are to be critically estimated at the problem. It is particularly because these are unknown previously for the required level of activity.

Fig. 2.3: Step Fixed Costs



BEP is calculated through the following steps:

Step 1: Assume all step fixed as variable for some time.

Step 2: Find out assumed CMPU.

Step 3: Find out BE range.

Step 4: Estimate total fixed cost for BE range.

Step 5: Determine actual BE sales volume according to determined fixed cost.

Step 6: If this calculated BEP doesn't satisfy step fixed cost, then again determine fixed cost according to this BEP unit.

BEP Analysis with LIFO-FIFO Consideration:

1) If the Company uses FIFO Method

$$\therefore \text{BEP (Units)} = \text{Begining Inventory} + \frac{\text{FC - CM of Begining Inventory}}{\text{CMPU of This Year}}$$

$$\therefore \text{BEP (Rs)} = \text{Begining Inventory} \times \text{SPPU} + \frac{\text{FC - CM of Begining Inventory}}{\text{C/M Ratio of This Year}}$$

2) If the Company uses LIFO Method

$$\therefore \text{BEP (Units)} = \text{Production Units} + \frac{\text{FC - CM of Begining Inventory}}{\text{CMPU of This Year}}$$

$$\therefore \text{BEP (Rs)} = \text{Production Units} \times \text{SPPU} + \frac{\text{FC - CM of Begining Inventory}}{\text{C/M Ratio of This Year}}$$

BEP Analysis with Non-Operating Income & Expense Consideration:

$$\therefore \text{BEP (Units)} = \frac{\text{FC - Non - Operating Income + Non - Operating Expenses}}{\text{CMPU}}$$

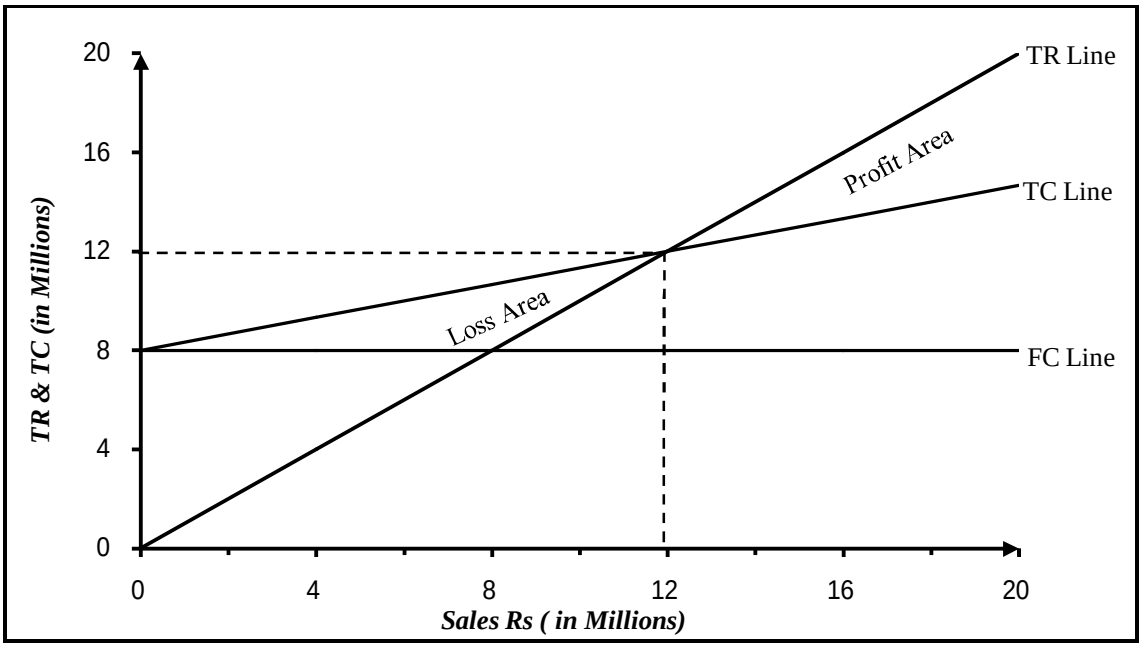
$$\therefore \text{BEP (Rs)} = \frac{\text{FC - Non - Operating Income + Non - Operating Expenses}}{\text{C/M Ratio}}$$

2.1.2.7 Economic Characteristics of CVP Analysis

Where costs are reasonable accurate, they can help management in decision making. Essentially, cost-volume-profit analysis offers greater insight into the economic

characteristics of a company and may be used to determine the approximate effect of various alternatives. CVP analysis is based on estimates; however, the arithmetical manipulations generally involve averages, and hence the results should never be interpreted as precise. Rather, the analysis may be characterized approximately as a 'slide-rule' approach that may be used to develop a test with a minimum of effort and the approximate effect on cost and profit of several types of management decisions

Fig. 2.4: Break-Even Chart



Above break-even chart with economic characteristic indicates few of the economic cartelistic of a business, "which are:

- Fixed cost, variable costs and total costs at varying volumes.
- The profit and loss potential before and after income taxes at varying volumes.
- The margin of safety is the relationship of budget volume to break even volume.
- The preferred dividend or danger point below which preferred dividends are not earned.
- The dead point, the point where management earns only the "going" rate in the investment.
- The common dividend or unhealthy points below earnings are insufficient to pay the preferred dividends and the expected dividend on the common stock.
  (Welsch, et al., 2000: 467)

All these points and as other can be completed if data are developed for cost volume profit purposes.

2.1.2.8 Required Sales for Desired Profit

Desired profit of the firm may be the 'Profit before Tax', Profit after Tax', '% of Profit on Sales Revenue', '%of Profit on Investment Amount' etc.

1) If the company wants to earn certain amount of profit before tax :

$$\text{Required Sales (Units)} = \frac{\text{FC} + \text{DPBT}}{\text{CMPU}}$$

$$\text{Required Sales (Rs)} = \frac{\text{FC} + \text{DPBT}}{\text{C/M Ratio}}$$

2) If the company wants to earn certain amount of profit after tax :

$$\text{Required Sales (Units)} = \frac{\text{FC} + \left[\frac{\text{DPAT}}{1 - \text{Tax}}\right]}{\text{CMPU}}$$

$$\text{Required Sales (Rs)} = \frac{\text{FC} + \left[\frac{\text{DPAT}}{1 - \text{Tax}}\right]}{\text{C/M Ratio}}$$

3) If the co. wants to earn certain % of profit before tax on sales revenue :

$$\text{Required Sales (Units)} = \frac{\text{FC}}{\text{CMPU} - \text{PPU}}$$

$$\text{Required Sales (Rs)} = \frac{\text{FC}}{\text{C/M Ratio} - \text{Profit Ratio}}$$

4) If the co. wants to earn certain % of profit after tax on sales revenue :

$$\text{Required Sales (Units)} = \frac{\text{FC}}{\text{CMPU} - \left[\frac{\text{PPU}}{1 - \text{Tax}}\right]}$$

$$\text{Required Sales (Rs)} = \frac{\text{FC}}{\text{C/M Ratio} - \left[\frac{\text{Profit Ratio}}{1 - \text{Tax}}\right]}$$

5) If the co. wants to earn certain % of profit after tax on sales revenue :

$$\text{Required Sales (Units)} = \frac{\text{FC} + \text{Investment} \times \text{ROI}}{\text{CMPU}}$$

$$\text{Required Sales (Rs)} = \frac{\text{FC} + \text{Investment} \times \text{ROI}}{\text{C/M Ratio}}$$

2.1.2.9 The Margin of Safety

Margin of safety is the excess of budgeted (or actual) sales over the break-even volume of sales. It is the difference between the BEP and actual sales revenue. It is a position above the BEP. It states the amount by which sales can drop before losses begin to be incurred. It gives management a feel for how does projected operations are to be organization's BEP. Manager often considers the size of the company's margin of safety for making any decisions regarding about various business opportunities. Margin of safety is the amount that sales can drop before reaching the break-even point and thus provides certain amount of 'cushion' from losses. The margin of safety can be expressed in units, value or a percentage *(Munankarmi, 2002: 405).*

$$\therefore \text{Margin of Safety} = \text{Total Sales} - \text{BE Sales}$$

$$\text{or, Margin of Safety} = \frac{\text{FC} + \text{Profit}}{\text{CMPU}} - \frac{\text{FC}}{\text{CMPU}}$$

$$\text{or, Margin of Safety} = \frac{1}{\text{CMPU}} (\text{FC} + \text{Profit} - \text{FC})$$

$$\text{or, Margin of Safety} = \frac{\text{Profit}}{\text{CMPU}}$$

$$\therefore \text{Margin of Safety (Units)} = \frac{\text{Profit}}{\text{CMPU}} \quad \& \quad \text{Margin of Safety (Rs)} = \frac{\text{Profit}}{\text{C/M Ratio}}$$

$$\therefore \text{Margin of Safety Ratio} = \frac{\text{Margin of Safety}}{\text{Total Sales}} = 1 - \frac{\text{BE Sales}}{\text{Total Sales}}$$

2.1.2.10 Sensitivity Analysis

Sensitivity analysis is the measurement of elasticity of the change in cost-volume-profit factors on break-even point or given profit. The strategist should focus more on the factor, which is more sensitive or responsive for profit. To measure the sensitivity of

cost-volume-profit factors, one can see the impact of certain percentage or amount change in volume, price or cost factors on net profit. In other words, sensitivity analysis is the measurement of responsiveness in outcome with the changes in determinant variables. We know that the goal of business enterprise is to maximize profit. Profit is the excess of revenues over the total costs.

$$\therefore \text{ Net Profit} = \text{Total Sales Revenue} - \text{Total Costs} - \text{Taxes}$$

$$\text{or, Net Profit} = \text{Total Sales Revenue} - (\text{Fixed Cost} + \text{Variable Cost}) - \text{Taxes}$$

$$\text{or, Net Profit} = \text{Total Sales Revenue} - (\text{Fixed Cost} + \text{Variable Cost}) - \text{Taxes}$$

$$\text{or, Net Profit} = \text{Sales Units} \times \text{SPPU} - (\text{Fixed Cost} + \text{Sales Units} \times \text{VCPU}) - \text{Taxes}$$

$$\text{So that, Profit} = f\{\text{Sales Volume, Selling Price, VC, FC, Taxes, etc.}\}$$

Means, profit is the function of volume, price, VC, FC, Taxes & so on.

Effect of Price Change: Other things remaining the same, an increase in selling price will result an increase in contribution margin and P/V ratio. It results the decrease in BEP & increase in profit. On the contrary, a reduction in the selling price will result in decrease in CM and thus P/V ratio.

Effect of Volume Change: A change in volume, no accompanied with a change in the selling price and the costs, will not affect P/V ratio. As a result the BEP remains unchanged. Profit will increase with an increase in volume and will be reduced with a decrease in volume.

Effect of Variable Cost Change: An increase in variable cost will result the decrease in contribution margin and then P/V ratio will also decrease. It results the increase in BEP & decrease in profit.

Effect of Fixed Cost Change: Any change in fixed cost will not affect the contribution margin. Therefore, the P/V ratio will not change. A fall in fixed cost will however reduce BEP but raise profit. Similarly, increase in fixed cost will reduce profit but raise BEP.

2.1.2.11 Risk Measurement: Operating Leverage & BEP

Operating leverage tells us how profit change with the change in sales. It is evident that profit changes more rapidly than sales. Why do profit change more rapidly than the

sales? It is because some costs do not change. Say, if sales decline, variable costs also decline in the same ratio so that contribution margin also declines proportionately. But fixed costs do not decline. So the net operating income declines more rapidly. The same thing applies in the case of increase as well. Sales revenues changes, but some part of costs, known as fixed costs, remain unchanged. That is why net operating income changes more rapidly. This change is called the operating leverage.

Operating leverage can be measured in terms of the "*Degree of Operating Leverage*" (DOL). A degree in operating leverage shows the times of percentage change in net operating income of the given percentage change in sales. Degree in operating leverage may be defined as the percentage change in net operating income (NOI) or EBIT associated with a given percentage change in sales *(Pandey, 2004)*.

$$\therefore \text{DOL} = \frac{\%\ \text{Change in Net Operating Income or EBIT}}{\%\ \text{Change in Sales}} = \frac{\Delta\,\text{EBIT}/\,\text{EBIT}}{\Delta\,\text{Sales}/\,\text{Sales}}$$

Alternatively;

$$\therefore \text{DOL} = \frac{\text{Contribution Margin (CM)}}{\text{Net Operating Income (EBIT)}}$$

$$\text{or, DOL} = \frac{\text{Q(SPPU - VCPU)}}{\text{Q(SPPU - VCPU) - FC}}$$

As we know;

$$\therefore \text{BEP} = \frac{\text{FC}}{\text{SPPU-VCPU}}$$

DOL & BEP Relationship: Leverage decision is meant to substitute variable costs by the fixed costs. To create a degree of operating leverage means the employment of higher amount of fixed costs, which eventually increases the break-even point also. Higher fixed costs increase the DOL and they increase the BEP. BEP will be '0' when DOL becomes '1'. Increase in DOL results the increase in BEP & decrease in DOL results the decrease in BEP.

Decision: A high DOL & a high BEP both are the indicators of higher risk. A decision to select a DOL depends upon the future likelihood. If the future is likely to be favorable, then it is better to choose high fixed cost alternative that is high DOL since a high DOL firm goes into loss sooner as sales decline and earns more as sales increase. If it is likely to be unfavorable, then it is safe to operate with a small or no amount of

fixed costs that is less DOL. Secondly, the selection of a DOL is sometimes subjective. A risk taker may prefer a high DOL but a risk averter prefers a small DOL.

2.1.2.12 CVP Analysis for Multi-Product Firms

Sales mix can be defined as the relative combination of two or more products represented in total. It is not only the sales revenue that makes profit. The proportion the sales contributed by different products greatly changes the amount of profit. Managers try to achieve that combination, or mix, that will yield the greatest amount of profit. If a company sells more than one product, these may not be equally profitable. So the company's profit will depend upon the ratio of each product's sales to total sales revenues. 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. Changes in sales mix can cause great variations in a company's profit. A shift to low-margin items can cause the total profit to decrease even through total sales increase. On the contrary, a shift in the sales mix from low-margin items to high margin items can cause the reverse effect-total profit may increase even through total sales decrease.

Factors to be Considered:

- Product wise Selling Price.
- Product wise Variable Cost.
- Fixed Cost: (a) Product wise FC / Departmental FC
  (b) Jointed FC / Allocated FC
- Sales Volume / Sales Mix: (a) Insignificant Mix
  (b) Significant Mix: (a) Sales Unit Mix
  (b) Sales Revenue Mix

Then, BEP & Required sales can be calculated as:

1) If Sales Mix is Insignificant:

$$\text{Overall BEP} = \text{Sum of Individual Products' BEP} = BEP_A + BEP_B$$

2) If Sales Mix is Significant:

$$\text{Overall BEP (Units)} = \frac{\text{Total FC}}{\text{Weighted CMPU}}$$

$$\text{Overall BEP (Rs)} = \frac{\text{Total FC}}{\text{Weighted C/M Ratio}}$$

Where, $\text{Total FC} = \text{Departmental FC} + \text{Joint FC}$

$$\text{Weighted CMPU} = \text{W(Unit)}_A \times \text{CMPU}_A + \text{W(Unit)}_B \times \text{CMPU}_B$$

$$\text{Weighted CMPU} = \frac{\text{Total CM}}{\text{Total Sales (Units)}} = \frac{\text{CM}_A + \text{CM}_B}{\text{Q}_A + \text{Q}_B}$$

$$\text{Weighted C/M Ratio} = \text{W(Rs)}_A \times \text{C/M Ratio}_A + \text{W(Rs)}_B \times \text{C/M Ratio}_B$$

$$\text{Weighted C/M Ratio} = \frac{\text{Total CM}}{\text{Total Sales (Rs)}} = \frac{\text{CM}_A + \text{CM}_B}{\text{SR}_A + \text{SR}_B}$$

2.1.2.13 CVP Analysis under Condition of Uncertainty

CVP analysis can be used for various purposes such as between machine and products, planning of profit and cost significant fixing up of selling price. Management uses this as a convenient tool of profit planning with giving consideration of risk and uncertainty involved in it.

Although, margin of safety ratio explains the degree of sensitivity of the project and product in general but it fails to explain certainty in the product and also between the alternatives. To overcome such a difficulty, risk and uncertainty analysis like in any other management decision making can also be used in CVP analysis. The objective in CVP analysis under condition of uncertainty is to assess the probability distribution of the profit volume under given distribution of one or more factors like sales, price, or profits.

Probability distribution approach is a simple statistical tool which may be used to measure the risk and uncertainty involved In CVP analysis. A probability distribution theory normally suggests for postulation of various possibility of happening the event in consideration. This may be done either taking into considerations of the experience in the past or may be done by considering the personal intuition of the persons doing so. In business, reference of past experience is hardly available not a person is likely to behave in the same manner in the similar situation in different time. Therefore, personal judgments plays significant role in the managerial decision making. The conditions thus postulated are assigned probability (i.e. ones judgments towards likeliness of happening of the condition forecasted). It must be understood that probability assigned here is subjective probability based in personal judgments of the man making such an analysis *(Pandey, 2003: 17).*

Normally, in CVP analysis, sales volume is treated as a random variable. A random variable can be thought of as an unknown quantity. Therefore, the outcome and the decision under CVP are based on the random sales volume of each product. The simplest and widely adopted approach to business decision making under uncertainty is to estimate the likelihood that the random variable will take on various possible values. Such an estimate is called a subjective probability distribution. The decision is then made by choosing that alternative which has the highest expected monetary value.

2.1.3 Use of CVP Analysis in Short-term Profit Planning & Control

Profit planning in fact is a managerial technique and is such a written plan in which all aspects of business organization with respect to definite future period are included. It is a formal statement of policy; plan objective and goal established by the top management in respect of some future period. Profit plan is a pre-determined detailed plan action developed and distributed as guide to current operation and as a partial basis for the subsequent evaluation of performance. Thus, we can say that profit plan is a tool, which may be used by management in planning the future course action and in controlling the actual performance *(Gupta, 1992:522).*

The fundamental concept of PPC includes the following activities of tasks that must generally be carried out to attain maximum usefulness from PPC:

a) A management process that includes planning, organizing, staffing, leading and controlling
b) A managerial commitment to effective management participation by all level in the entity.
c) An organization structure that clearly specifies assignments of management authority and responsibility at all organization levels.
d) A management planning process.
e) A management control process.
f) A continuous and consistent coordination of all the management functions (Continuous feedback, follow-up and re-planning through defined communication channels (both downward and upward).
g) A strategic profit plan.
h) A tactical plan.

i) A responsibility accounting system.

j) A continuous use of the exception principle.

k) A behavioral management program.

CVP analysis is 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 cost. CVP analysis provides information regarding:

a) Minimum level of sales to avoid losses.

b) Sales level to earn target profit.

c) Effects of changes of price, cost and volume towards profit.

d) New break-even point for changes.

e) Impact of expansion plan on CVP relationship.

f) Products those are most profitable and least profitable.

g) Whether to continue or discontinue the sales of product or operation of plan.

h) Effects on operating profit with the increase in fixed costs.

i) Decision regarding special offer.
(Munankarmi, 2002: 401)

Thus, CVP analysis is one of the effective tools for making the profit plan and the objective of CVP analysis is to establish what will happen to the financial results if a specified level of activity or volume fluctuates. If you are going to measure the performance of a department or an activity, then the department and individuals should supply the necessary input to assemble a food plan. As a result, management not only has complete financial forecast as possible but also a clear picture or the operational plans and controls that are currently in place.

2.2 Review of Previous Research

Review of literature is an essential part of all studies. It is a way to discover what other research in the area of our problem has uncovered. It is also a way to avoid investigating problems that have already been definitely answered. Review of literature provides the foundation for developing a comprehensive theoretical frame work from which hypothesis can be developed for testing. It also minimizes the risk of pursuing the dead ends in research. But there are very few research paper concerning comparative cost-volume-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, the previous studies related to PPC are reviewed which will helpful to further study. There has been a lot of research work in the past on public enterprises of Nepal and the application of PPC in both manufacturing and non-manufacturing companies. These past studies have helped this study to be more effective and logistic in its sense. To solve the task presented in this study several concepts and theories of past have been taken. Many researchers have shown interest in doing research in PPC and have carried numerous research and field observations to illuminate pertinent issues. Very few researchers have carried research in CVP analysis by choosing broad areas in multinational company. Whatever the research in this area of profit planning and control made, are also not in depth and in detail. An attempt is made here to review some of the researches, which have been submitted in the related topics, which are as follows:-

Ojha (1995) has done a research on *"Profit Planning and Control in Manufacturing Public Enterprises in Nepal."* For case study he has selected two public enterprises namely Royal Drugs Limited (RDL) and Herbs Production & Processing Company Limited (HPPCL). His research was in partial fulfillment of MBA, submitted to the central Department of Management, Tribhuvan University. The study has covered five years period from FY 2046/47 to 2050/51.

Objectives:

- To analyze the trend of profit planning.
- To compare between production and sales plan.
- To examine the variation between production plan and actual production.

Major Findings:

- Objectives of Nepalese Public Enterprises are not clear, conflict between social objectives and profit objectives are hindering profit planning program of NPEs.
- Inadequate planning of profit due to lack of skilled planner.
- Inadequate authority and responsibility to planning department.
- Failure due to inadequate forecasting system.
- Cost volume profit (price-cost-volume) relationships are not considered when developing sales and pricing strategy.
- Lack of entrepreneurship and commercial concept in overall operations of the enterprises.
- In adequate planning of profit due to lack of skilled manpower.
- Inadequate evaluation of internal and external variables.

Bhusal (2000) has submitted the thesis on the topic *"A Comparative Study on Profit Planning in Manufacturing & Non-manufacturing Public Enterprise of Nepal"***.** He had focused his study to highlight the current practice if profit planning and its effectiveness in Nepalese Public Enterprises. The study covers only five-year-period from 2051/052 to 2054/055. He has used primary as well as secondary data in his research.

Major Findings:

- There is no adequate and clear-cut co-ordination among various units in the organization.
- Objectives of the enterprises are controversial. There is conflict between profit and social goals.
- There is inadequate planning of profit due to lack of planning experts.
- There is lack of entrepreneurship and commercial concept in overall operation of the enterprises.
- There is radicalism and delay in the implementation phase as shown by the achievement to below the targets.
- The plans are based on ad hoc and unrealistic forecast.

Dhakal(2005) has submitted a thesis on the topic of *"Cost-Volume-Profit Analysis as a Tool to Measure the Effectiveness of Profit Planning and Control: A Case Study of Gorkhkali Rubber Industry Limited."* He has focused his study to examine CVP as a tool to

measure the effectiveness of profit planning and control by using both primary and secondary data.

Major Findings:

- Sales plan are not properly maintained by GRIL.
- Appropriated cost classification techniques are not practiced in GRIL.
- There is very low contribution margin of GIRL.
- GIRL is in very high interest bracket.
- GIRL does not have a detailed and systematic practice of planning.
- Goals and objectives are not communicated to the lower level of management.
- GIRL produces very high quality and exportable product but the production cost is high.
- The profitability of the industry is very poor and suffering a high degree of losses.
- GIRL is utilizing only 35% capacity.
- The industry is in risk where operating leverage is high.

Rijal (2005) has conducted a research *"Cost-Volume-Profit Analysis as at Tool to Measure Effectiveness of Profit Planning and Control: A Case Study of Nebiko Private Limited."* He has centered his study to examine CVP analysis as a tool in manufacturing industry and to analyze the CVP and its impact in profit planning.

Major Findings:

- Nebiko's variable cost is high in portion than fixed cost, which contributes for lower contribution margin.
- Lack of effective cost control and program or technique.
- The profit proportion of the company is very low.
- There is no effective inventory policy in the company.
- The company has no detailed of any systematic plan.
- The board of director is the main body of price determination and he interferes directly in the price decision.
- Nebiko has not proper practice in the segregation of costs.
- There is not proper co-ordination among production, administration, distribution, inventory and sales department.

Katwal (2006) has submitted his thesis on the topic *"Cost-Volume-Profit Analysis of Bottlers Nepal Limited"* with some remarkable objectives for measuring the applicability of CVP analysis on budgeting, for finding the profitability of the Bottlers Nepal Pvt. Ltd. as a tool of financial performance analysis, for the examination of the risk position, and then Mr. Katwal concluded some remarkable findings with respect to these objectives.

Major Findings:

- BNL does not practice the scientific and appropriate cost classification technique.
- BNL has not maintained proper sales plan.
- Out of total cost of BNL, variable cost is almost 60% in every year, which causes the low contribution margin.
- The company has moderate risk.
- The actual sales of BNL have crossed the BEP for five years. So, the company is in profitable condition.
- The financial position of the company is profitable.
- The company has not maintained the broad and long-term objectives.
- Only the top executives are involved in planning and decision-making and lower participation is not encouraged.
- The fixed cost of BNL is in fluctuated trend. It means the BNL is unable to manage the fixed cost.
- There is not systematic purchasing of necessary equipment and fixed assets.
- The company does not apply any appropriate and effective sales forecasting technique.

Gautam (2006) has studied on the topic of *"An Analytical and Comparative Study on Cost Volume Profit Analysis of Unilever Nepal Ltd. and Dabur Nepal Private Limited"* is research was in partial fulfillment of MBS, submitted to the Nepal Commerce Campus, TU.

Major Findings:

- Classification of expenses items as variable and fixed or controllable and non controllable must be made within specific framework of responsibility and time.
- Separate cost control department should be established for the effective management of cost.
- UNL and DNPL should consider BEP analysis while preparing sales plan, production plan and selling price of its products.

- Both companies should consider about the product line to improve its profit. Market studies on demand, supply and pricing of product should be carried out and loss oriented cost should be identified and controlled.
- As UNL and DNPL is multi-product company, more emphasis should be provided to the product having high contribution margin for more profit.
- Some portion of profit should be allocated to research and development program so that new technology could be found which provide more competitiveness in the market.
- UNL and DNPL should have proper manpower planning.
- System of periodical performance reports should be strictly followed to be consisted about poor performance and take corrective action immediately and timely.
- New market areas should be identified for the coverage of increased activities of companies.
- A systematic approach should be made towards comprehensive profit. This can considerably contributed to the increase in profitability to UNL and DNPL. Since separation of costs into fixed and variable elements, all decision makers ought to be fully aware of and understand the cost structure of their operation. Otherwise CVP analysis will be meaningless.

Dahal (2006) has studies on the topics of "*Cost Volume Profit Analysis as a Tool to Measure the Effectiveness of Profit Planning with Special Reference to Dabur Nepal Ltd.*" this was submitted to Nepal Commerce Campus, TU in partial fulfillment of Master's Degree in the year 2006.

Objectives:

- Examine the variance between targets and actual sales and production.
- To show the capacity utilization of Dabur Nepal Ltd.
- To forecast future production and sales.
- To analyze financial performance.
- To analyze the CVP of company and its impact in profit planning.
- To analyze the trend of profit over the time covered by the study.
- To provide recommendations and suggestions for improving the profit planning systems of Dabur Nepal Pvt. Ltd.

Major Findings:

- Dabur Nepal Pvt. Ltd. constitutes lack of adequate inventory policy.
- No control over external factor i.e. it has poor SWOT analysis.
- Dabur Nepal Pvt. Ltd. does not prepare strategic and policies for long term.
- Dabur Nepal Pvt. Ltd. is not able to coordinate among various departments.
- Dabur Nepal Pvt. Ltd. does not prepare raw material requirement budget and raw material purchase budget systematically.

2.3 Research Gap

Research is a continuous process having no ending point. Every researcher gives his/her effort to fulfill the gap, which has not been covered by the previous research work. Most of the researches are analyzed in very limited areas and also impacts are rarely explained. Especially very few researches have been made by comparing the two multinational companies. So, the researcher has attempted to fulfill the following matters:

- Most of the studies have been done in respect of comprehensive profit planning and control of manufacturing enterprises but this study examines the current practice of CVP analysis as a tool of PPC in BNL.
- Previous studies have not covered risk measurement, CVP analysis under conditions of uncertainties but this research tries to cover these areas.
- This study gives a high degree of value as the process and the data used in a systematic way of CVP Analysis
- This study has focused on operating position of the organization and clear picture of CVP analysis and its impact on profitability.

So this research will be fruitful to those interested person, scholars, students, teachers, government, businessman, civil society and other stakeholders for academic and policy prospective.

CHAPTER – THREE

3. RESEARCH METHODOLOGY

Research is the process of arriving at the solution of a problem through an organized and systematic investigation of facts and figures related to it. This process involves a series of planned activities of gathering, recording, analyzing and interpreting the data.

Research methodology is the way to solve systematically about the research problem. It helps to analyze, examine and interpret various aspects of research works such as sales, production and profit planning. So, this part concerned with research methodology applied in this study. This chapter deals with the brief conceptual review of research design of this study and the research methodology used to achieve the objectives of study so that the proper recommendations may be given to the concerned enterprises. Thus, this chapter plays vital role to accomplish the study in realistic term with sound empirical analysis.

3.1 Research Design

Research design is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance. It provides a way to reach to research objectives.

In order to make any types of research a well research design is necessary, which fulfills the objectives of the study. The research design is the strategy for conducting research. It describes the general framework for collecting, analyzing and evaluating data after identifying: (a) What the researcher wants to know and (b) What has to be dealt with in order to obtain required information. The researcher design refers to the entire process of planning and carrying out research study *(Wolf and Pant, 1999: 209).*

By research design, we mean an overall framework, outline or plan for conducting the study. It is the plan, structure and strategy for investigation of the facts in order to arrive at conclusion. Research is generally either exploratory or descriptive in nature. The exploratory or descriptive design can be further classified into three categories:

(i) Small-Scale Surveys (ii) Case Studies & (iii) Feasibility Studies

This study attempts to show the relationship among cost, volume and profit to determine margin of safety, BEP, and effective application within the conceptual framework.

Comparative cost-volume-profit analysis during the five-year period is presented and analyzed by descriptive research design and analytical method. But qualities aspect of the research such as effectiveness of CVP in enterprise, views of various manager and personnel and the theoretical prescription are explained in words wherever necessary. The researcher has gathered pertinent data about the present status, past experiences and the relevant forces that contribute to the unit of study and has attempted to present an integrated picture of the study unit after a complete study and analysis.

3.2 Population and Sample

As per the objectives of the study, the population comprises all the Nepalese business enterprises operating with the objectives of earning profit. There are not any limitations for the selection of the enterprise. Since it is not possible to attempt all the number of research population in this research due to various circumstances, one of the large multinational companies in Nepal is selected randomly for the sake of convenience of the study.

The latest 5 year's data has been taken as a sample for the comparative analysis. So, the study is based on the sample data.

3.3 Nature and Sources of Data

There are vital role of data in research to clear and complete research objectives. Research methodology cannot be utilized to bring the conclusion. For the purpose of CVP analysis of the enterprise, data has been collected from both sources, which are as follows:

a) Primary Data:

Primary data is original in nature. For the purpose of research work, primary data were collected, basically, following techniques are adopted:

- Direct observation.
- Unstructured dialogues and discussions with personnel of the company.
- Personal interview through questionnaires etc.

b) Secondary Data:

This data has already been used by others. Only primary data are not sufficient to fulfill the requirement of the research work. Sometimes it is very difficult to collect the primary

data. In this situation, it is better to use secondary data to accomplish the objectives of study. Secondary data is used from the following sources:

- Annual Report provided by the company.
- Different publications made by the company.
- Library
- Books, Booklets, Journals, Magazines

3.4 Data Gathering Procedure

Data gathering is the most important phase of the research work. The conclusion of the study depends upon the collected data. The researcher found the data gathering procedure as the most difficult part of the fieldwork. Frequent visits to personnel of different departments of the company as well as the manufacturing unit were made to ensure that the collected data were according to the requirements of study.

3.5 Period Covered

Due to the short span of time and other constraints, this research only covers the last five years i.e. FY 2004/05 to FY2008/09.

3.6 Research Variables Studies

A variable is symbol to which numerals or values are assigned. In other words, a variable can take on values. The researcher has defined two types of variables: dependent & independent variables. There are three factors i.e. cost, volume and profit, which are interrelated and depended on each other. So, these three factors are dependent variables. But for the sake of convenience to test the relationship between these variables following criteria are assumed:

Table 3.1: Classification of Variables

S.N.	Independent Variables	S.N.	Dependent Variables
1.	Cost	1.	Profit
2.	Volume (Sales)	2.	Profit
3.	Cost and Volume	3.	Profit

3.7 Tools and Techniques Used for Analysis

The collected information is recorded in the appropriate categories on the basis of their similarity and homogeneous nature. The data are presented in proper formats and interpreted and explained whenever necessary. The following tools are used for analyzing the data.

3.7.1 Accounting and Financial Tools

Generally, the accounting and financial tools are used for the purpose of the assessment of the financial position to a particular organization. The following tools are used for analyzing the data:

1) Contribution Margin (CM) = Sales Revenue (SR) - Variable Cost (VC)

2) Contribution Margin (CM) = Fixed Cost (SR) ± Profit/Loss

3) Contribution Margin per Unit (CMPU) = SPPU - VCPU

4) Contribution Margin Ratio (C/M Ratio) = $\frac{CM}{SR}$ or $\frac{CMPU}{SPPU}$

5) BEP (Units) = $\frac{FC}{CMPU}$

6) BEP (Rs) = $\frac{FC}{C/M\,Ratio}$

7) Required Sales (Units) = $\frac{FC + DPBT}{CMPU}$

8) Required Sales (Rs) = $\frac{FC + DPBT}{C/M\,Ratio}$

9) Required Sales (Units) = $\frac{FC + \left[\frac{DPAT}{1 - Tax}\right]}{CMPU}$

10) Required Sales (Units) = $\frac{FC + \left[\frac{DPAT}{1 - Tax}\right]}{C/M\,Ratio}$

11) Required Sales (Units) = $\frac{FC}{CMPU - PPU}$

12) $$\text{Required Sales (Rs)} = \frac{\text{FC}}{\text{C/M Ratio - Profit Ratio}}$$

13) $$\text{Required Sales (Units)} = \frac{\text{FC}}{\text{CMPU} - \left[\frac{\text{PPU}}{1 - \text{Tax}}\right]}$$

14) $$\text{Required Sales (Rs)} = \frac{\text{FC}}{\text{C/M Ratio} - \left[\frac{\text{Profit Ratio}}{1 - \text{Tax}}\right]}$$

15) $$\text{Margin of Safety (MOS)} = \text{Total Sales - BE Sales}$$

16) $$\text{Margin of Safety Ratio} = \frac{\text{Total Sales - BE Sales}}{\text{Total Sales}} = \frac{\text{Margin of Safety (MOS)}}{\text{Total Sales}}$$

17) $$\text{DOL} = \frac{\text{CM}}{\text{EBIT}}$$

3.7.2 Mathematical and Statistical Tools

Generally, the mathematical and statistical tools are used for attaining accuracy on analysis as well as on study. The following tools are used for analyzing the data:

1) Mean, Standard Deviation and Coefficient of Variation:

a) Mean $(\overline{X}) = \frac{\sum X}{n}$

b) Standard Deviation $(\sigma) = \sqrt{\frac{1}{n-1}\left(\sum X^2 - \frac{\sum X^2}{n}\right)}$

c) Coeficient of Variation (C.V.) $= \frac{\text{S.D.}(\sigma)}{\text{Mean}(\overline{X})}$

2) Time Series Analysis (Trend Analysis):

Trend analysis is also one of the moat useful statistical tools. It is used for forecasting. A widely and most commonly used method to describe the trend is the least square method.

a) Simple Regression Analysis:

Let, the demand forecasting regression equation of Y on X is,

$Y = a + bX$

Where, Y = Dependent Variable
a = Intercept of Regression Line
b = Slope of Regression Line
X = Independent Variable &

$$b = \frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - (\sum X)^2} \quad \& \quad a = \overline{Y} - b\overline{X} = \frac{\sum Y}{n} - b\frac{\sum X}{n}$$

b) Multiple Regression Analysis:

Let, the demand forecasting multiple regression equation of X_1 on X_2 & X_3 is,

$X_1 = a_1 + b_1X_2 + b_2X_2$

Where, X_1 = Dependent Variable
X_2 = Independent Variable
X_3 = Independent Variable
a_1 = Point of Intercept on Y-axis
b_1 = Slope of X_1 with variable X_2
b_2 = Slope of X_1 with variable X_3

3) Karl Pearson's Correlation Coefficient & Probable Error:

a) Simple Correlation Coef. (r) $= \dfrac{n \times \sum XY - \sum X \times \sum Y}{\sqrt{\left[n \times \sum X^2 - (\sum X)^2\right]\left[n \times \sum Y^2 - (\sum Y)^2\right]}}$

b) Cofficient of Determination (C.D.) $= r^2$

c) Probable Error (P.E.) $= 0.6745 \times \dfrac{1 - r^2}{\sqrt{n}}$

d) Multiple Correlation Coef. ($R_{1.23}$) $= \sqrt{\dfrac{a_1 \sum X_1 + b_1 \sum X_1X_2 + b_2 \sum X_1X_3 - n(\overline{X}_1)^2}{\sum X_1^2 - n(\overline{X}_1)^2}}$

e) Multiple Determination $= R^2_{1.23}$

F) Standard Error of Estimate $(\sigma_{1.23}) = \sqrt{\frac{\sum X_1^2 - a_1 \sum X_1 - b_1 \sum X_1 X_2 - b_2 \sum X_1 X_3}{n-3}}$

4) Hypothesis Test (t -Test):

Null Hypothesis

$\therefore H_0 : \mu_1 = \mu_2$, i.e. there is no significant difference between budgeted & actual sales.

Alternative Hypothesis

$\therefore H_0 : \mu_1 \neq \mu_2$, i.e. there is significant difference between budgeted & actual sales.

Test Statistics

$$\therefore t = \frac{\bar{X}1 - \bar{X}2}{\sqrt{S^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Level of Significance:

$\therefore \alpha = 5\% = 0.05$

Degree of Freedom:

$\therefore n_1 + n_2 - 2$

Critical Value:

$\therefore t_{0.05}$ for $(n_1 + n_2 - 2)$ df for two tailed test

Decision:

$\therefore$ a) If the calculated value of 't' is less than the critical value, then H_0 is accepted.

b) If the calculated value of 't' is greater than the critical value, then H_0 is rejected

CHAPTER- FOUR

4. PRESENTATION AND ANALYSIS OF DATA

4.1 Sales Plan of BNL

It is fundamental plan of overall profit planning. It provides basic management decision about marketing. It is an organized approach for developing comprehensive sales plan. Different important decisions such as production, purchase, expenses etc. are made on the basis of sales budget.

The company doesn't have a fixed method of sales forecasting. It uses personal judgment method as well as statistical method like regression method, time series analysis etc. The following factors are considered when forecasting the sales:

- Past Sales Levels
- General Economic Trend
- Economic Trend in Industry i.e. Industry of Soft Drink
- Current Political & Legal Situation of Country
- Planned Advertising & Sales Promotion Expenses
- Market Research Studies

The following table shows the target and actual sales of BNL (in Rs.) during the five-year period from 2004/05 to 2008/09.

Table 4.1: Budgeted & Actual Sales of BNL

Detail / Year	Budgeted		Actual		Variance	
	Sales (in Rs)	Increase/ Decrease	Sales (in Rs)	Increase/ Decrease		
2004/05	732,114,113	3.16%	614,739,440	-2.75%	16.03%	U
2005/06	714,739,440	-2.37%	621,827,381	1.15%	13.00%	U
2006/07	721,827,381	0.99%	634,189,583	1.99%	12.14%	U
2007/08	734,189,583	1.71%	746,581,607	17.72%	1.69%	F
2008/09	846,581,607	15.31%	1,002,720,181	34.31%	18.44%	F
Mean*	Rs749,890,425		Rs724,011,638			
S.D.*	Rs54,623,311		Rs164,801,314			
C.V.*	7.28%		22.76%			
r*	0.962267558					
P.E.*	0.022334184					

* Appendix II

Source: Annual Report of BNL

The above table shows the budgeted and actual sales of BNL over five year-period from fiscal year 2004/05 to 2008/09. Actual sales is Rs. 632,114,113in FY 2003/04 which is decreased by 2.75% in 2004/05. After then it is increased in increasing rate up to the fiscal year 2008/09. There is a slight increase in sales in 2005/6 and 2006/07 but there is significant increase in sales afterwards and is increased by 17.72% and 34.31% in 2007/08 and 2008/09 respectively. The lowest sales of Rs. 614,739,440 is made in 2004/05 and the highest sales of Rs. 1002,720,181 is made in 2008/09. So, sales of BNL are satisfactory since sales are increased in increasing rate except in 2004/05.

If it is assumed that 5% variance is ignorable, then performance of BNL is not satisfactory since variance is more than 10%. For this variance sales manager should be responsible. The unrealistic forecasting of regional sales manager may also result this variance. The company is able to meet his forecasted sales in 2007/08 and 2008/09 in which there are favorable variances of 1.69% and 18.44% respectively. And the company has a poorest performance in 2004/05 in which there is high unfavorable variance of 16.03%.

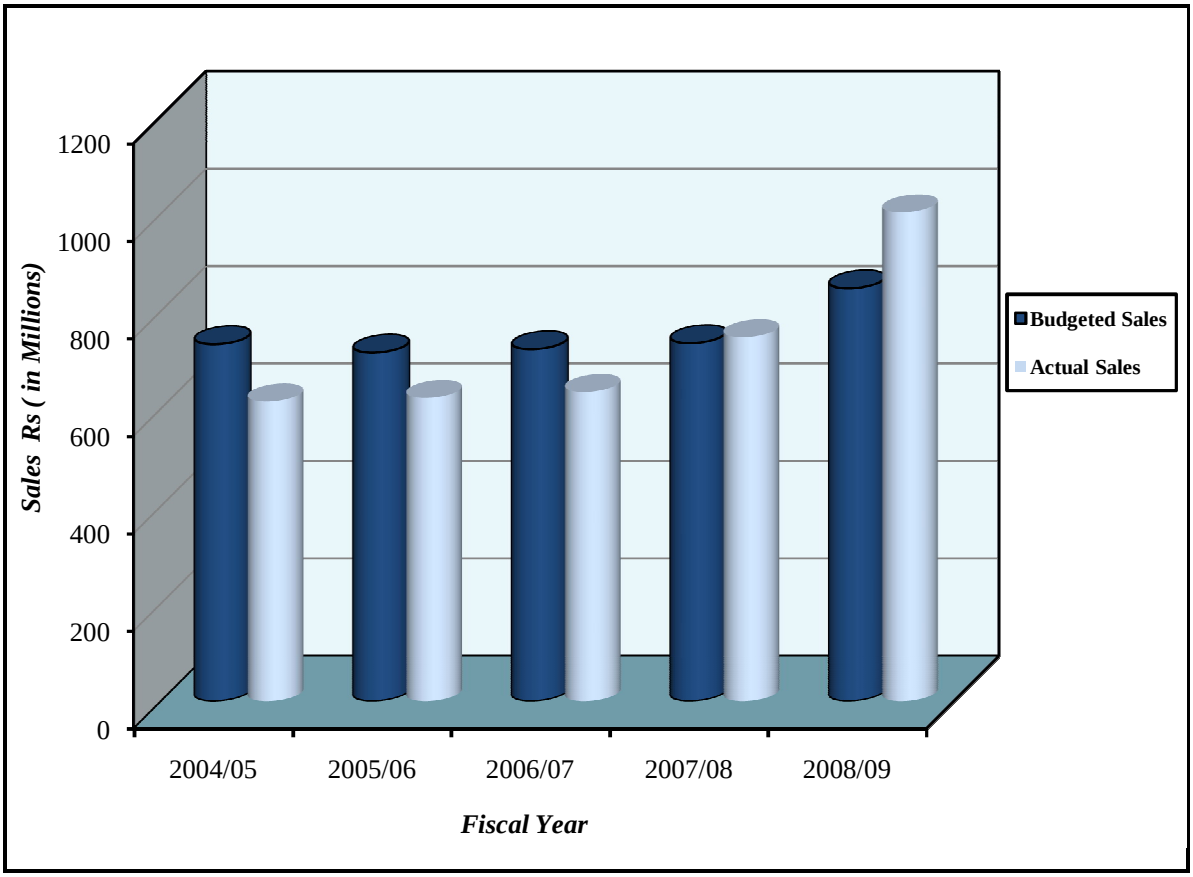
From the above table the average of budgeted sales is Rs. 749,890,425 with the standard deviation of Rs. 54,623,311 which is more than the average of actual sales of Rs. 724,011,638 with the standard deviation of Rs. 164,801,314. The actual sales has the high C.V. than the budgeted sales. That means actual sales is more fluctuating than the budgeted sales. It shows that there is not any proper planning for making budget and for achieving the target sales.

Similarly, the value of correlation coefficient of 0.962267558 shows the positive relationship between budgeted and the actual sales with the very high significant. Since r = 0. 962267558, then the coefficient of determination r2 = 0.9260. That means only 92.60% of the total variation in actual sales is due to the change in budgeted sales and remaining 7.40% (1- 0.9260) is unexplained. Since r > 6P.E. (i.e. 0. 962267558 > 0.134005104), we can conclude that r is significant.

The above analysis shows that BNL has not a good planning for preparing the budget. The targets are somehow unrealistic and high and there is no proper planning for achieving the target.

The multiple bar diagram for the budgeted and actual sales is presented below:

Fig. 4.1: Budgeted & Actual Sales of BNL



The above diagram shows that there is high variance (favorable) in FY 2008/09 and low variance (unfavorable) in FY 2007/08. The company is not able to meet its target in first three years till 2006/07. But the company is able to achieve its target in 2007/08 and 2008/09.

4.2 Production Plan of BNL

Production planning is the second step of profit planning and control in a manufacturing company. The past sales & production, inventory levels and forecasted sales are the basic foundations of production budget. It is affected by the desired ending inventory of finished goods. To find the budgeted production the following equation should be considered by the management.

∴ Budgeted production = Budgeted Sales + Desired Ending Inventory –Beginning Inventory

or, Budgeted production = Budgeted Sales ± Finished Goods Inventory Change

The production plan of BNL is based upon various controllable factors. It adopts seasonal production. The production manager of the company prepares production budget with the help of sales manager, production supervisors, marketing managers, administrative manager and financial manager. The industry has sufficient capacity to produce the goods to fulfill the demand of budgeted sales; nevertheless, it is unable to utilize its full capacity.

The company uses the fluctuating seasonal production policy. While determining inventory levels for finished goods, the management considers fluctuating production & inventory policy for smooth supply. The company keeps inventory of finished goods equal to 2% of next year's sales. The following factors are considered while preparing the production budget:

- Planned sales for the budgeted period.
- Inventory policies relative to levels of finished goods and WIP.
- Plant capacity
- Availability of raw material, labour.
- Economic lot size of production runs.

The following table shows the planned production and actual production of BNL (in Rs.) over five-year period from 2004/05 to 2008/09.

Table 4.2: Budgeted Production of BNL

Detail / Year	Cost of Goods Sold	Desired Ending Inventory	Total Needed	Actual Beginning Inventory	Budgeted Production
2004/05	415,071,759	8,309,605	423,381,364	10,721,659	412,659,705
2005/06	415,480,239	8,150,789	423,631,028	7,465,594	416,165,434
2006/07	407,539,444	9,012,746	416,552,190	7,133,110	409,419,080
2007/08	450,637,322	10,321,929	460,959,251	14,401,378	446,557,873
2008/09	516,096,450	13,678,286	529,774,736	18,874,839	510,899,897

Source: Annual Report of NBL

Table 4.3: Actual Production of BNL

Detail / Year	Cost of Goods Sold	Ending Inventory	Total Needed	Beginning Inventory	Actual Production
2004/05	357,349,931	7,465,594	364,815,525	10,721,659	354,093,866
2005/06	351,080,039	7,133,110	358,213,149	7,465,594	350,747,555
2006/07	389,258,445	14,401,378	403,659,823	7,133,110	396,526,713
2007/08	455,134,052	18,874,839	474,008,891	14,401,378	459,607,513
2008/09	621,893,624	17,371,311	639,264,935	18,874,839	620,390,096
Total	**2,174,716,091**	**17,371,311**	**2,192,087,402**	**10,721,659**	**2,181,365,743**

Source: Annual Report of BNL

Table 4.4: Budgeted &Actual Production of BNL

Detail / Year	Budgeted		Actual		Variance	
	Production	Increase/ Decrease	Production	Increase/ Decrease		
2004/05	412,659,705	-5.90%	354,093,866	-2.01%	14.19%	U
2005/06	416,165,434	0.85%	350,747,555	-0.95%	15.72%	U
2006/07	409,419,080	-1.62%	396,526,713	13.05%	3.15%	U
2007/08	446,557,873	9.07%	459,607,513	15.91%	2.92%	F
2008/09	510,899,897	14.41%	620,390,096	34.98%	21.43%	F
Mean*	Rs439,140,398		Rs436,273,149			
S.D.*	Rs42,769,374		Rs111,905,522			
C.V.*	9.74%		25.65%			
r*	0.9771806					
P.E.*	0.013609668					

* Appendix II

Source: Annual Report of BNL

The above table shows the budgeted and actual production of BNL. Budgeted and actual productions are Rs. 438,531,241 and Rs. 361,347,497 respectively in 2003/04. The budgeted production is decreased by 5.90% in FY 2004/05 but it is only 2.01% in actual production. Then there is a slight increase in budgeted production in 2005/06 where actual production is again decreased by 0.95%. Budgeted production is decreased by 1.62% in 2006/07 but actual production is highly increased in that year. Both productions are increased with high rates afterwards.

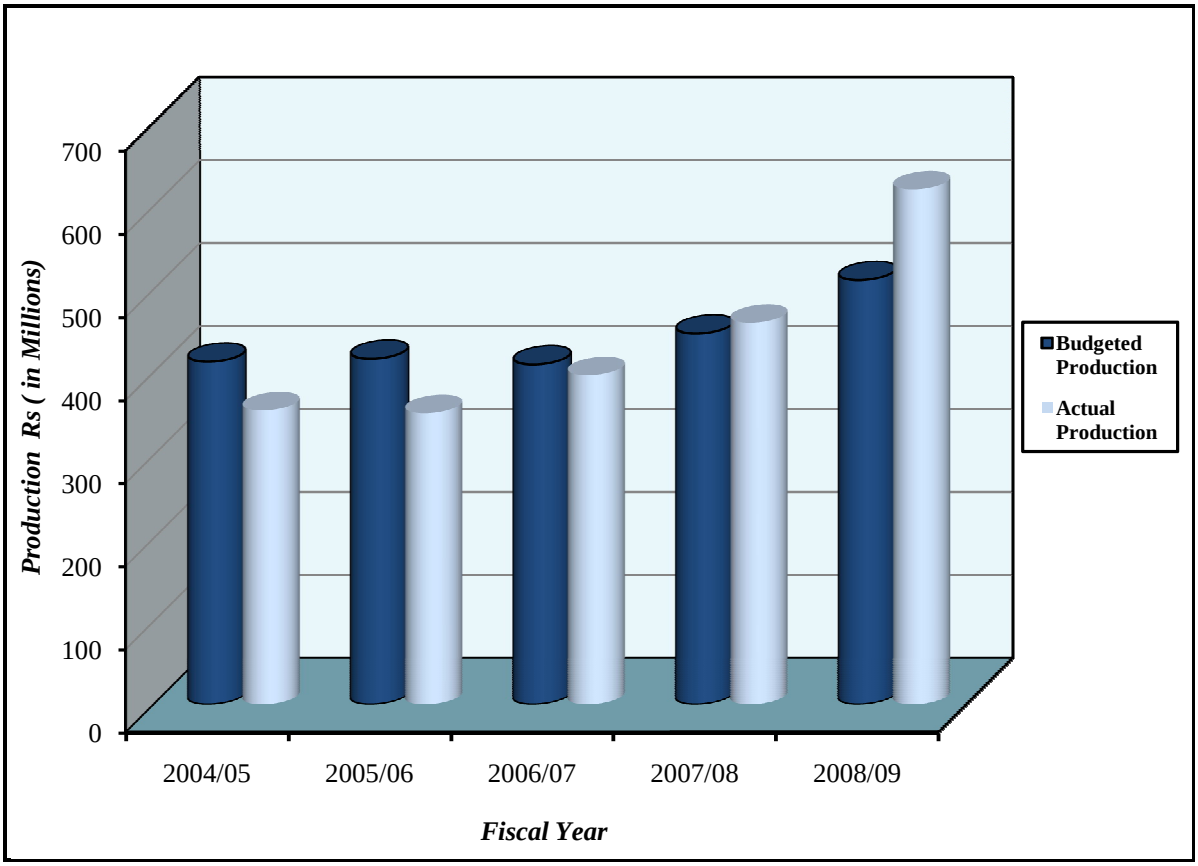
If 5% variance is assumed to be ignorable, then the performance of BNL is not satisfactory since it has 14.19%, 15.72%, & 3.15% unfavorable variances in FY 2004/05, 2005/06 & 2006/07 respectively. BNL has achieved its target in last two years but there is high variance of 21.43% in 2008/09. The company has the poorest performance in FY 2005/06 in which there is high unfavorable variance of 15.72%. Overall the company has not a good performance since it has the unfavorable variance in most of the year. The unrealistic sales forecasting, the poorest coordination between sales and production manager may happen this result. Production manager as well as sales manager should be responsible for this variance.

The averages of budgeted and actual productions are Rs 439,140,398 & Rs 436,273,149 with the standard deviation of Rs 42,769,374 &Rs 111,905,522 respectively. The C.V. of budgeted production is 9.74% where as the C.V. of actual production is 25.65%. That means actual production is more fluctuating than the budgeted production.

Similarly, the value of correlation coefficient of 0.9771806 shows the positive relationship between budgeted and the actual production with the high significance. Since r =0.9771806, then the coefficient of determination r2 = 0.9549. That means 95.49% of the total variation in actual sales is due to the change in budgeted production and remaining 4.51% (1- 0.9549) is unexplained. Since r>6P.E. (i.e. 0.9771806 > 0.081658), we can conclude that r is significant.

The multiple bar diagram for the budgeted and actual production is presented as below:

Fig. 4.2: Budgeted & Actual Production of BNL



The above diagram shows that there is high favorable variance of 21.43% in 2008/09 and high unfavorable variance of 15.72% in 2005/06. The company has low favorable variance of 2.92 % in 2007/08 and low unfavorable variance of 3.15% in 2006/07. The company is unable to meet its target in first three years till 2006/07 but it is able to achieve its target in last two years.

4.3 Cost Plan of BNL

The cost is the amount which is expenses for production of goods and services or used in operation. When we take any goods or service, we have to pay some amount for that. Organization has to bear various types of costs like variable cost, fixed cost or semi-variable cost. Variable cost can be controlled. So, it is also called controllable cost. But fixed cost cannot be controlled and it is known as uncontrollable cost. For the operation of business, cost is required but it should be controlled to earn profit. Different organization should bear different types of cost. For the cost volume profit analysis, production and operation cost should be segregated into variable cost and fixed cost. So, every organization should segregate their various types of cost into fixed and variable.

Costs incurred by BNL under different headings are presented as below:

Table 4.5: Cost Heading & Their Behavior

Cost Heading	Behavior	FC	VC
1) Cost of Sales:			
Material Cost:			
Production of CO2 Gas	Variable	-	100%
Purchase	Variable	-	100%
Production Expenditure:			
Salary, Wages & Allowances	Fixed	100%	-
Utilities	Fixed	100%	-
Travelling	Fixed	100%	-
Repair & Maintenance	Fixed	100%	-
Consumables	Fixed	100%	-
Insurance	Fixed	100%	-
Printing & Stationery	Fixed	100%	-
Other Expenses	Fixed	100%	-
2) Administrative Expenses:			
Salaries, Wages & Other Employee Costs	Fixed	100%	-
Contribution to P.F, Gratuity	Fixed	100%	-
Rent	Fixed	100%	-

Repair & Maintenance	Fixed	100%	-
Security Expenses	Fixed	100%	-
Electricity, Fuel & Water	Fixed	100%	-
Training & Travelling Expenses	Fixed	100%	-
SAP Related Expenses	Fixed	100%	-
Audit Fee	Fixed	100%	-
Legal & Professional Fees & Expenses	Fixed	100%	-
Rates & Taxes	Fixed	100%	-
Bank Charges	Fixed	100%	-
Trade Discount	Variable	-	100%
General Meeting Expenses	Fixed	100%	-
Insurance Premium	Fixed	100%	-
Communication	Fixed	100%	-
Information Service Charges	Fixed	100%	-
Printing & Stationery	Fixed	100%	-
Advertisement	Fixed	100%	-
Sales Promotion Expenses	Fixed	100%	-
Deposit Written Off	Fixed	100%	-
Charity & Donation	Non-Operating	-	-
Uniform	Non-Operating	-	-
Rejection & Breakages	Fixed	100%	-
Vehicle Operating Expenses	Fixed	100%	-
Royalties & Management Fees	Fixed	100%	-
Obsolete Stock & Fixed Assets Written Off	Fixed	100%	-
Product Transfer Fees	Fixed	100%	-
Management Fees	Fixed	100%	-
Miscellaneous Expenses	Fixed	100%	-
Bad Debt Expenses	Fixed	100%	-
3) Distribution Expenses	Semi-Variable	30%	70%
4) Interest	Fixed	100%	-
5) Depreciation	Fixed	100%	-

6) Impairment	Fixed	100%	-
7) Amortization	Fixed	100%	-
8) Provision for Staff Quarter	Non-Operating	-	-
9) Provision for Bonus	Non-Operating	-	-

4.3.1 Analysis of Semi-Variable Costs

Semi-variable cost is combined cost of both fixed and variable. Fixed cost should bear for certain level and if the level of output or services is increased, excess amount should be spent which is known as variable cost. To segregate the mixed cost into fixed and variable cost, the company has provided the information about the degree of variability of the cost. All semi variable costs have been segregated on the basis of the given information.

Table 4.6: Segregation of Semi-Variable Costs of BNL

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
1) Distribution Expenses:					
Fixed Costs (30%)	5,920,791	5,086,429	6,353,684	7,791,626	10,446,856
Variable Costs (70%)	13,815,180	11,868,334	14,825,263	18,180,461	24,375,998
Total	**19,735,971**	**16,954,763**	**21,178,947**	**25,972,087**	**34,822,854**
Increase/Decrease	-18.44%	-14.09%	24.91%	22.63%	34.08%

Source: Annual Report of BNL

The above table shows the detailed segregation of semi-variable cost. The company treats the distribution cost as a semi-variable cost. BNL is able to control its distribution cost in FY 2004/05 and 2005/06. But it is increased by 24.19%, 22.63% & 34.08% in FY 2006/07, 2007/08 & 2008/09 respectively.

4.3.2 Analysis of Fixed Costs

Fixed cost remains constant up to the certain level or the maximum level. It does not vary with level of output. The per unit fixed cost may vary with level of output (i.e. increase with decrease in level of output & decrease with increase in level of output). Fixed cost in total

may vary in different fiscal years due to the other than level of output like inflation, tax rate increase in price of different factors used etc. Fixed costs incurred by BNL under different headings are presented in detail as below:

Table 4.7: Computation of Fixed Cost of BNL

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
1) Cost of Sales:					
Production Expenditure	**71,535,008**	**70,512,428**	**91,752,580**	**96,140,535**	**139,242,327**
2) Administrative Expenses:					
Salaries, Wages & Other Employee Cost	27,881,453	35,286,009	46,051,701	66,029,922	72,107,937
Contribution to PF, Gratuity	975,668	0	0	0	0
Rent	402,077	1,381,389	4,485,245	5,397,472	3,632,008
Repair & Maintenance	3,088,979	4,446,570	3,874,630	3,757,276	5,296,273
Security Expenses	382,095	0	0	0	4,323,839
Electricity, Fuel & Water	118,469	155,645	212,230	163,108	178,147
Training & Travelling Expenses	3,239,883	14,899,616	8,900,706	8,608,982	9,492,818
SAP Related Expenses	0	6,291,308	0	0	0
Audit Fees	219,615	219,615	220,000	220,000	220,000
Legal & Professional Fees & Expenses	648,014	1,131,161	1,251,851	1,640,001	3,232,729
Rates & Taxes	186,843	352,071	308,578	280,645	223,526
Bank Charges	307,452	287,786	334,678	346,337	225,145
General Meeting Expenses	48,559	52,096	24,822	242,632	387,166
Insurance Premium	86,580	180,293	71,575	102,184	66,439
Communication	6,844,404	5,492,827	2,711,339	5,776,770	5,863,637
Information Service Charges	0	0	10,882,367	12,209,111	0
Printing & Stationery	714,671	1,312,883	1,616,886	1,381,211	996,071
Advertisement	3,933,150	2,789,767	3,224,720	488,387	852,800
Sales Promotion Expenses	5,955,335	4,628,452	17,966,080	22,285,256	28,487,149
Training	1,316,153	0	0	0	0

Deposit Written Off	0	0	0	2,190,175	2,797,354
Rejection & Breakages	6,637,676	1,902,187	2,511,779	1,219,546	1,061,836
Vehicle Operating Expenses	1,911,602	2,316,701	2,044,689	1,626,485	1,257,336
Obsolete Stock & Fixed Assets Written Off	5,804,724	717,221	0	16,228,486	1,626,320
Product Transfer Fees	7,773,754	6,779,918	17,983,671	25,677,800	38,537,009
Management Fees	6,275,675	6,643,214	6,879,300	7,725,931	0
Miscellaneous Expenses	767,706	971,262	4,652,968	1,677,923	2,012,295
Bad Debt Expenses	0	0	0	0	28,831,080
Total	**85,520,537**	**98,237,991**	**136,209,815**	**185,275,640**	**211,708,914**
3) Distribution Expenses	5,920,791	5,086,429	6,353,684	7,791,626	10,446,856
4) Interest	265,317	1,328,931	8,875,422	20,789,989	26,193,016
5) Depreciation	49,175,557	64,165,899	60,227,418	65,414,572	67,871,841
6) Impairment			37,672,142		
7) Amortization	6,601,641	503,470	531,622	1,030,864	2,570,691
Total Fixed Costs	**219,018,851**	**239,835,148**	**341,622,683**	**376,443,226**	**458,033,645**
Increase/Decrease	-4.54%	9.50%	42.44%	10.19%	21.67%

The above table shows the fixed costs incurred by BNL. Fixed cost is decreased by 4.54% in 2004/05, and then it is increased by 9.50%, 42.44%, 10.19% and 21.67% in FY 2005/06, 2006/07, 2007/08 and 2008/09 respectively. In 2006/07, it is increased by 42.44% due to increase in miscellaneous expenses and impairment. The company should always try to control its miscellaneous expenses and try to spend in more productive sectors like advertisement expenses, sales promotion expenses, information service charges etc. It can be concluded that BNL is not using the effecting planning to control the fixed costs.

4.3.3 Analysis of Variable Costs

Variable costs are based on activity. Thus, the variable costs should be zero with no activity level. They are changed directly with change in activity level in a responsibility center. Therefore, variable costs will be proportionately changed with the change in output level.

Variable costs are controllable costs. So, management has to give priority to control variable cost. Variable costs incurred by BNL under different headings are presented in detail as below:

Table 4.8: Computation of Variable Cost of BNL

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
1) Cost of Sales:					
Opening Stocks:					
Raw Materials	79,957,968	142,772,596	81,600,664	87,259,400	47,762,161
Work-in-Process	1,575,931	1,379,482	1,074,612	863,340	1,219,212
Finished Goods	10,721,659	7,465,594	7,133,110	14,401,378	18,874,839
Total	**92,255,558**	**151,617,672**	**89,808,386**	**102,524,118**	**67,856,212**
Add: Production of CO_2 Gas	5,861,691	5,877,892	425,936	0	0
Add: Purchase during the Year (net rebate on concentrate)	347,870,245	224,047,225	369,282,382	351,268,529	541,140,109
Less: Transfer to Bottlers Nepal (Terai) Ltd.	(8,554,900)	(11,166,792)	(59,486,721)	(26,942,919)	(47,789,047)
Total Available	**437,432,594**	**370,375,997**	**400,029,983**	**426,849,728**	**561,207,274**
Less: Closing Stock:					
Raw Materials	142,772,596	81,600,664	87,259,400	47,762,161	58,718,366
Work-in-Process	1,379,482	1,074,612	863,340	1,219,212	2,466,301
Finished Goods	7,465,594	7,133,110	14,401,378	18,874,839	17,371,311
Total	**151,617,672**	**89,808,386**	**102,524,118**	**67,856,212**	**78,555,978**
Material Cost	**285,814,922**	**280,567,611**	**297,505,865**	**358,993,516**	**482,651,296**
2) Administrative Expenses:					
Trade Discount	51,340,591	56,673,446	49,126,411	30,979,640	32,256,140
3) Distribution Expenses:	13,815,180	11,868,334	14,825,263	18,180,461	24,375,998
Total Variable Costs	**350,970,693**	**349,109,391**	**361,457,539**	**408,153,617**	**539,283,434**
Increase/Decrease	-2.64%	-0.53%	3.54%	12.92%	32.13%

Source **:** Annual Report of BNL

The above table shows the variable cost of BNL. Variable cost varies with the level of output. In 2004/05, variable cost is decreased by 2.64% with 2.75% decrease in sales revenue. Again in 2005/06, variable cost is decreased by 0.53% with 1.15% increase in sales revenue. Again in 2006/07, variable cost is increased by 3.54% with 1.99% increase in sales revenue. Again in 2007/08, variable cost is increased by 12.92% with 17.72% increase in sales revenue. Again, variable cost is increased by 32.13% with 34.31% increase in sales in 2008/09.That means the company is able to control its cost in 2005/06, 2007/08 & 2008/09 but it is not able to control its variable cost in 2004/05 and 2006/07 in which variable cost is decreased less than sales revenue and increased more than sales revenue in these years.

4.3.4 Non-Operating Income & Expenses

These costs are those cost which are not related to production and operation of the organization. That means these are the expenses or losses from non operating sectors. Non operating income includes the income other than the sales revenue. Thus, these are the extra income for the company. So, these income and expenses are not related with output level. Non operating income of BNL under different headings is presented in detail as below:

Table 4.9: Computation of Non-Operating Income of BNL

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
Dividend from Bottlers Nepal (Terai) Ltd., a Subsidiary Co.	5,492,360	0	0	83,483,872	0
Profit on Sales of Fixed Assets	0	2,860,982	385,302	0	9,972
Other Income	1,161,382	859,031	1,092,417	1,317,254	30,701,457
Total	**6,653,742**	**3,720,013**	**1,477,719**	**84,801,126**	**30,711,429**
Increase/Decrease	-39.92%	-44.09%	-60.28%	5638.65%	-63.78%

Source **:** Annual Report of BNL

The above table shows the non operating income of BNL from FY 2004/05 to 2008/09. The company has the non operating income of Rs. 11,074,457in 2003/04. Then it is decreased with increasing rate up to 2006/07. But it is increased with very high rate in 2007/08. Then, again it is decreased by 63.78% in 2008/09.

Non operating expenses of BNL under different headings are presented in detail as below:

Table 4.10: Computation of Non-Operating Expenses of BNL

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
Administrative Expenses:					
Charity & Donation	124,178	139,331	88,258	312,356	199,871
Uniform	475,750	613,017	1,210,954	997,000	645,383
Total	**599,928**	**752,348**	**1,299,212**	**1,309,356**	**845,254**
Others:					
Loss on Sales of Fixed Assets	0	0	0	10,070,535	0
Provision for Staff Quarter	2,540,185	1,792,525	0	1,770,300	1,763,464
Provision for Bonus	4,387,593	3,096,180	0	3,363,570	3,045,983
Total	**6,927,778**	**4,888,705**	**0**	**15,204,405**	**4,809,447**
Grand Total	**7,527,706**	**5,641,053**	**1,299,212**	**16,513,761**	**5,654,701**
Increase/Decrease	-8.95%	-25.06%	-76.97%	1171.06%	-65.76%

***Source*:** Annual Report of BNL

The above table shows the non operating expenses of BNL incurred from FY 2004/05 to 2008/09. The company has the non operating expenses of Rs. 8,267,525 in 2003/04. Then, it is decreased by 8.95%, 25.06% and 76.97% in 2004/05, 2005/06, & 2006/07 respectively. Then, it is increased with very high increasing rate by 1171.06% in 2007/08. And again, it is decreased by 65.76% in 2008/09. The company should always try to reduce its non operating expenses.

Both non operating income and expenses are decrease with increasing rate up to 2006/07. Then, both are increased with very high rate in 2007/08 and again both are decreased in 2008/09.

4.4 Income Statement under Variable Costing

Income statement of BNL under variable costing during five-year period from 2004/05 to 2008/09 is presented as below:

Table 4.11: Income Statement of BNL

Bottlers Nepal Limited, Balaju, Kathmandu					
Income Statement (Under Variable Costing)					
From FY 2004/05 to 2008/09					
Particulars	**2004/05**	**2005/06**	**2006/07**	**2007/08**	**2008/09**
Sales Revenue	614,739,440	621,827,381	634,189,583	746,581,607	1,002,720,181
Less: Variable Cost of Sales	(350,970,693)	(349,109,391)	(361,457,539)	(408,153,617)	(539,283,434)
Contribution Margin	**263,768,747**	**272,717,990**	**272,732,044**	**338,427,990**	**463,436,747**
Less: Fixed Cost	(219,018,851)	(239,835,148)	(341,622,683)	(376,443,226)	(458,033,645)
Net Profit before Non-Operating Income & Expenses	**44,749,896**	**32,882,842**	**(68,890,639)**	**(38,015,236)**	**5,403,102**
Add: Non-Operating Income	6,653,742	3,720,013	1,477,719	84,801,126	30,711,429
Less: Non-Operating Expenses	(7,527,706)	(5,641,053)	(1,299,212)	(16,513,761)	(5,654,701)
Net Profit before Tax	**43,875,932**	**30,961,802**	**(68,712,132)**	**30,272,129**	**30,459,830**
Provision for Tax	(8,503,311)	(5,539,057)	0	0	0
Provision for Special Fee	(637,748)	(461,588)	0	0	0
Income Tax	0	0	(2,959,078)	(2,209,062)	(716,990)
Deferred Tax	0	0	41,363,862	(39,492,081)	(9,212,196)
Net Profit after Tax	**34,734,873**	**24,961,157**	**(30,307,348)**	**(11,429,014)**	**20,530,644**
Increase/Decrease	-8.11%	-28.14%	-221.42%	62.29%	279.64%
Mean*	Rs7,698,062				
S.D.*	Rs27,404,083				
C.V.*	355.99%				

* Appendix II

Source **:** Annual Report of BNL

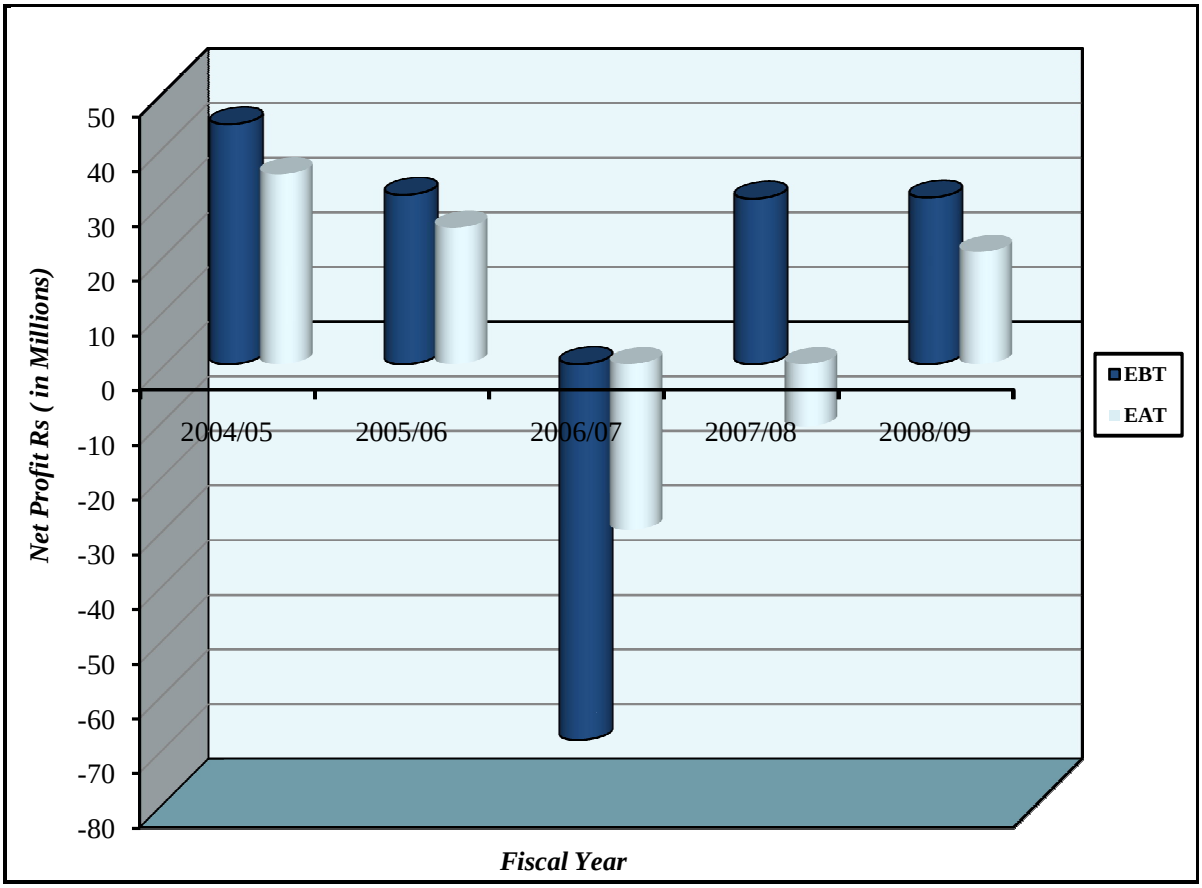
The above table shows the income statement of BNL from FY 2004/05 to 2008/09. The company has net profit of Rs.37,800,558 in 2003/04. Then it is decreased by 8.11% in 2004/05. Again, it is decreased with increasing rate up to 2006/07. The company has incurred losses in 2006/07 due to highly increasing in fixed cost. Again it has incurred losses in 2007/08

due to high amount of taxes but it has the satisfactory amount of profit before tax. Again the company is able to make profit of Rs. 20,530,644 in 2008/09. The company is unable to maintain a stable profit during these periods. This is happened due to the unrealistic and improper planning. The whole management team should be responsible for it.

The average income of BNL is Rs. 7,698,062 with standard deviation of Rs. 27,404,083. The coefficient of variation (C.V.) is more than 100% that means profit is highly fluctuating.

The bar diagram for the net profit before and after tax earned by BNL is presented as below:

Fig. 4.3: Comparative Net Profit of BNL



The above diagram shows that profit is decreased in every year up to 2007/08. The company has paid high amount of taxes in 2006/07 and 2007/08. The company has incurred losses in 2006/07 and again it has earned profit in 2008/09. Both profits are in highly fluctuating trend which shows the company associates the high risk.

4.5 Contribution Margin Analysis

Contribution margin is the excess of sales revenue over variable cost. Contribution margin is the balance available to recover fixed expenses and after that it contributes towards profit. If the contribution margin is not sufficient to cover the fixed costs, then the firm suffers from losses. Contribution margin can be expressed by:

$$\therefore \text{Contribution Margin} = \text{Sales Revenue} - \text{Variable Cost}$$

$$\text{C/M Ratio, or, P/V Ratio} = \frac{\text{Contribution Margin}}{\text{Sales Revenue}} = \frac{\text{Sales Revenue} - \text{Variable Cost}}{\text{Sales Revenue}}$$

$$\text{V/C Ratio, or, C/V Ratio} = \frac{\text{Variable Cost}}{\text{Sales Revenue}}$$

Contribution margin of BNL during five-year period up to 2007/08 is presented as below:

Table 4.12: Calculation of CM, C/M Ratio & V/C Ratio of BNL

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
Sales Revenue	614,739,440	621,827,381	634,189,583	746,581,607	1,002,720,181
Less: Variable Cost of Sales	(350,970,693)	(349,109,391)	(361,457,539)	(408,153,617)	(539,283,434)
Contribution Margin	**263,768,747**	**272,717,990**	**272,732,044**	**338,427,990**	**463,436,747**
C/M Ratio (P/V Ratio)	**42.91%**	**43.86%**	**43.00%**	**45.33%**	**46.22%**
V/C Ratio (C/V Ratio)	**57.09%**	**56.14%**	**57.00%**	**54.67%**	**53.78%**

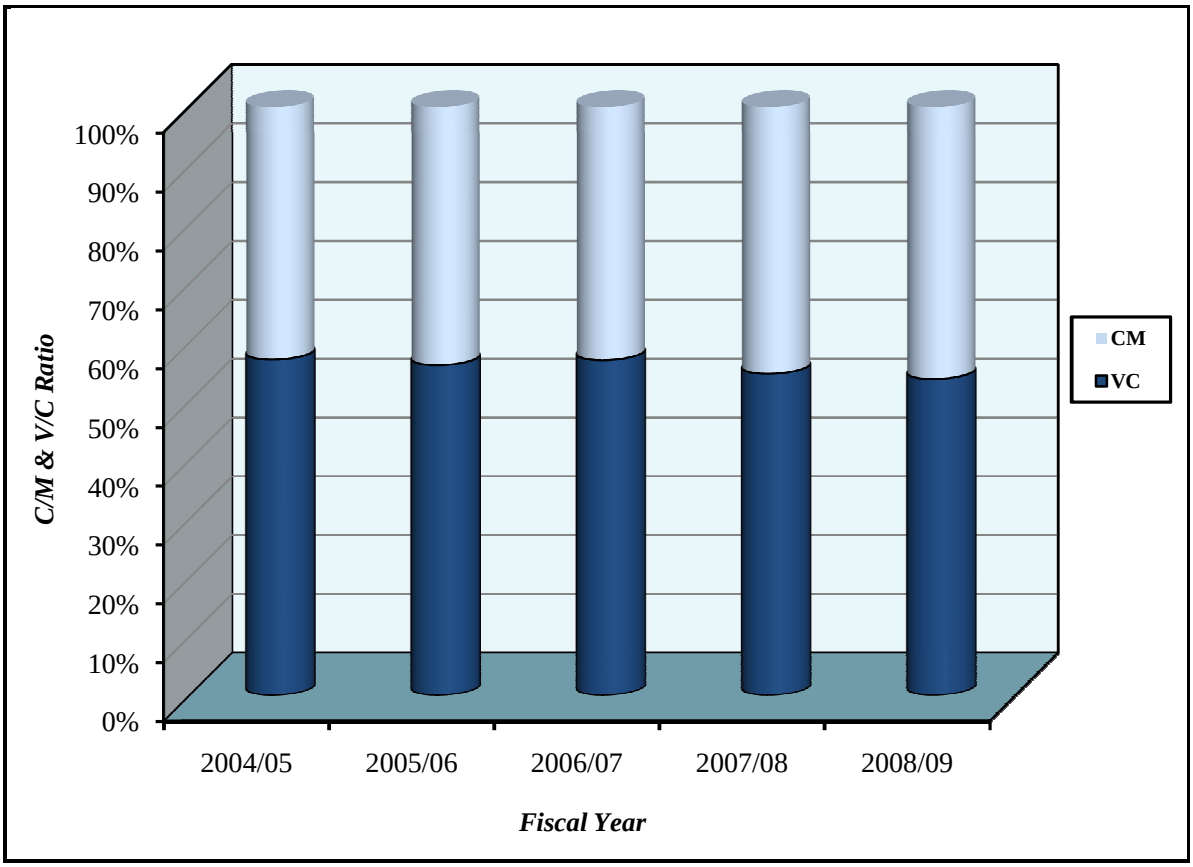
The above table shows the contribution margin of BNL over five-year period form FY 2004/05 to 2008/09. The company has the contribution margin of Rs. 271,628,581 in 2003/04. Then, it has been slightly decreased and become Rs. 263,768,747 in 2004/05. Again it has been slightly increased and become Rs 272,717,990 and Rs. 272,732,044 in 2005/06 and 2006/07 respectively. And then, it is increased to Rs 338,427,990 in 2007/08 & Rs. 463,436,747 in 2008/09.

The company has the almost stable C/M ratio in first three years and then it is slightly increased in 2007/08 and then it is almost same in 2008/09. The company has the C/M ratio

of 42.97% in 2003/04. Then, it is slightly decreased and become 42.91% in 2004/05. Again it is increased and become 43.86% in 2005/06. Then, it is decreased to 43% in 2006/07 and again it is slightly increased to 45.33% in 2007/08. Then, it has become 46.22% in 2008/09. There is no high variance in V/C ratio during three years period up to 2006/07. But V/C ratio is decreased by 2.33% (i.e. 57%- 54.67%) in 2007/08. In this way, the company is able to control its variable cost in 2007/08 and V/C ratio is almost stable in other years.

The percentile bar diagram for V/C ratio and C/M ratio of BNL during five years period up to 2008/09 is presented as below:

Fig. 4.4: Comparative C/M & V/C Ratio of BNL



The above diagram shows that V/C ratio is almost stable in every year up to 2006/07. But it is a bit lower than other years' in 2007/08 then against it is almost same.

4.6 Break-even Analysis

Break-even analysis is the most widely known form of the cost volume profit analysis. Therefore, cost volume profit analysis is also called break-even analysis. Break-even point

is the level of activity at which total cost equals to total revenue. In other words, break-even point is a point of "no profit no loss". If the sales is higher than the BEP level, there will be profit and if the sales is less than BEP level, there will be loss. BEP can be determined by using these two methods:

- Algebraic or Formula Approach
- Graphical or Chart Approach

1) Algebraic or Formula Approach

The most popularly practiced approach to the break-even point and cost volume profit analysis is the formula, also known as the equation. The formula approach uses an algebraic equation to calculate the break-even point.

$$\text{BEP (Units)} = \frac{\text{Fixed Costs}}{\text{SPPU - VCPU}}$$

$$= \frac{\text{Fixed Costs + Non - Operating Expenses - Non - Operating Income}}{\text{CMPU}}$$

$$\text{BEP (Rs)} = \frac{\text{Fixed Costs}}{\text{C/M Ratio}}$$

$$= \frac{\text{Fixed Costs + Non - Operating Expenses - Non - Operating Income}}{\text{1 - V/C Ratio}}$$

BEP of BNL under formula approach during five year-period up to 2008/09 is presented as below:

Table 4.13: Calculation of Break-even Sales (in Rs.) of BNL

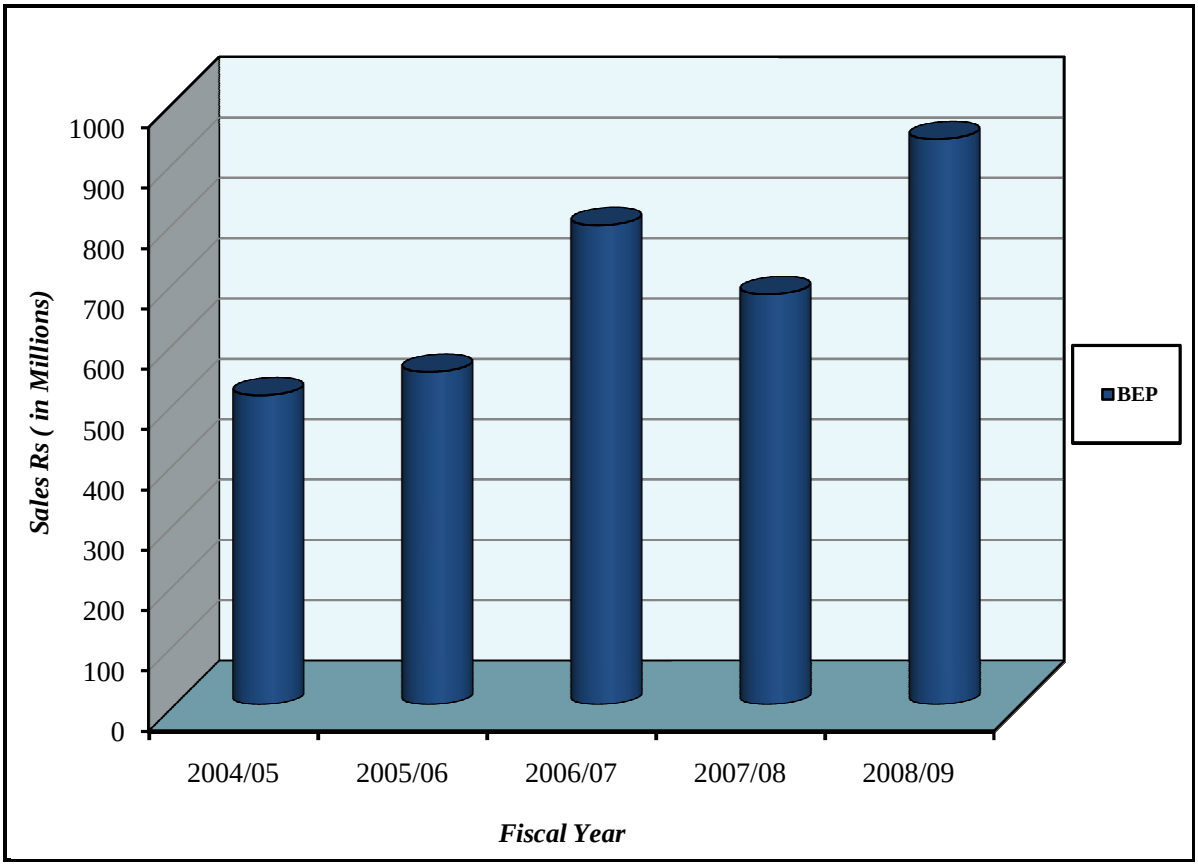
Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
Sales Revenue	614,739,440	621,827,381	634,189,583	746,581,607	1,002,720,181
Less: Variable Cost of Sales	(350,970,693)	(349,109,391)	(361,457,539)	(408,153,617)	(539,283,434)
Contribution Margin	263,768,747	272,717,990	272,732,044	338,427,990	463,436,747
C/M Ratio (P/V Ratio)	42.91%	43.86%	43.00%	45.33%	46.22%
Fixed Costs	219,018,851	239,835,148	341,622,683	376,443,226	458,033,645
Non-Operating Expenses	7,527,706	5,641,053	1,299,212	16,513,761	5,654,701
Non-Operating Income	6,653,742	3,720,013	1,477,719	84,801,126	30,711,429
BEP (Rs)	**512,482,193**	**551,231,025**	**793,967,355**	**679,800,444**	**936,815,424**
Increase/Decrease	-2.82%	7.56%	44.04%	-14.38%	37.81%
Mean*	Rs694,859,288				
S.D.*	Rs174,987,451				
C.V.*	25.18%				

* Appendix II

The above table shows the break-even sales of BNL during five years period from FY 2004/05 to 2008/09. The company has BEP of Rs. 527,372,583 in 2003/04. Then, it is decreased by 2.82% and become Rs. 512,482,193 in 2004/05 because of decreasing in fixed cost. Due to increase in fixed cost, it is increased by 7.56% and become Rs. 551,231,025 in 2005/06. Sudden increase in fixed cost, BEP is increased with high rate and reaches to Rs. 793,967,355 in 2006/07 which is higher than sales revenue. So, the company is not able to maintain profit and it has incurred losses. BNL is able to decrease its V/C ratio although there is increased in fixed cost in 2007/08. So, BEP is decreased to Rs. 679,800,341 and company is able to make profit. Again, BEP is increased to Rs. 936,815,424 due to increase in fixed cost although C/M ratio is little bit increased. The average BEP is Rs 694,859,288 with the standard deviation of Rs 174,987,451. The company has CV of 25.18%.

The bar diagram for BEP of BNL is presented as below:

Fig. 4.5: Comparative Break-even Sales of BNL



The above diagram shows that BEP is slightly increased in 2005/06. But it is increased significantly in 2006/07. Then, it is decreased in 2007/08 and again, it is increased with high rate in 2008/09.

2) Graphical or Chart Approach

A specialized form of profit graph, called the break-even chart, is frequently used to present diagrammatically significant cost- volume –profit relationship ; relating total costs at various sales volumes to the expected revenue and profit or loss at each alternative volume. The break-even chart is also for determining the break –even point. The break-even point indicated in the chart is one at which total cost line and total sales line intersect with each other.

Graphical approach to calculate BEP is presented as below:

Fig. 4.6: Graphical Chart of Break-even Sales of BNL in 2004/05

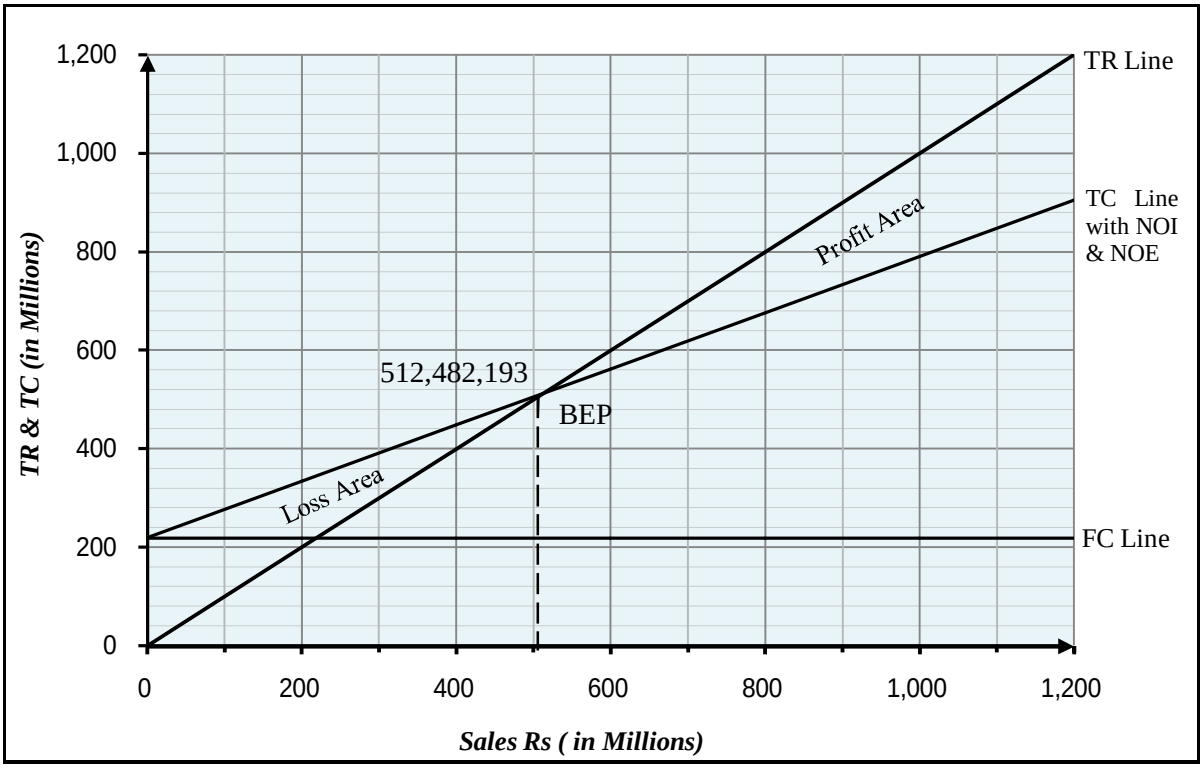
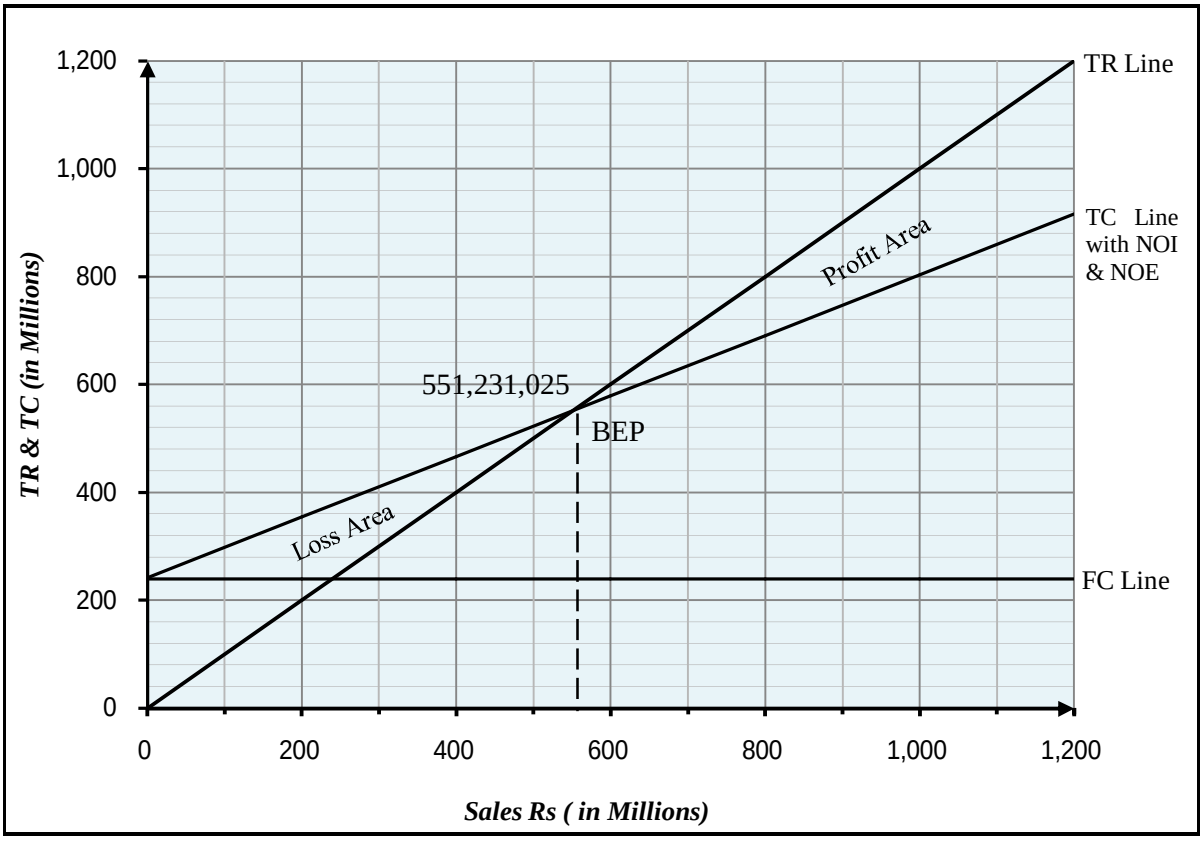


Fig. 4.7: Graphical Chart of Break-even Sales of BNL in 2005/06



Note: TC Line is plotted after the adjustment of Non –operating Income (NOI) & Non-operating Expenses (NOE)

Fig. 4.8: Graphical Chart of Break-even Sales of BNL in 2006/07

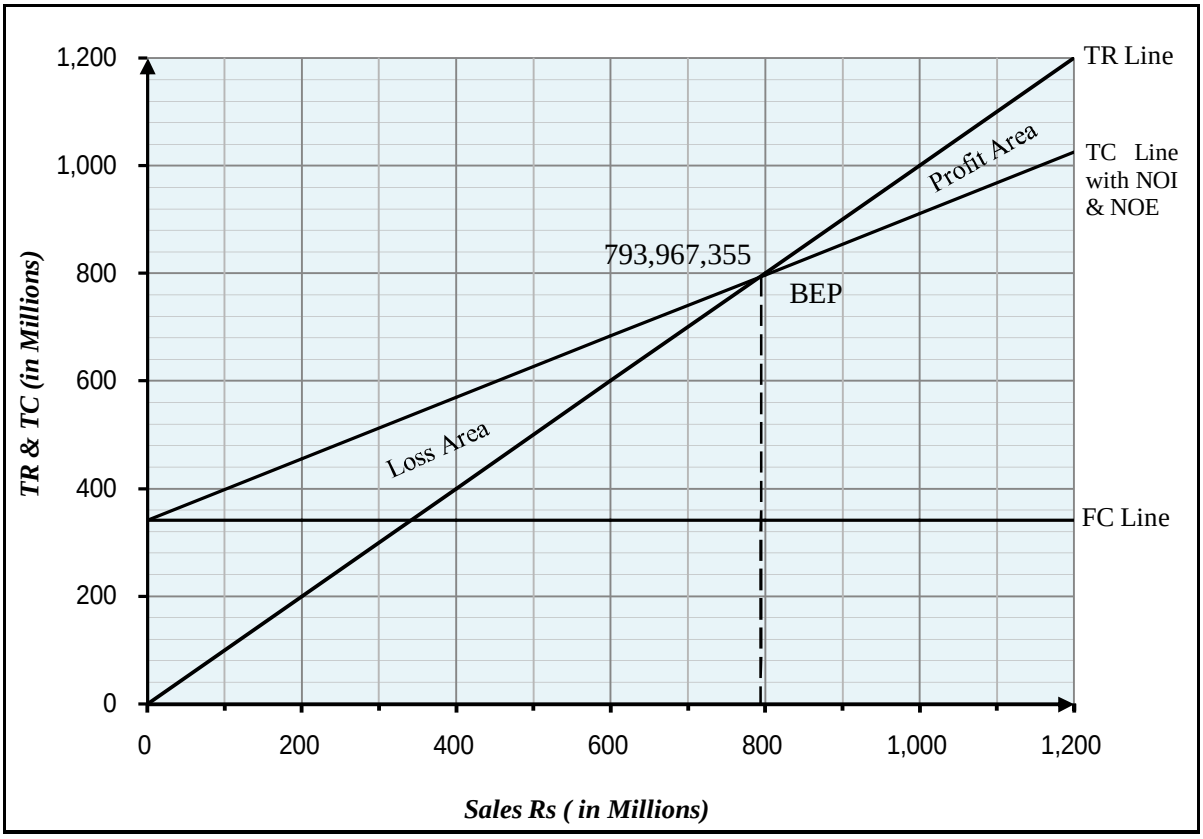


Fig. 4.9: Graphical Chart of Break-even Sales of BNL in 2007/08

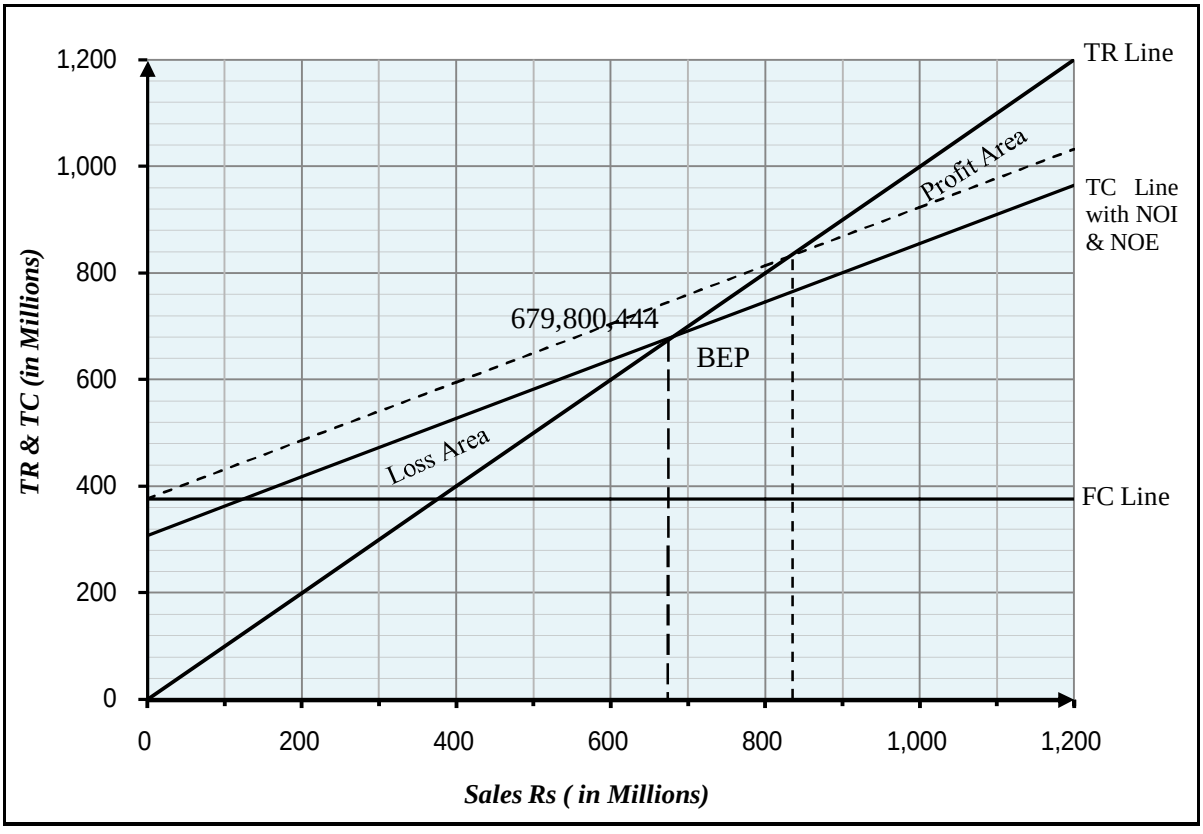
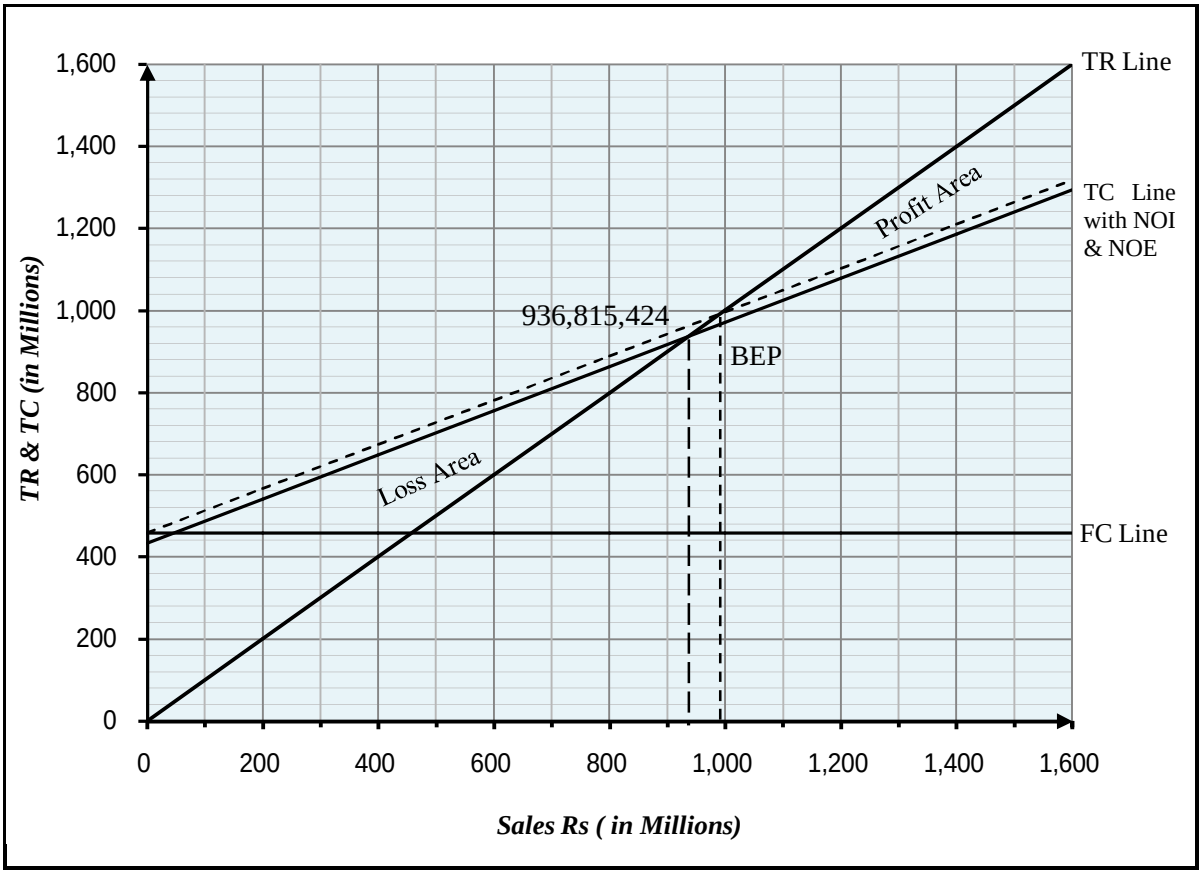


Fig. 4.10: Graphical Chart of Break-even Sales of BNL in 2008/09



The above charts show the graphical approach to calculate BEP during five-year period up to FY 2008/09. From the above charts, fixed cost is a horizontal straight line parallel to X-axis because it remains constant up to maximum level of output and doesn't change with the change in level of activity. So, the company should bear fixed cost although there is no production level. Total cost line is straight line slopping upward to the right and initiates from fixed cost due to no variable cost with no production level. TR line is also a straight line slopping upward to the right and initiates from origin with the slope of 45o with the concept of no output no revenue. BEP is the point where TR= TC. That means TR line & TC line intersect with each other at BEP point.

In the above figures, TR line & TC line intersect with each other at Rs 512,482,193, Rs 551,231,025, Rs 793,967,355, Rs 679,800,444 & Rs 936,815,424 which are the BE sales of BNL in 2004/05, 2005/06, 2006/07, 2007/08 & 2008/09 respectively. At these points, the company has neither profit nor loss. Before these points the company should bear losses and after these points the company makes profit. The company is able to maintain sales above than BE sales in most of the periods. So the company has made profit in 2004/05, 2005/06, 2007/08, & 2008/09. But the company is failed to maintain sales up to BE sales in 2006/07, so the company has incurred losses in this year.

4.7 Margin of Safety Analysis

It is the difference between the actual sales revenue and the break-even sales revenue. It states the amount by which sales can drop before loss begins to be incurred. Larger margin of safety saves the firm. A high margin of safety is particularly significant in times of depression when the demand for the firm's product is falling. A low margin of safety may result for a firm which has a low contribution ratio. It can be calculated as:

$$\text{Margin of Safety (MOS)} = \text{Total Sales} - \text{BE Sales}$$

$$\text{Margin of Safety Ratio} = \frac{\text{Total Sales} - \text{BE Sales}}{\text{Total Sales}} = \frac{\text{Margin of Safety (MOS)}}{\text{Total Sales}}$$

MOS of BNL during five years period up to 2008/09 is presented as below:

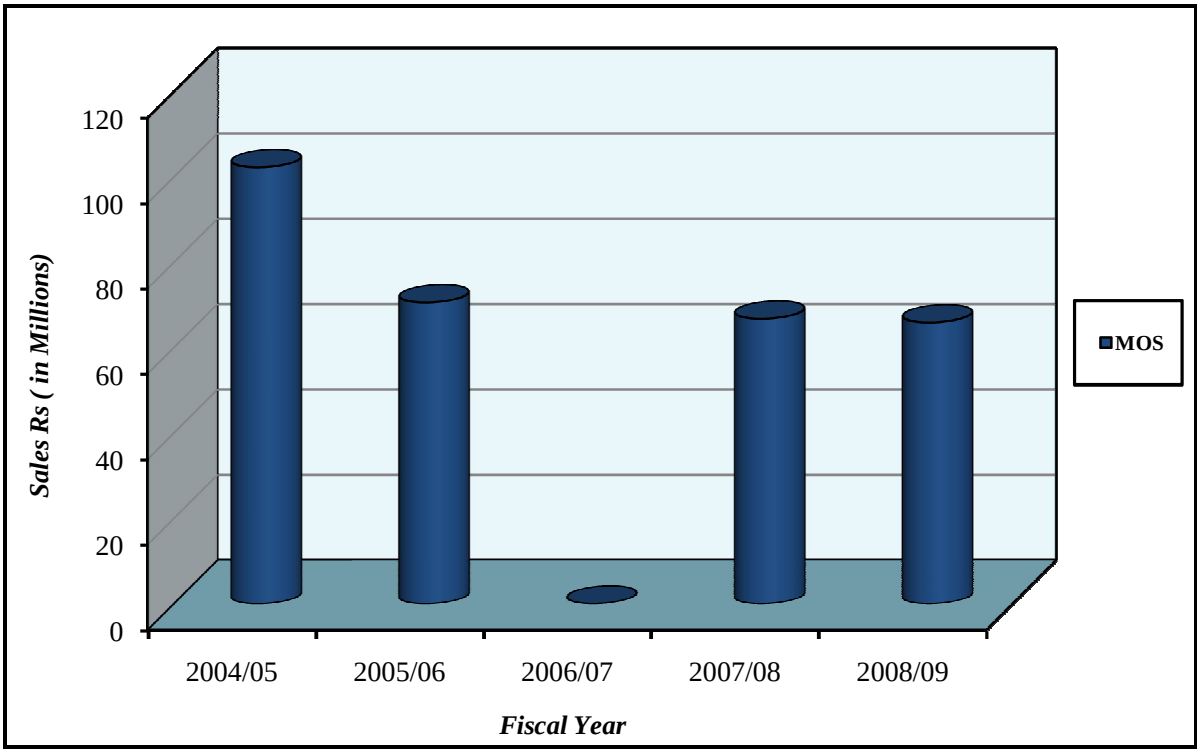
Table 4.14: Calculation of MOS, MOS Ratio & BEP Ratio of BNL

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
Sales Revenue	614,739,440	621,827,381	634,189,583	746,581,607	1,002,720,181
Less: Break-even Sales	(512,482,193)	(551,231,025)	(793,967,355)	(679,800,444)	(936,815,424)
Margin of Safety	**102,257,247**	**70,596,356**	**(159,777,772)**	**66,781,163**	**65,904,757**
Margin of Safety Ratio	**16.63%**	**11.35%**	**-25.19%**	**8.94%**	**6.57%**
BEP Ratio	**83.37%**	**88.65%**	**125.19%**	**91.06%**	**93.43%**

The above table shows the margin of safety of BNL during the five years period up to 2008/09. The company has the margin of safety of Rs 102,257,247 in 2004/05 which shows the 16.63% of the total sales revenue. Then, it is decreased to Rs 70,596,356 which shows the 11.35% of total sales revenue. The company has the negative MOS ratio of 25.19% in 2006/07. That means the company is in loss position & the sales volume is less than the BE sales volume. Then, the company is able to make profit and MOS has become 8.94% in 2007/08. Again, it is decreased to Rs 65,904,757 in 2008/09 which shows the only 6.57% of total sales revenue. From the above analysis, we can say that the company has high MOS ratio in the initial period and then, it is decreased over year. It may be happened due to the high competition in the market.

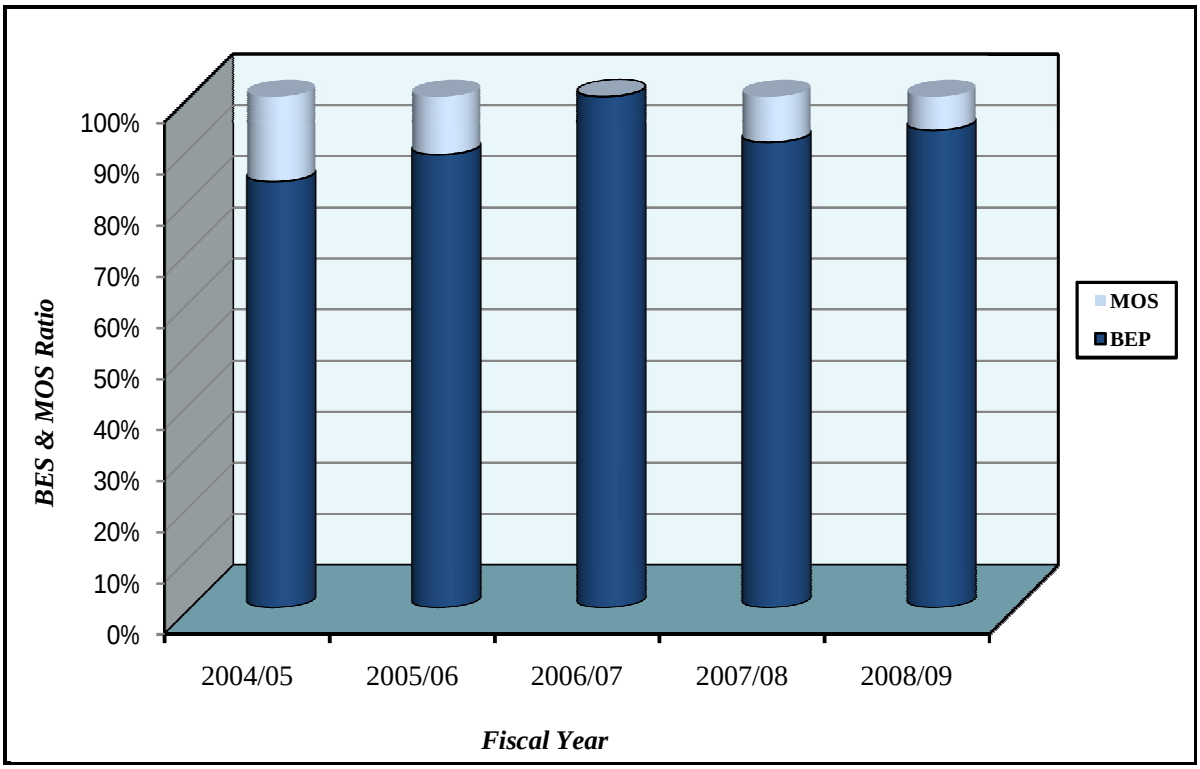
The bar diagram for MOS of BNL is presented as below:

Fig. 4.11: Comparative Margin of Safety Sales of BNL



From the above figure, margin of safety is highly decreased in FY 2005/06 & has become Rs. 70,596,356. It has become zero in 2006/07. And the company is again able to maintain margin of safety in 2007/08.The margin of safety is almost same in 2007/08 and 2008/09.

Fig. 4.12: Comparative Break-even Ratio & Margin of Safety Ratio of BNL



From the above figure, MOS ratio of BNL is 16.63% and BEP ratio is 83.37% in FY 2004/05. Then after MOS ratio is decreased and has become 11.35% where BEP ratio is increased to 88.65% in 2005/06. The company has zero MOS ratio since it has incurred losses in 2006/07. Again the company is able to make profit and has maintained 8.94% MOS ratio in 2007/08. Again MOS ratio is decreased and has become 6.57% where BEP ratio is increased to 93.43% in 2008/09. We can say that the company is not able to maintain constant MOS ratio in last few years.

4.8 Sensitivity Analysis

Sensitivity analysis is the measurement of elasticity of the change in CVP factors on break-even point or given profit. In other words, sensitivity analysis is the measurement of responsiveness in outcome with the changes in determinant variables. So, the impact on net income and BEP level by the change in main determinant variables like selling price, variable cost, fixed cost are shown as below:

Table 4.15: Sensitivity Analysis of BNL in FY 2004/05 with 10% Increase/Decrease

Particulars	Bases	Increase			Decrease		
		10% in SPPU	10% in VCPU	10% in FC	10% in SPPU	10% in VCPU	10% in FC
Sales Revenue	614,739,440	676,213,384	614,739,440	614,739,440	553,265,496	614,739,440	614,739,440
Less: Variable Cost of Sales	350,970,693	350,970,693	386,067,762	350,970,693	350,970,693	315,873,624	350,970,693
Contribution Margin	263,768,747	325,242,691	228,671,678	263,768,747	202,294,803	298,865,816	263,768,747
Less: Fixed Costs	219,018,851	219,018,851	219,018,851	240,920,736	219,018,851	219,018,851	197,116,966
NI before NOI &NOE	44,749,896	106,223,840	9,652,827	22,848,011	(16,724,048)	79,846,965	66,651,781
Add: Non-Operating Income	6,653,742	6,653,742	6,653,742	6,653,742	6,653,742	6,653,742	6,653,742
Less: Non-Operating Expenses	7,527,706	7,527,706	7,527,706	7,527,706	7,527,706	7,527,706	7,527,706
Net Income before Tax	43,875,932	105,349,876	8,778,863	21,974,047	(17,598,012)	78,973,001	65,777,817
Change in Net Income	0	61,473,944	(35,097,069)	(21,901,885)	(61,473,944)	35,097,069	21,901,885
% Change from base NI	0	140.11%	-79.99%	-49.92%	-140.11%	79.99%	49.92%
Volatility to NI in Times	0	14.01	8.00	4.99	14.01	8.00	4.99
C/M Ratio	42.91%	48.10%	37.20%	42.91%	36.56%	48.62%	42.91%
BEP (Rs)	512,482,193	457,180,034	591,139,171	563,526,726	601,395,120	452,299,255	461,437,660
% Change from base BEP	0	-10.79%	15.35%	9.96%	17.35%	-11.74%	-9.96%
Volatility to BEP in Times	0	1.08	1.53	1.00	1.73	1.17	1.00

The above table shows that when there is 10% change in SPPU, VCPU, and FC, then the change in selling price is the most volatile in relation to the net income in comparison to change in other factors. That means a small change in selling price may cause 14.01 times more change in net income. But the decrease in selling price per unit is the most volatile in relation to the BEP level i.e. a decrease in SPPU may cause 1.73 times more increase in BEP level. The increase in selling price is not as much volatile as the decrease in selling price by the same percent. But in the case of variable cost, the increase in variable cost is more volatile than the decrease in variable cost by same percent. And the increase and decrease in fixed cost is equally volatile in nature.

Table 4.16: Sensitivity Analysis of BNL in FY 2005/06 with 10% Increase/Decrease

Particulars	Bases	Increase			Decrease		
		10% in SPPU	10% in VCPU	10% in FC	10% in SPPU	10% in VCPU	10% in FC
Sales Revenue	621,827,381	684,010,119	621,827,381	621,827,381	559,644,643	621,827,381	621,827,381
Less: Variable Cost of Sales	349,109,391	349,109,391	384,020,330	349,109,391	349,109,391	314,198,452	349,109,391
Contribution Margin	272,717,990	334,900,728	237,807,051	272,717,990	210,535,252	307,628,929	272,717,990
Less: Fixed Costs	239,835,148	239,835,148	239,835,148	263,818,663	239,835,148	239,835,148	215,851,633
NI before NOI &NOE	32,882,842	95,065,580	(2,028,097)	8,899,327	(29,299,896)	67,793,781	56,866,357
Add: Non-Operating Income	3,720,013	3,720,013	3,720,013	3,720,013	3,720,013	3,720,013	3,720,013
Less: Non-Operating Expenses	5,641,053	5,641,053	5,641,053	5,641,053	5,641,053	5,641,053	5,641,053
Net Income before Tax	30,961,802	93,144,540	(3,949,137)	6,978,287	(31,220,936)	65,872,741	54,945,317
Change in Net Income	0	62,182,738	(34,910,939)	(23,983,515)	(62,182,738)	34,910,939	23,983,515
% Change from base NI	0	200.84%	-112.75%	-77.46%	-200.84%	112.75%	77.46%
Volatility to NI in Times	0	20.08	11.28	7.75	20.08	11.28	7.75
C/M Ratio	43.86%	48.96%	38.24%	43.86%	37.62%	49.47%	43.86%
BEP (Rs)	551,231,025	493,769,243	632,153,743	605,916,109	642,636,111	488,675,163	496,545,941
% Change from base BEP	0	-10.42%	14.68%	9.92%	16.58%	-11.35%	-9.92%
Volatility to BEP in Times	0	1.04	1.47	0.99	1.66	1.13	0.99

The above table shows that when there is 10% change in SPPU, VCPU, and FC, then the change in selling price is the most volatile in relation to the net income in comparison to change in other factors. That means a small change in selling price may cause 20.08 times more change in net income. But the decrease in selling price per unit is the most volatile in relation to the BEP level i.e. a decrease in SPPU may cause 1.66 times more increase in BEP level. The increase in selling price is not as much volatile as the decrease in selling price by the same percent. But in the case of variable cost, the increase in variable cost is more volatile than the decrease in variable cost by same percent. And the increase and decrease in fixed cost is equally volatile in nature.

Table 4.17: Sensitivity Analysis of BNL in FY 2006/07 with 10% Increase/ Decrease

Particulars	Bases	Increase			Decrease		
		10% in SPPU	10% in VCPU	10% in FC	10% in SPPU	10% in VCPU	10% in FC
Sales Revenue	634,189,583	697,608,541	634,189,583	634,189,583	570,770,625	634,189,583	634,189,583
Less: Variable Cost of Sales	361,457,539	361,457,539	397,603,293	361,457,539	361,457,539	325,311,785	361,457,539
Contribution Margin	272,732,044	336,151,002	236,586,290	272,732,044	209,313,086	308,877,798	272,732,044
Less: Fixed Costs	341,622,683	341,622,683	341,622,683	375,784,951	341,622,683	341,622,683	307,460,415
NI before NOI &NOE	(68,890,639)	(5,471,681)	(105,036,393)	(103,052,907)	(132,309,597)	(32,744,885)	(34,728,371)
Add: Non-Operating Income	1,477,719	1,477,719	1,477,719	1,477,719	1,477,719	1,477,719	1,477,719
Less: Non-Operating Expenses	1,299,212	1,299,212	1,299,212	1,299,212	1,299,212	1,299,212	1,299,212
Net Income before Tax	(68,712,132)	(5,293,174)	(104,857,886)	(102,874,400)	(132,131,090)	(32,566,378)	(34,549,864)
Change in Net Income	0	63,418,958	(36,145,754)	(34,162,268)	(63,418,958)	36,145,754	34,162,268
% Change from base NI	0	92.30%	-52.60%	-49.72%	-92.30%	52.60%	49.72%
Volatility to NI in Times	0	20.48	11.67	11.03	20.48	11.67	11.03
C/M Ratio	43.00%	48.19%	37.31%	43.00%	36.67%	48.70%	43.00%
BEP (Rs)	793,967,355	708,593,376	915,270,025	873,405,599	931,075,594	701,055,049	714,529,111
% Change from base BEP	0	-10.75%	15.28%	10.01%	17.27%	-11.70%	-10.01%
Volatility to BEP in Times	0	1.08	1.53	1.00	1.73	1.17	1.00

The above table shows that when there is 10% change in SPPU, VCPU, and FC, then the change in selling price is the most volatile in relation to the net income in comparison to change in other factors. That means a small change in selling price may cause 20.48 times more change in net income. But the decrease in selling price per unit is the most volatile in relation to the BEP level i.e. a decrease in SPPU may cause 1.73 times more increase in BEP level. The increase in selling price is not as much volatile as the decrease in selling price by the same percent. But in the case of variable cost, the increase in variable cost is more volatile than the decrease in variable cost by same percent. And the increase and decrease in fixed cost is equally volatile in nature.

Table 4.18: Sensitivity Analysis of BNL in FY 2007/08 with 10% Increase/ Decrease

Particulars	Bases	Increase			Decrease		
		10% in SPPU	10% in VCPU	10% in FC	10% in SPPU	10% in VCPU	10% in FC
Sales Revenue	746,581,607	821,239,768	746,581,607	746,581,607	671,923,446	746,581,607	746,581,607
Less: Variable Cost of Sales	408,153,617	408,153,617	448,968,979	408,153,617	408,153,617	367,338,255	408,153,617
Contribution Margin	338,427,990	413,086,151	297,612,628	338,427,990	263,769,829	379,243,352	338,427,990
Less: Fixed Costs	376,443,226	376,443,226	376,443,226	414,087,549	376,443,226	376,443,226	338,798,903
NI before NOI &NOE	(38,015,236)	36,642,925	(78,830,598)	(75,659,559)	(112,673,397)	2,800,126	(370,913)
Add: Non-Operating Income	84,801,126	84,801,126	84,801,126	84,801,126	84,801,126	84,801,126	84,801,126
Less: Non-Operating Expenses	16,513,761	16,513,761	16,513,761	16,513,761	16,513,761	16,513,761	16,513,761
Net Income before Tax	30,272,129	104,930,290	(10,543,233)	(7,372,194)	(44,386,032)	71,087,491	67,916,452
Change in Net Income	0	74,658,161	(40,815,362)	(37,644,323)	(74,658,161)	40,815,362	37,644,323
% Change from base NI	0	246.62%	-134.83%	-124.35%	-246.62%	134.83%	124.35%
Volatility to NI in Times	0	24.66	13.48	12.44	24.66	13.48	12.44
C/M Ratio	45.33%	50.30%	39.86%	45.33%	39.26%	50.80%	45.33%
BEP (Rs)	679,800,444	612,632,128	773,030,026	762,844,872	784,991,781	606,638,183	596,756,016
% Change from base BEP	0	-9.88%	13.71%	12.22%	15.47%	-10.76%	-12.22%
Volatility to BEP in Times	0	0.99	1.37	1.22	1.55	1.08	1.22

The above table shows that when there is 10% change in SPPU, VCPU, and FC, then the change in selling price is the most volatile in relation to the net income in comparison to change in other factors. That means a small change in selling price may cause 24.66 times more change in net income. But the decrease in selling price per unit is the most volatile in relation to the BEP level i.e. a decrease in SPPU may cause 1.55 times more increase in BEP level. The increase in selling price is not as much volatile as the decrease in selling price by the same percent. But in the case of variable cost, the increase in variable cost is more volatile than the decrease in variable cost by same percent. And the increase and decrease in fixed cost is equally volatile in nature.

Table 4.19: Sensitivity Analysis of BNL in FY 2008/09 with 10% Increase/ Decrease

Particulars	Bases	Increase			Decrease		
		10% in SPPU	10% in VCPU	10% in FC	10% in SPPU	10% in VCPU	10% in FC
Sales Revenue	1,002,720,181	1,102,992,199	1,002,720,181	1,002,720,181	902,448,163	1,002,720,181	1,002,720,181
Less: Variable Cost of Sales	539,283,434	539,283,434	593,211,777	539,283,434	539,283,434	485,355,091	539,283,434
Contribution Margin	463,436,747	563,708,765	409,508,404	463,436,747	363,164,729	517,365,090	463,436,747
Less: Fixed Costs	458,033,645	458,033,645	458,033,645	503,837,010	458,033,645	458,033,645	412,230,281
NI before NOI &NOE	5,403,102	105,675,120	(48,525,241)	(40,400,263)	(94,868,916)	59,331,445	51,206,467
Add: Non-Operating Income	30,711,429	30,711,429	30,711,429	30,711,429	30,711,429	30,711,429	30,711,429
Less: Non-Operating Expenses	5,654,701	5,654,701	5,654,701	5,654,701	5,654,701	5,654,701	5,654,701
Net Income before Tax	30,459,830	130,731,848	(23,468,513)	(15,343,535)	(69,812,188)	84,388,173	76,263,195
Change in Net Income	0	100,272,018	(53,928,343)	(45,803,365)	(100,272,018)	53,928,343	45,803,365
% Change from base NI	0	329.19%	-177.05%	-150.37%	-329.19%	177.05%	150.37%
Volatility to NI in Times	0	32.92	17.70	15.04	32.92	17.70	15.04
C/M Ratio	46.22%	51.11%	40.84%	46.22%	40.24%	51.60%	46.22%
BEP (Rs)	936,815,424	847,193,075	1,060,185,063	1,035,918,394	1,075,928,338	839,165,032	837,712,454
% Change from base BEP	0	-9.57%	13.17%	10.58%	14.85%	-10.42%	-10.58%
Volatility to BEP in Times	0	0.96	1.32	1.06	1.48	1.04	1.06

The above table shows that when there is 10% change in SPPU, VCPU, and FC, then the change in selling price is the most volatile in relation to the net income in comparison to change in other factors. That means a small change in selling price may cause 32.92 times more change in net income. But the decrease in selling price per unit is the most volatile in relation to the BEP level i.e. a decrease in SPPU may cause 1.48 times more increase in BEP level. The increase in selling price is not as much volatile as the decrease in selling price by the same percent. But in the case of variable cost, the increase in variable cost is more volatile than the decrease in variable cost by same percent. And the increase and decrease in fixed cost is equally volatile in nature.

4.9 Risk Measurement: Operating Leverage & BEP Analysis

Leverage decision is meant to substitute variable costs by the fixed costs. To create a degree of operating leverage means the employment of higher amount of fixed costs, which eventually increases the break-even point also. So, a high degree of operating leverage makes good time better and bad time worse. So, a risk taker may prefer a high DOL but a risk averter prefers a small DOL.

$$\therefore \text{DOL} = \frac{\text{Contribution Margin (CM)}}{\text{Net Operating Income (EBIT)}} = \frac{Q(\text{SPPU} - \text{VCPU})}{Q(\text{SPPU} - \text{VCPU}) - \text{FC}}$$

DOL of BNL during five years period up to 2008/09 is presented as below:

Table 4.20: Computation of DOL

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
Sales Revenue	614,739,440	621,827,381	634,189,583	746,581,607	1,002,720,181
Less: Variable Cost of Sales	(350,970,693)	(349,109,391)	(361,457,539)	(408,153,617)	(539,283,434)
Contribution Margin	263,768,747	272,717,990	272,732,044	338,427,990	463,436,747
Less: Fixed Cost	(218,753,534)	(238,506,217)	(332,747,261)	(355,653,237)	(431,840,629)
EBIT	45,015,213	34,211,773	(60,015,217)	(17,225,247)	31,596,118
DOL (in Times)	**5.86**	**7.97**	**4.54**	**19.65**	**14.67**

The above table shows the DOL of BNL during five years period. The company has DOL of 5.86 times in FY 2004/05. That means profit is increased by 5.86 more times than sales increased and vice versa. The company has 7.97 & 4.54 times in 2005/06 &2006/07respectively. The company has the highest DOL of 19.65 times in 2007/08 which may very good in increase in sales and very bad for decreased in sales. Again, it is decreased to 14.67 times in 2008/09.

4.10 CVP Analysis under Condition of Uncertainty

4.10.1 Probability of Achieving Expected Sales

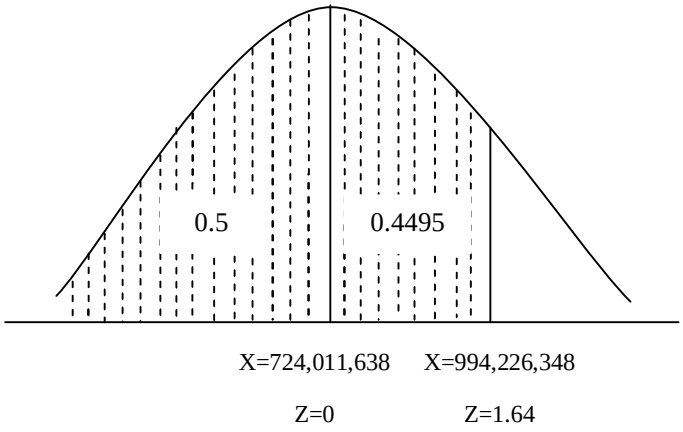
$\therefore$ Average Sales Revenue (μ) = Rs. 724,011,638

Standard Deviation (σ) = Rs. 164,801,314

Now,

1) Probability of Sales being less than Forecasted Sales of Rs. 994,226,348:

$$\therefore z = \frac{X - \mu}{\sigma} = \frac{994,226,348 - 724,011,638}{164,801,314} = 1.64$$



From a 'z' table, the value of 'z' corresponding to 1.64 is 0.4495. So,

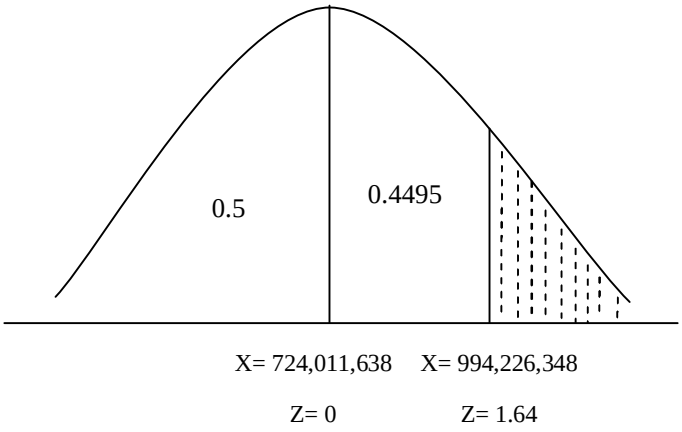
$\therefore$ P (X < 994,226,34 8) = 0.5 + 0.4495

or, P (X < 994,226,34 8) = 0.9495 = 94.95 %

Hence, the probability of sales being less than forecasted sales of Rs. 994,226,348 is 94.95%.

2) Probability of Sales being more than Forecasted Sales of Rs. 994,226,348:

$$\therefore z = \frac{X - \mu}{\sigma} = \frac{994,226,348 - 724,011,638}{164,801,314} = 1.64$$



From a 'z' table, the value of 'z' corresponding to 1.64 is 0.4495. So,

$\therefore$ P (X > 994,226,348) = 0.5 – 0.4495

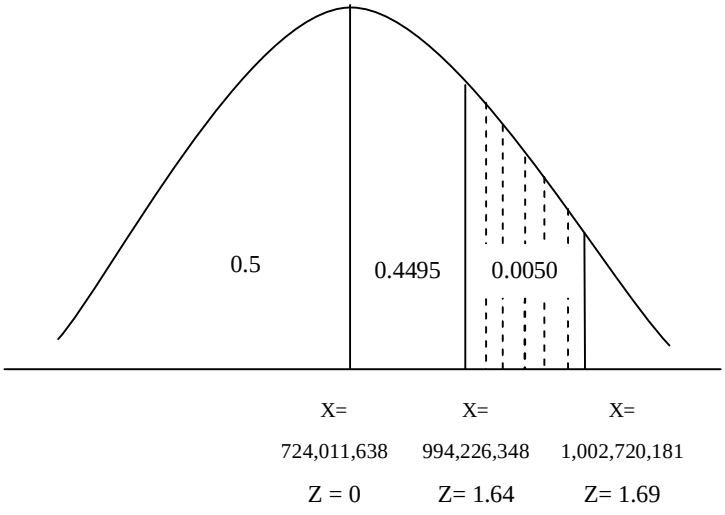
or, P (X > 994,226,348) = 0.0505 = 5.05 %

Hence, the probability of sales being more than forecasted sales of Rs 994,226,348 is 5.05%.

3) Probability of Sales being between Previous Sales of Rs.1,002,720,181 & the Forecasted Sales of Rs. 994,226,348:

When $X = Rs.1,002,720,181$, then $\therefore z = \frac{X - \mu}{\sigma} = \frac{1,002,720,181 - 724,011,638}{164,801,314} = 1.69$

When $X = Rs.994,226,348$, then $\therefore z = \frac{X - \mu}{\sigma} = \frac{994,226,348 - 724,011,638}{164,801,314} = 1.64$



From a 'z' table, the values of 'z' corresponding to 1.64 and 1.69 are 0.4495and 0.4545 respectively. So,

$\therefore$ P (1,002,720,181 < X < 994,226,348) = 0.4545 - 0.4495

or, P (1,002,720,181 < X < 994,226,348) = 0.0050 = 0.50 %

Hence, the probability of sales being between Rs. 1,002,720,181 and Rs. 994,226,348 is 0.50%.

4.10.2 Probability of Achieving Expected Profit

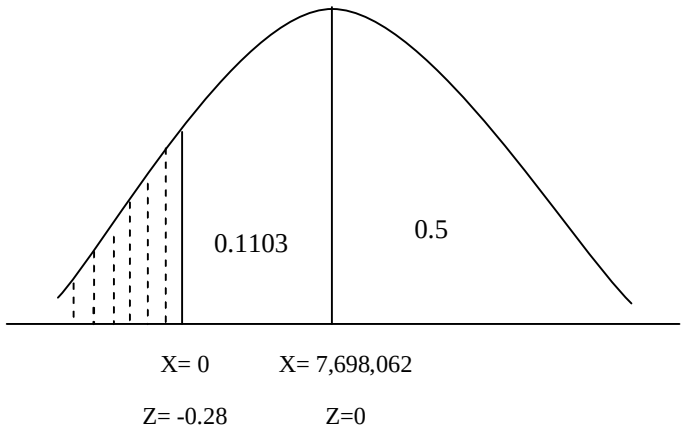
$\therefore$ Average Profit (μ) = Rs. 7,698,062

Standard Deviation (σ) = Rs. 27,404,083

Now,

1) **Probability of Achieving Sales less than or equal to BE Sales or Probability of Bearing Loss:**

$$\therefore z = \frac{X - \mu}{\sigma} = \frac{0 - 7,698,062}{27,404,083} = -0.28$$



From a 'z' table, the value of 'z' corresponding to 0.28 is 0.1103. So,

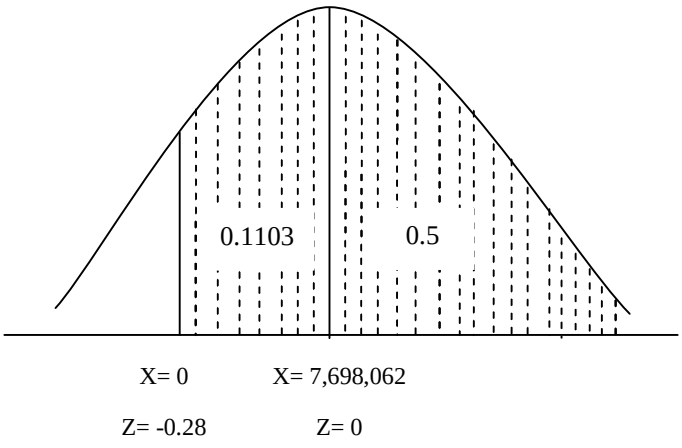
$\therefore$ P ($X \leq 0$) = 0.5 – 0.1103

or, P ($X \leq 0$) = 0.3897 = 38.97 %

Hence, the probability of sales being less than or equal to BEP is 38.97%.

2) Probability of Achieving Sales more than BE Sales or Probability of Achieving Profit:

$$\therefore z = \frac{X - \mu}{\sigma} = \frac{0 - 7{,}698{,}062}{27{,}404{,}083} = -0.28$$



From a 'z' table, the value of 'z' corresponding to 0.28 is 0.1103. So,

$\therefore$ P (X > 0) = 0.5 + 0.1103

or, P (X > 0) = 0.6103 = 61.03 %

Hence, the probability of sales being more than BEP is 61.03%.

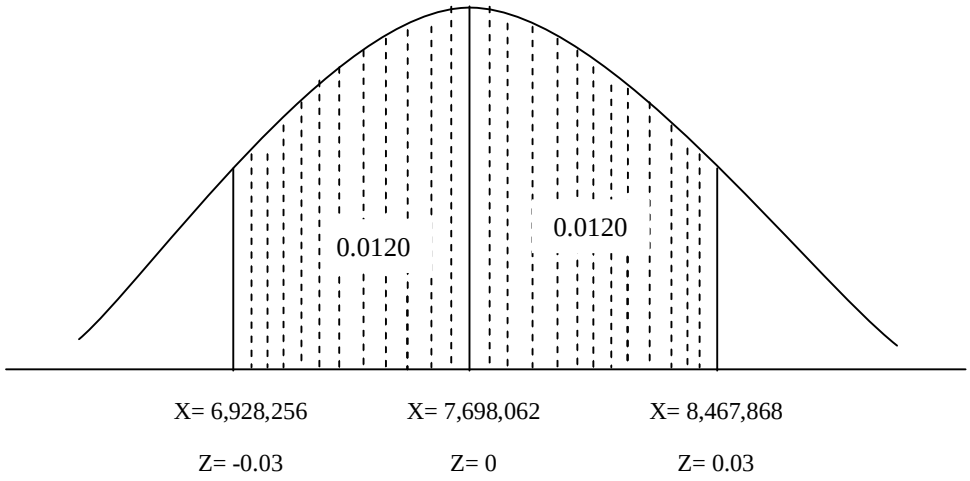
3) Probability of Profit being between 10% less and 10% more than Average:

When X = 90 % of Rs. 7,698,062

$$= \text{Rs. } 6{,}928{,}256, \text{ then } \therefore z = \frac{X - \mu}{\sigma} = \frac{6{,}928{,}256 - 7{,}698{,}062}{27{,}404{,}083} = -0.03$$

When X = 110 % of Rs. 7,698,062

$$= \text{Rs. } 8{,}467{,}868, \text{ then } \therefore z = \frac{X - \mu}{\sigma} = \frac{8{,}467{,}868 - 7{,}698{,}062}{27{,}404{,}083} = 0.03$$



From a 'z' table, the value of 'z' corresponding to 0.07 is 0.0279. So,

$$\therefore\ P(8{,}467{,}868 < X < 6{,}928{,}256) = 0.0120 + 0.0120$$

$$\text{or, } P(8{,}467{,}868 < X < 6{,}928{,}256) = 0.0240 = 2.40\%$$

Hence, the probability of profit being between 10% less and 10% more than average is 2.40%.

4.11 Time Series Analysis for Sales Plan

Let, X_1, X_2 & X_3 be the Sales Revenue, No. of Time Periods & Advertisement & Promotional Expenses of BNL respectively.

Then,

Since sales revenue is a dependent variable, so the multiple regression equation of X_1on X_2 & X_3 is,

$$X_1 = a_1 + b_1 X_2 + b_2 X_3 \text{ ----------(I)}$$

The value of a_1, b_1 & b_2 can be determined by solving the following three normal equations simultaneously.

Note: Appendix III

$$\Sigma X_1 = n a_1 + b_1 \Sigma X_2 + b_2 \Sigma X_3 \text{ ----------(II)}$$

$$\Sigma X_1 X_2 = a_1 \Sigma X_2 + b_1 \Sigma X_2^2 + b_2 \Sigma X_2 X_3 \text{ ----------(III)}$$

$$\Sigma X_1 X_3 = a_1 \Sigma X_3 + b_1 \Sigma X_2 X_3 + b_2 \Sigma X_3^2 \text{ ----------(IV)}$$

Now, putting the value of X in the above equation, the equation will be

$$3{,}620{,}058{,}192 = 5a_1 + 15b_1 + 90{,}611{,}096\, b_2 \text{ ----------(V)}$$

$$11{,}760{,}890{,}284 = 15a_1 + 55b_1 + 326{,}091{,}640b_2 \text{ ----------(VI)}$$

$$70{,}552{,}819{,}999{,}234{,}300 = 90{,}611{,}096\, a_1 + 326{,}091{,}640b_1 + 1{,}981{,}333{,}536{,}181{,}240b_2 \text{ --(VII)}$$

Solving eqn (V), (VI) and (VII), then

a_1= 451,239,434, b_1= 82,549,248 b_2 = 1.386389763

Now, substituting the value of a_1, b_1 and b_2 in eqn (I),

$X_1 = a_1 + b_1X_2 + b_2X_3$

or, X_1 = 451,239,434 + 82,549,248 X_2 + 1.386389763 X_3

Hence, sales forecasting equation for BNL is,

$$\therefore \hat{X}_1 = 451{,}239{,}434 + 82{,}549{,}248\, X_2 + 1.386389763\, X_3$$

Interpretation:

1) Since a_1= 451,239,434, which represents the value of dependent variable X_1 (Sales Revenue) when other independent variables X_2 (no. of time periods) & X_3 (advertisement & promotional expenses) remain zero i.e. sales revenue = Rs. 451,239,434 when no. of time periods = advertisement & promotional expenses = 0.

2) Again, since b_1= 82,549,248, which represents the corresponding change in sales revenue for each no. of change in time period when advertisement & promotional expenses is held constant i.e. each no. of change in time period leads to increase sales revenue by Rs. 82,549,248 at advertisement & promotional expenses is held constant.

3) Again, since b_2 = 1.386389763, which represents the corresponding change in sales revenue for each rupee change in advertisement & promotional expenses when time period is held constant i.e. each rupee change in advertisement & promotional expenses leads to increase sales revenue by Rs. 1.386389763 at time period is held constant.

Table 4.21: Sales Forecasting of BNL

Fiscal Year	X_1= 451,239,434 + 82,549,248 X_2 + 1.386389763 X_3	Sales (in Rs)
2009/10	X_6 = 451,239,434 + 82,549,248 × 6 + 1.386389763 × 34,399,725 *	994,226,348.31
2010/11	X_7 = 451,239,434 + 82,549,248 × 7 + 1.386389763 × 39,825,560 *	1,084,297,918.69
2011/12	X_8 = 451,239,434 + 82,549,248 × 8 + 1.386389763 × 45,251,395 *	1,174,369,489.07
2012/13	X_9 = 451,239,434 + 82,549,248 × 9 + 1.386389763 × 50,677,230 *	1,264,441,059.44
2013/14	X_{10} = 451,239,434 + 82,549,248 × 10 +1.386389763 × 56,103,066 *	1,354,512,629.82

* Appendix IV

4.12 Multiple Correlation Analysis

Let, X_1, X_2 & X_3 be the Net Profit before Tax, Sales Revenue, and Operating Expenses of BNL respectively.

Since profit is a dependent variable, so the multiple regression equation of X_1on X_2 & X_3 is,

$$X_1 = a_1 + b_1X_2 + b_2X_3 \text{ ----------(I)}$$

The value of a_1, b_1 & b_2 can be determined by solving the following three normal equations simultaneously.

$$\Sigma X_1 = n\,a_1 + b_1 \Sigma X_2 + b_2 \Sigma X_3 \text{ ----------(II)}$$

$$\Sigma X_1X_2 = a_1 \Sigma X_2 + b_1 \Sigma X_2^2 + b_2 \Sigma X_2 X_3 \text{ ----------(III)}$$

$$\Sigma X_1X_3 = a_1 \Sigma X_3 + b_1 \Sigma X_2X_3 + b_2 \Sigma X_3^2 \text{ ----------(IV)}$$

Now, putting the value of X in the above equation, the equation will be

Note: Appendix V

$66,858 = 5a_1 + 3,620,058b_1 + 3,643,927b_2$ ----------(II)

$55,792,214,162 = 3,620,058a_1 + 2,729,601,893,274b_1 + 2,748,297,753,453b_2$ ----------(III)

$49,063,284,736 = 3,643,927a_1 + 2,748,297,753,453b_1 + 2,776,297,632,555b_2$ ----------(IV)

Solving eq^n (V), (VI) and (VII), then

$a_1 = -39,477.77$ $b_1 = 0.8570812063$ $b_2 = -0.7789499645$

1) Calculation of Multiple Correlation Coefficient:

$$\therefore R_{1.23} = \sqrt{\frac{a_1 \sum X_1 + b_1 \sum X_1X_2 + b_2 \sum X_1X_3 - n(\bar{X}_1)^2}{\sum X_1^2 - n(\bar{X}_1)^2}}$$

$$\text{or, } R_{1.23} = \sqrt{\frac{-39,477.77 \times 66,858 + 0.8570812063 \times 55,792,214,162 + (-0.7789499645) \times 49,063,284,736 - 5 \times \left(\frac{66,858}{5}\right)^2}{2,776,297,632,555 - 5 \times \left(\frac{66,858}{5}\right)^2}}$$

$$\text{or, } R_{1.23} = \sqrt{0.7091762}$$

$$\text{or, } R_{1.23} = 0.842126$$

Hence, required multiple correlation coefficient is,

$$\therefore R_{1.23} = 0.842126$$

Calculation of Coefficient of Multiple Determination:

$$\therefore R_{1.23} = 0.7091762$$

$$\text{or, } R^2_{1.23} = 0.842126$$

Interpretation:

Since the correlation coefficient $R_{1.23} = 0.7091762$, then the coefficient of multiple determination $R^2_{1.23} = 0.842126$, which indicates that 84.21% of the total variation in the

dependent variable X_1 (Net Profit before Tax) is due to the independent variables X_2 (Sales Revenue) & X_3 (Operating Expenses) and remaining 15.79% is due to the other factors.

2) Calculation of Standard Error of Estimate:

$$\therefore \quad \sigma_{1.23} = \sqrt{\frac{\sum X_1^2 - a_1 \sum X_1 - b_1 \sum X_1 X_2 - b_2 \sum X_1 X_3}{n-3}}$$

$$\text{or, } \sigma_{1.23} = \sqrt{\frac{9,449,293,348 - (-39,477.77) \times 66,858 - 0.8570812063 \times 55,792,214,162 - (-0.7789499645) \times 49,063,284,736}{5-3}}$$

$$\text{or,} \quad \sigma_{1.23} = \sqrt{1,244,041,891}$$

$$\text{or,} \quad \sigma_{1.23} = 35,270.97803$$

Hence, required standard error of estimate is,

$$\therefore \sigma_{1.23} = 35,270.97803$$

4.13 Testing of Hypothesis

For Budgeted Sales: $n = 5,\ \bar{X}_1 = 749,890,425,\ s_1 = 54,623,311$

For Actual Sales: $n = 5,\ \bar{X}2 = 724,011,638,\ s_2 = 164,801,314$

$$\therefore S^2 = \frac{n_1 s_1^2 + n_2 s_2^2}{n_1 + n_2 - 2} = \frac{5 \times 54,623,311^2 + 5 \times 164,801,314^2}{5+5-2} = 18,839,487,064,072,500$$

Null Hypothesis

$\therefore H_0 : \mu_1 = \mu_2$, i.e. there is no significant difference between budgeted & actual sales.

Alternative Hypothesis

$\therefore H_0 : \mu_1 \neq \mu_2$, i.e. there is signiificant difference between budgeted & actual sales.

Test Statistics:

$$\therefore t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{S^2\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}} = \frac{749,890,425 - 724,011,638}{\sqrt{18,839,487,064,072,500 \times \left(\frac{1}{5}+\frac{1}{5}\right)}} = 0.2981$$

Level of Significance:

$\therefore \alpha = 5\% = 0.05$

Degree of Freedom:

$\therefore n_1 + n_2 - 2 = 5+5-2 = 8$

Critical Value:

$\therefore t_{0.05}$ for 8 df for two tailed test = 2.306

Decision:

$\therefore$ Since the calculated value of t is less than the critical value of t, so H_0 is accepted

Hence,we can conclude that there is no significant difference between budgeted & actual sales.

4.14 Major Findings of the Study

After the brief analysis of various elements of BNL, it can be concluded that it has been doing good in formulating and implementing respective tools and techniques in controlling cost and making effective and efficient use of its resources. From this research, the major findings of BNL based on the analysis of available data and under the constraint of given method of study are pointed out as follow:

- The use of profit planning and control is not practiced by the management.
- The planning is not properly maintained. The planning is made on ad hoc basis.
- The objectives set by the management are very ambiguous which resulted in the fluctuation in the actual and targeted results.

- There is more than 10% unfavorable variance between actual and budgeted sales in most of the periods i.e. research periods. The company is able to meet its target in 2007/08 & 2008/09.
- There is no linearity in the target figure.
- The company has not practiced any appropriate and effective sales forecasting techniques like survey method and statistical method. It uses market studies and experimentation method for sales forecasting. It also forecast sales on the basis of advertisement expenses made.
- The company has unfavorable variance between budgeted and actual production in first three years. There is high fluctuation in desired ending inventory and actual ending inventory.
- This company has not practice cost volume profit analysis tools for profit planning and the company has not any policy for using CVP tools in coming year.
- The company has not applied any special technique for segregation of costs into fixed and variable costs, controllable and uncontrollable, operating and non-operating.
- The company has used high variable costs as compared to fixed costs.
- The company is not able to control its variable cost. Variable cost is increased more than sales increased and decreased less than sales decreased.
- The company has not applied any effective managerial tools of "Profit planning and Control" for controlling its activity.
- The company is not considering about margin of safety.
- Sensitivity test shows that the changes in various factors cause to increase or decrease the C/M ratio, BEP, margin of safety. The company has some impact on sensitivity analysis.
- The top-level management being highly competent is praised worthy. They have given due care on ascertaining their level of operation to have good profitability.
- Coefficient of variation of actual sales is less than BEP sales. So actual sales is less volatile.

- The relationship between sales and profit & loss is not significant. There is no clear relationship, so that it can be concluded that the pattern of fixed cost and variable cost is not consistent.
- The company is enjoying huge profit every year in comparison to other companies of similar category whether be public or private.
- MOS ratio is very fluctuating with a decreasing trend which shows the risk of loss.
- The company has incurred losses in FY 2006/07 due to the high increase in fixed costs.
- The company is able to maintain almost consistent C/M ratio in every year which shows the good efficiency of BNL not for increasing V/C ratio.
- Change in selling price is most volatile in relation to the net income in comparison to change in other factors. But the decrease in selling price is most volatile in relation to the BEP level.
- DOL is not consistent and fluctuating every year which leads BNL to the risk. DOL is high in last two years which is best for increasing sales but worst for decreasing sales
- BNL has low probability to achieve its forecasted sales but it has high probability to achieve profit i.e. there is high probability to achieve sales more than break-even sales.
- 84.21% of the total variation in Net Profit before Tax is due to the Sales Revenue & Operating Expenses and remaining 15.79% is due to the other factors which is not good for BNL.
- From the t-test, we can conclude that there is no significant difference between budgeted and actual sales.
- Turmoil political situation is giving tough time to function the entity well.
- BNL has the good strategic policy for promotion of sales, which helps actual sales to stay far above the BEP level.

CHAPTER – FIVE

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

A large number of business organizations including multinational companies have emerged in our country since the restoration of democracy in 2046.The threats of competition from multinational companies are forcing Nepalese managers to be more efficient in managing and utilizing their assets. However, inventory constitutes the most significant part of current assets; most of the organizations in Nepal are facing various problems in management of inventories. Very little measures have been taken to use the scientific tools and techniques developed for the purpose.

Nepal is least developing country in the world. The main source of income is agriculture. For the socio-economic development of the nation industrialization is essential. Science and technological advancement plays vital role in industrialization of the nation. But it is not enough only the advancement of science and technology for development of the country. Management of all these sectors is very essential. Without good management organization cannot achieve its goal and objectives. Government of Nepal has established so many public enterprises to facilitate the people. Most of public enterprises are suffering loss; whether the government has invested huge amount of resource. There is no any concept of effective and appropriate planning system and procedure. Lack of expert, qualified and skilled manpower in the field of management, available resources, capacity and efficiency are not utilized properly. Some popular and systematic tools and technique of management are ignored. These tools are not practicing in public enterprises for measurement of financial statement.

The main objective of the present research was to examine the use of cost-volume profit analysis to plan the profit. So, this study was undertaken to cost-volume-profit analysis to plan the profit. It was observed that BNL was successful private enterprise in soft drinks and beverages all over the country. As per the nature of the study, the secondary data were used and related other information were collected through informal interviews for sales analysis, costs analysis, inventory analysis, contribution margin analysis, P/V ratio analysis, BEP analysis.

BNL, one of the large multinational companies, has glorious history in the field of cold drinks. It is running smoothly by earning profit. Profit shows the strong financial position of the company where as loss shows the weak financial position. Profit is necessary to every organization. Profit is excess amount over the cost. Financial position of the company can analyze its various ways like financial performance, cash flow statement, ratio analysis, profit and loss account, balance sheet, and budgeting etc. Cost volume profit analysis is one of the most popular tools of management account. It is part of profit planning and control. It shows the relationship among the variables like selling price, sales volume, cost, break-even level, safety margin etc. When the organization finds it's BE sales, it can determine the price, volume and cost for profit earning. The main objectives of the study are to highlight the cost volume profit analysis of BNL and comparative study of sales revenue, P/V ratio, BEP sales, safety margin etc. in different years. As per the objectives of the study, various primary and secondary data are collected for five-year period from FY 2004/05 to 2008/09. The collected data are analyzed with descriptive and analytical approach. Sales revenue analysis, sales trend analysis, costs analysis, P/V ratio analysis, BEP analysis, sensitivity analysis, profitability analysis, correlation analysis are done with the help of various financial and statistical tools. Primary data are collected by direct interview with concerned employee and senior staff of the enterprises. Secondary data are drawn from the various document like annual report, journals published by these enterprises and concerned authority. Different results are concluded from the analysis of CVP variables. BNL has almost consistent CM ratio. Its operating income is in fluctuating trend. Variable cost of BNL is very less in comparison to fixed cost. So, profit volume ratio is high. So, it is able to earn profit. Sensitivity analysis of the profit planning is very important and necessary tool for both deficit and surplus units of the growing financial markets of our country Nepal. So, profit plan is the lifeblood of every organization, which not only keeps it alive but also assures the future and creates the soundness on it. PPC means the development of objectives, which motivates the organization to achieve the objectives effectively and efficiently.

5.2 Conclusion

In Nepal, most of the theoretical knowledge is not applied in practical. There is vast gab between theory and practice. There are so many tools and techniques to measure the financial performance of the company but BNL has applied very few tools to analyze its performance.BNL has neither applied cost-volume-profit analysis nor segregated costs into

fixed and variable. Increasing in operating and maintenance cost in each year is another remarkable problem for BNL. The company has not adapted the cost control programme. Company had no practice of segregating semi-variable cost into fixed and variable components. The classification of cost is not scientific and systematic. Therefore, BNL is unable to apply CVP analysis as a tool of profit planning and control.

After performing the study, we are able to arrive at some results. Thus, this study helps us to conclude that:

- The objective of the company is not clearly defined. There is not a long term strategic plan to achieve the objectives. There is not complete and comprehensive budgeting system. BNL has not prepared long term strategic profit plan but has prepared only short-term profit plan in term of budget for each year.

- There is not a scientific budgeting system. Budgets are prepared on traditional basis. There is no proper planning for purchasing of materials and sales of goods. It has not applied any inventory policy. All overhead expenses or shown in general expenditures budget.

- Different types of profit planning tools, which are used in the academic field, are not found applied by the company as no segregation of cost into fixed and variable, which is the hardcore of CVP.

- There is no plan and policies like production plan, sales plan and other operating plan. The company has not utilized its full capacity because of the lack of raw material, inefficiency of management and lack of skilled production specialist.

- BNL has not used CVP tools for planning. So, the company is not able to earn a large. There is no perfect sales policy or sales planner; as a result the company is not able to meet the target sales.

- The top-level management makes the decisions and policies. Target sales are always greater than actual sales. So, there is high fluctuation in target and actual sales.

- The major problem faced by the company is increasing in the variable operating cost because it has adopted neither the cost control system nor the systematic and scientific plan for classification of cost.

- The company has incurred heavy losses in 2006/07 which is happened due to the improper cost planning. Fixed cost is increased by 42.44%.
- The company is able to maintain almost consistent CM ratio in every year but it is not able to increase CM ratio.
- Margin of safety ratio is decreased in every year which leads BNL to the risk. BEP ratio is more than 80% in every year
- The change in selling price is the most volatile in relation to the net income in comparison to change in other factors like variable cost and fixed cost. But the decrease in selling price per unit is the most volatile in relation to the BEP level.
- Degree of operating leverage is fluctuating more which leads BNL to the risk. More DOL is only good for the favorable condition.
- There is high probability not to achieve the expected sales in coming year which shows the improper planning of sales. But there is high probability to make profit.
- From the t-test, we can conclude there is no significant difference between budgeted and actual sales which is good for company.

5.3 Recommendations

Nepal is moving towards globalization with membership of WTO. Therefore, Nepalese companies now have to prepare themselves to compete in international market through effective use of limited resources. Profit planning and control is a means for every organization to achieve goals in a cut throat competition without much difficulty. Nepalese organization lacks effective tools for its improvement. On the basis of the study of use of CVP analysis, it seems necessary to develop, implement and improve the process of CVP analysis to plan the profit. Thus, the recommendations based on the findings of the research study are as follows:

- **Analyze the SWOT:**

For long life of the company, it should analyze its strengths and weaknesses in internal environment of company and its opportunities and threats in external environment of the company. Regular inspection, evaluation, monitoring activities should be undertaken by the central level to different departments.

- **Apply Participatory Management System:**

The participative management can play the vital role in implementation of decisions. Therefore the company should try to involve more personnel in decision making process as far as possible. The CVP and PPC manuals should be communicated from top to lower levels of the company.

- **Apply Budgetary Control System:**

The company should use the different tools of PPC to strengthen the competitiveness of BNL and to carry out planning and controlling activities. For this purpose the company can use CVP analysis tool for planning in budgetary activities.

- **Production and Sales Plan:**

There is unfavorable variance between budgeted and actual due to the unrealistic planning. The planning should be made on the basis of systematic and the realistic way. The achievable target should be made instead of higher target.

- **Classify the Cost as Fixed and Variable:**

Classification of expenses and cost according to their nature of variability is very essential. The preparation of flexible budget becomes exact and easier after classification of costs. So, it is recommended to follow the segregation method either high-low method or least square method for segregating semi-variable cost into variable cost and fixed cost.

- **Make Optimum Utilization of Fixed Cost:**

BNL has invested huge amount of capital in fixed cost. Therefore, the company should try to maximize and effective utilize of fixed costs to generate profit.

- **Use Effective Inventory Policy:**

The ending inventory of the company does not show the any inventory policy. Therefore the company should apply the effective inventory management policy, raw material handling and controlling system for continuous production and selling of the product.

- **Use Systematic and Complete Profit Planning Programme:**

A systematic and complete profit planning programme should be followed to generate more profit. The efficiency and profitability of the company may be improved through different planning programs.

- **Profitability:**

BNL is running smoothly by earning profit. But it has incurred heavy losses in 2006/07 due to the high increase in fixed cost. The company should consider cost controlling program.

- **Contribution Margin:**

Contribution margin ratio is less than 47% and variable cost ratio is more than 53%. The company should control variable cost to minimize the risk. It is suggested to utilize maximum fixed cost.

- **Break-even Sales and Margin of Safety:**

Break-even level of BNL is more than 83% and margin of safety is only less than 17%. It is suggested to increase margin of safety to minimize the risk by applying cost controlling programme

- **Sensitivity Analysis:**

Sensitivity analysis of BNL has shown that changes in sales revenue and variable cost are most volatile to boost up profit. The decrease in sales revenue and increase in variable cost are more volatile in relation to BEP level. It is suggested to increase in sales revenue and decrease in variable cost to heavy change in profit and BEP level.

- **Degree of Operating Leverage:**

High degree of operating leverage makes good time better and bad time worse. So, it is suggested to increase DOL if the company will have a favorable condition in future. Otherwise it is suggested to use average level of DOL.

- **Application of New Management Theory:**

There are many new and popular management theories like, management by objective, participative management etc. These principles can be more effective to BNL.

- **Use Performance Report:**

Finally, a system of periodical performance report should be prepared and analyzed after a budget is implemented. Actual results should be compared with the outcome that ought to be. Then, necessary corrective actions should be strictly implemented for any variances occurred.

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APPENDIX - I

Income Statement

For the Year July 17 to July 16

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
Sales	614,739,440	621,827,381	634,189,583	746,581,607	1,002,720,181
Cost of Sales (Shedule No. 13)	(357,349,931)	(351,080,038)	(389,258,445)	(455,134,052)	(621,893,624)
Gross Profit	**257,389,509**	**270,747,343**	**244,931,138**	**291,447,555**	**380,826,557**
Other Income	1,161,382	859,030	1,092,417	1,317,254	30,701,457
Business Expenses:					
Distribution Expenses	(19,735,971)	(16,954,763)	(21,178,947)	(25,972,087)	(34,822,854)
Administrative Expenses (Shedule No. 14)	(137,461,056)	(155,663,785)	(186,635,438)	(217,564,636)	(244,810,306)
Profit from Operation	**101,353,864**	**98,987,825**	**38,209,170**	**49,228,086**	**131,894,854**
Interest	(265,317)	(1,328,931)	(8,875,422)	(20,789,989)	(26,193,016)
Depreciation	(49,175,556)	(64,165,899)	(60,227,418)	(65,414,572)	(67,871,841)
Impairment	0	0	(37,672,142)	0	0
Amrotization	(6,601,641)	(503,470)	(531,622)	(1,030,864)	(2,570,691)
Dividend from Bottlers Nepal (Terai) Ltd.	5,492,360	0	0	83,483,872	0
Profit /(Loss) on Sales of Fixed Assets	0	2,860,982	385,302	(10,070,535)	9,972
Provision for staff Quarter	(2,540,185)	(1,792,525)	0	(1,770,300)	(1,763,464)
Provision for Bonus	(4,387,593)	(3,096,180)	0	(3,363,570)	(3,045,983)
Profit before Tax	**43,875,932**	**30,961,802**	**(68,712,132)**	**30,272,128**	**30,459,831**
Provision for Tax	(8,503,311)	(5,539,057)	0	0	0
Provision for Special Fees	(637,748)	(461,588)	0	0	0
Income Tax	0	0	(2,959,078)	(2,209,062)	(716,990)
Deferred Tax	0	0	41,363,862	(39,492,081)	(9,212,196)
Net Profit after Tax	**34,734,873**	**24,961,157**	**(30,307,348)**	**(11,429,015)**	**20,530,645**
Balance brought Forward	365,178,077	399,912,950	342,592,657	178,483,161	167,054,146
Provision for Tax in respect of Earlier Years	0	(24,332,000)	0	0	0
Depreciation Expenses for Earlier Years	0	(57,949,450)	0	0	0
Dividend Tax in respect of Dividend from Earlier Years	0	0	(1,376,840)	0	0
Profit available for Appropriation	**399,912,950**	**342,592,657**	**310,908,469**	**167,054,146**	**187,584,791**
Proprosed Dividend	0	0	(224,122,005)	0	(9,744,435)
Balance of Profit Transferred to B/S	**399,912,950**	**342,592,657**	**86,786,464**	**167,054,146**	**177,840,356**

Schedule 13: Cost of Sales

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
Opening Stocks:					
Raw Materials	79,957,968	142,772,596	81,600,664	87,259,400	47,762,161
Work-in-Process	1,575,931	1,379,482	1,074,612	863,340	1,219,212
Finished Goods	10,721,659	7,465,594	7,133,110	14,401,378	18,874,839
Production of CO_2 Gas	5,861,691	5,877,892	425,936	0	0
Purchase during the Year (net of rebate on concentrate)	347,870,245	224,047,225	369,282,382	351,268,529	541,140,109
Add: Transfer from Bottlers					
Nepal (Terai) Ltd.	0	0	0	0	0
Less: Transfer to Bottlers					
Nepal (Terai) Ltd.	(8,554,900)	(11,166,792)	(59,486,721)	(26,942,919)	(47,789,047)
Total Available	**437,432,594**	**370,375,997**	**400,029,983**	**426,849,728**	**561,207,274**
Less: Closing Stock:					
Raw Materials	142,772,596	81,600,664	87,259,400	47,762,161	58,718,366
Work-in-Process	1,379,482	1,074,612	863,340	1,219,212	2,466,301
Finished Goods	7,465,594	7,133,110	14,401,378	18,874,839	17,371,311
Stock Write Off	0	0	0	0	0
Total	**151,617,672**	**89,808,386**	**102,524,118**	**67,856,212**	**78,555,978**
Material Cost	**285,814,922**	**280,567,611**	**297,505,865**	**358,993,516**	**482,651,296**
Production Expenditure	71,535,008	70,512,428	91,752,000	96,140,535	139,242,327
Total	**357,349,930**	**351,080,039**	**389,257,865**	**455,134,051**	**621,893,623**

Schedule 14: Administrative Expenses

Particulars	2004/05	2005/06	2006/07	2007/08	2008/09
Salaries, Wages & Other Employee Cost	27,881,453	35,286,009	46,051,701	66,029,922	72,107,937
Contribution to PF, Gratuity	975,668	0	0	0	0
Rent	402,077	1,381,389	4,485,245	5,397,472	3,632,008
Repair & Maintenance	3,088,979	4,446,570	3,874,630	3,757,276	5,296,273
Security Expenses	382,095	0	0	0	0
Electricity, Fuel & Water	118,469	155,645	212,230	163,108	178,147
Training & Travelling Expenses	3,239,883	14,899,616	8,900,706	8,608,982	9,492,818
SAP Related Expenses	0	6,291,308	0	0	0
Audit Fees	219,615	219,615	220,000	220,000	220,000
Legal & Professional Fees & Expenses	648,014	1,131,161	1,251,851	1,640,001	3,232,729
Rates & Taxes	186,843	352,071	308,578	280,645	223,526
Bank Charges	307,452	287,786	334,678	346,337	225,145
Trade Discount	51,340,591	56,673,446	49,126,411	30,979,640	32,256,140
General Meeting Expenses	48,559	52,096	24,822	242,632	387,166
Insurance Premium	86,580	180,293	71,575	102,184	66,439
Communication	6,844,404	5,492,827	2,711,339	5,776,770	5,863,637
Information Service Charges	0	0	10,882,367	12,209,111	0
Printing & Stationery	714,671	1,312,883	1,616,886	1,381,211	996,071
Advertisement	3,933,150	2,789,767	3,224,720	488,387	852,800
Sales Promotion Expenses	5,955,335	4,628,452	17,966,080	22,285,256	28,487,149
Training	1,316,153	0	0	0	0
Deposite Written Off	0	0	0	2,190,175	2,797,354
Charity & Donation	124,178	139,331	88,258	312,356	199,871
Uniform	475,750	613,017	1,210,953	997,000	645,383
Rejection & Breakages	6,637,676	1,902,187	2,511,779	1,219,546	1,061,836
Vehicle Operating Expenses	1,911,602	2,316,701	2,044,689	1,626,485	1,257,336
Obsolete Stock & Fixed Assets Written Off	5,804,724	717,221	0	16,228,486	1,626,320
Product Transfer Fees	7,773,754	6,779,918	17,983,671	25,677,800	38,537,009
Management Fees	6,275,675	6,643,214	6,879,300	7,725,931	4,323,839
Special Fees	0	0	0	0	0
Miscellaneous Expenses	767,706	971,262	890,308	1,677,923	2,012,295
Bad Debt Expenses	0	0	0	0	28,831,080
Total	**137,461,056**	**155,663,785**	**182,872,777**	**217,564,636**	**244,810,308**

APPENDIX – II

1) Actual & Budgeted Sales:

Year	Budgeted Sales (X)	Actual Sales (Y)	X^2	Y^2	XY
2004/05	732,114,113	614,739,440	535,991,074,453,777,000	377,904,579,091,514,000	450,059,419,841,717,000
2005/06	714,739,440	621,827,381	510,852,467,091,514,000	386,669,291,761,319,000	444,444,554,072,607,000
2006/07	721,827,381	634,189,583	521,034,767,961,319,000	402,196,427,185,714,000	457,775,405,754,372,000
2007/08	734,189,583	746,581,607	539,034,343,785,714,000	557,384,095,910,702,000	548,132,438,718,800,000
2008/09	846,581,607	1,002,720,181	716,700,417,310,702,000	1,005,447,761,384,670,000	848,884,462,202,311,000
n =	**ΣX=**	**ΣY=**	**ΣX^2=**	**ΣY^2=**	**ΣXY=**
5	**3,749,452,124**	**3,620,058,192**	**2,823,613,070,603,030,000**	**2,729,602,155,333,920,000**	**2,749,296,280,589,810,000**

1) Mean $(\overline{X}) = \frac{\sum X}{n}$

– Budgeted Sales $(\overline{X}) = \frac{3,749,452,124}{5} = \text{Rs. } 749,890,425$

– Actual Sales $(\overline{Y}) = \frac{3,620,058,192}{5} = \text{Rs.}724,011,638$

2) Stanadard Deviation $(\sigma) = \sqrt{\frac{1}{n-1}\left(\sum X^2 - \frac{(\sum X)^2}{n}\right)}$

– Budgeted Sales $= \sqrt{\frac{1}{5-1}\left(2,823,613,070,603,030,000 - \frac{3,749,452,124^2}{5}\right)} = 54,623,311$

– Actual Sales $= \sqrt{\frac{1}{5-1}\left(2,729,602,155,333,920,000 - \frac{3,620,058,192^2}{5}\right)} = 164,801,314$

3) Coefficient of Variation $= \frac{\text{Standard Deviation } (\sigma)}{\text{Mean } (\overline{X})}$

- Budgeted Sales $= \frac{54,623,311}{749,890,425} = 0.0728 = 7.28\%$

- Actual Sales $= \frac{164,801,314}{724,011,638} = 0.2276 = 22.76\%$

4) Correlation Coefficient (r) $= \frac{n \times \sum XY - \sum X \times \sum Y}{\sqrt{\left[n \times \sum X^2 - (\sum X)^2\right]\left[n \times \sum Y^2 - (\sum Y)^2\right]}}$

$$= \frac{5 \times 2,749,296,280,589,810,000 - 3,749,452,124 \times 3,620,058,192}{\sqrt{\left[5 \times 2,823,613,070,603,030,000 - 3,749,452,124^2\right]\left[5 \times 2,729,602,155,333,920,000 - 3,620,058,192^2\right]}}$$

$= 0.962267558$

5) Probable Error (P.E) $= 0.6745 \times \frac{1 - r^2}{\sqrt{n}} = 0.6745 \times \frac{1 - (0.962267558)^2}{\sqrt{5}} = 0.022334184$

2) Actual & Budgeted Production:

Year	Budgeted Production (X)	Actual Production (Y)	X^2	Y^2	XY
2004/05	412,659,705	354,093,866	170,288,032,130,687,000	125,382,465,938,826,000	146,120,270,285,870,000
2005/06	416,165,434	350,747,555	173,193,668,456,408,000	123,023,847,338,478,000	145,969,008,451,014,000
2006/07	409,419,080	396,526,713	167,623,983,068,046,000	157,233,434,122,584,000	162,345,602,031,884,000
2007/08	446,557,873	459,607,513	199,413,933,938,284,000	211,239,066,006,045,000	205,241,353,420,100,000
2008/09	510,899,897	620,390,096	261,018,704,754,611,000	384,883,871,214,889,000	316,957,236,146,220,000
n =	**ΣX=**	**ΣY=**	**ΣX^2=**	**ΣY^2=**	**ΣXY=**
5	**2,195,701,989**	**2,181,365,743**	**971,538,322,348,037,000**	**1,001,762,684,620,820,000**	**976,633,470,335,087,000**

1) Mean $(\overline{X}) = \frac{\sum X}{n}$

– Budgeted Sales $(\overline{X}) = \frac{2,195,701,989}{5} = \text{Rs. } 439,140,398$

– Actual Sales $(\overline{Y}) = \frac{2,181,365,743}{5} = \text{Rs.}436,273,149$

2) Stanadard Deviation (σ) $= \sqrt{\frac{1}{n-1}\left(\sum X^2 - \frac{(\sum X)^2}{n}\right)}$

– Budgeted Sales $= \sqrt{\frac{1}{5-1}\left(971{,}538{,}322{,}348{,}037{,}000 - \frac{2{,}195{,}701{,}989^2}{5}\right)} = 42{,}769{,}374$

– Actual Sales $= \sqrt{\frac{1}{5-1}\left(1{,}001{,}762{,}684{,}620{,}820{,}000 - \frac{2{,}181{,}365{,}743^2}{5}\right)} = 111{,}905{,}522$

3) Coefficient of Variation $= \frac{\text{Standard Deviation } (\sigma)}{\text{Mean } (\overline{X})}$

- Budgeted Sales $= \frac{42{,}769{,}374}{439{,}140{,}398} = 0.0974 = 9.74\%$

- Actual Sales $= \frac{111{,}905{,}522}{436{,}273{,}149} = 0.2565 = 25.65\%$

4) Correlation Coefficient (r) $= \frac{n \times \sum XY - \sum X \times \sum Y}{\sqrt{\left[n \times \sum X^2 - (\sum X)^2\right]\left[n \times \sum Y^2 - (\sum Y)^2\right]}}$

$$= \frac{5 \times 976{,}633{,}470{,}335{,}087{,}000 - 2{,}195{,}701{,}989 \times 2{,}181{,}365{,}743}{\sqrt{\left[5 \times 971{,}538{,}322{,}348{,}037{,}000 - 2{,}195{,}701{,}989^2\right]\left[5 \times 1{,}001{,}762{,}684{,}620{,}820{,}000 - 2{,}181{,}365{,}743^2\right]}}$$

$= 0.9771806$

5) Probable Error (P.E) $= 0.6745 \times \frac{1 - r^2}{\sqrt{n}} = 0.6745 \times \frac{1 - (0.9771806)^2}{\sqrt{5}} = 0.0136096668$

3) Net Income & Break-even Sales:

Year	Net Profit after Tax (X)	BEP Sales (Y)	X^2	Y^2
2004/05	34,734,873	512,482,193	1,206,511,402,326,130	262,637,998,142,089,000
2005/06	24,961,157	551,231,025	623,059,358,778,649	303,855,642,922,551,000
2006/07	(30,307,348)	793,967,355	918,535,342,793,104	630,384,160,805,696,000
2007/08	(11,429,014)	679,800,444	130,622,361,012,196	462,128,643,662,597,000
2008/09	20,530,644	936,815,424	421,507,343,054,736	877,623,138,644,300,000
n =	**ΣX=**	**ΣY=**	**ΣX^2=**	**ΣY^2=**
5	**38,490,312**	**3,474,296,441**	**3,300,235,807,964,810**	**2,536,629,584,177,230,000**

1) Mean $(\overline{X}) = \dfrac{\sum X}{n}$

– Net Profit $(\overline{X}) = \dfrac{38,490,312}{5} = \text{Rs. } 7,698,062$

– BEP Sales $(\overline{Y}) = \dfrac{3,474,296,441}{5} = \text{Rs.}694,859,288$

2) Stanadard Deviation $(\sigma) = \sqrt{\dfrac{1}{n-1}\left(\sum X^2 - \dfrac{(\sum X)^2}{n}\right)}$

– Net Profit $= \sqrt{\dfrac{1}{5-1}\left(3,300,235,807,964,810 - \dfrac{38,490,312^2}{5}\right)} = 27,404,083$

– BEP Sales $= \sqrt{\dfrac{1}{5-1}\left(2,536,629,584,177,230,000 - \dfrac{3,474,296,441^2}{5}\right)} = 174,987,451$

3) Coefficient of Variation $= \dfrac{\text{Standard Deviation } (\sigma)}{\text{Mean } (\overline{X})}$

– Net Profit $(\overline{X}) = \dfrac{27,404,083}{7,698,062} = 3.5599 = 355.99\%$

– BEP Sales $(\overline{Y}) = \dfrac{174,987,451}{694,859,288} = 0.2518 = 25.18\%$

APPENDIX – III

Calcu lation of $\sum X_1$, $\sum X_2$, $\sum X_3$, $\sum X_1X_2$, $\sum X_2X_3$, $\sum X_3X_1$, $\sum X_1^2$, $\sum X_2^2$ & $\sum X_3^2$								
X_1	X_2	X_3	X_1X_2	X_2X_3	X_3X_1	X_1^2	X_2^2	X_3^2
614,739,440	1	9,888,485	614,739,440	9,888,485	6,078,841,731,348,400	377,904,579,091,514,000	1	97,782,135,595,225
621,827,381	2	7,418,219	1,243,654,762	14,836,438	4,612,851,692,454,440	386,669,291,761,319,000	4	55,029,973,131,961
634,189,583	3	21,190,800	1,902,568,749	63,572,400	13,438,984,615,436,400	402,196,427,185,714,000	9	449,050,004,640,000
746,581,607	4	22,773,643	2,986,326,428	91,094,572	17,002,382,988,184,300	557,384,095,910,702,000	16	518,638,815,491,449
1,002,720,181	5	29,339,949	5,013,600,905	146,699,745	29,419,758,971,810,800	1,005,447,761,384,670,000	25	860,832,607,322,601
$\sum X_1$ =	$\sum X_2$ =	$\sum X_3$ =	$\sum X_1X_2$ =	$\sum X_2X_3$ =	$\sum X_3X_1$ =	$\sum X_1^2$ =	$\sum X_2^2$ =	$\sum X_3^2$ =
3,620,058,192	**15**	**90,611,096**	**11,760,890,284**	**326,091,640**	**70,552,819,999,234,300**	**2,729,602,155,333,920,000**	**55**	**1,981,333,536,181,240**

APPENDIX – IV

Trend Analysis of Advertisement and Promotional Expenses:

Let, X & Y be the No. of Time Periods & Advertisement & Promotional Expenses of BNL respectively. Then, the forecasting regression equation of Y on X is,

$Y = a + bX$

Year	No. of Time Periods (X)	Advertisement & Promotional Expenses (Y)	X^2	Y^2	XY
2004/05	1	9,888,485	1	97,782,135,595,225	9888485
2005/06	2	7,418,219	4	55,029,973,131,961	14836438
2006/07	3	21,190,800	9	449,050,004,640,000	63572400
2007/08	4	22,773,643	16	518,638,815,491,449	91094572
2008/09	5	29,339,949	25	860,832,607,322,601	146699745
n =	**ΣX=**	**ΣY=**	**ΣX^2=**	**ΣY^2=**	**ΣXY=**
5	**15**	**90,611,096**	**55**	**1,981,333,536,181,240**	**326,091,640**

$$\therefore \quad b = \frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - (\sum X)^2} = \frac{5 \times 326,091,640 - 15 \times 90,611,096}{5 \times 55 - 15^2} = 5,425,835.2$$

$$\therefore \quad a = \frac{\sum Y}{n} - b\frac{\sum X}{n} = \frac{90,611,096}{5} - 5,425,835.2 \times \frac{15}{5} = 1,844,713.6$$

Forecasting of Advertisement & Promotional Expenses

Fiscal Year	**Y = 1,844,713.6 + 5,425,835.2X**	Advertisement & Promotional Expenses (Y)
2009/10	Y_6 = 451,239,434 + 82,549,248 × 6	34,399,725
2010/11	Y_7 = 451,239,434 + 82,549,248 × 7	39,825,560
2011/12	Y_8 = 451,239,434 + 82,549,248 × 8	45,251,395
2012/13	Y_9 = 451,239,434 + 82,549,248 × 9	50,677,230
2013/14	Y_{10} = 451,239,434 + 82,549,248 × 10	56,103,066

APPENDIX – V

Calculation of $\sum X_1$, $\sum X_2$, $\sum X_3$, $\sum X_1X_2$, $\sum X_2X_3$, $\sum X_3X_1$, $\sum X_1^2$, $\sum X_2^2$ & $\sum X_3^2$

X_1 (in '000')	X_2 (in '000')	X_3 (in '000')	X_1X_2	X_2X_3	X_3X_1	X_1^2	X_2^2	X_3^2
43,876	614,739	569,989	26,972,288,364	350,394,467,871	25,008,837,364	1,925,103,376	377,904,038,121	324,887,460,121
30,962	621,827	588,944	19,253,007,574	366,221,280,688	18,234,884,128	958,645,444	386,668,817,929	346,855,035,136
(68,712)	634,190	703,080	(43,576,463,280)	445,886,305,200	(48,310,032,960)	4,721,338,944	402,196,956,100	494,321,486,400
30,272	746,582	784,597	22,600,530,304	585,765,997,454	23,751,320,384	916,393,984	557,384,682,724	615,592,452,409
30,460	1,002,720	997,317	30,542,851,200	1,000,029,702,240	30,378,275,820	927,811,600	1,005,447,398,400	994,641,198,489
$\sum X_1$ =	$\sum X_2$ =	$\sum X_3$ =	$\sum X_1X_2$ =	$\sum X_2X_3$ =	$\sum X_3X_1$ =	$\sum X_1^2$ =	$\sum X_2^2$ =	$\sum X_3^2$ =
66,858	**3,620,058**	**3,643,927**	**55,792,214,162**	**2,748,297,753,453**	**49,063,284,736**	**9,449,293,348**	**2,729,601,893,274**	**2,776,297,632,555**